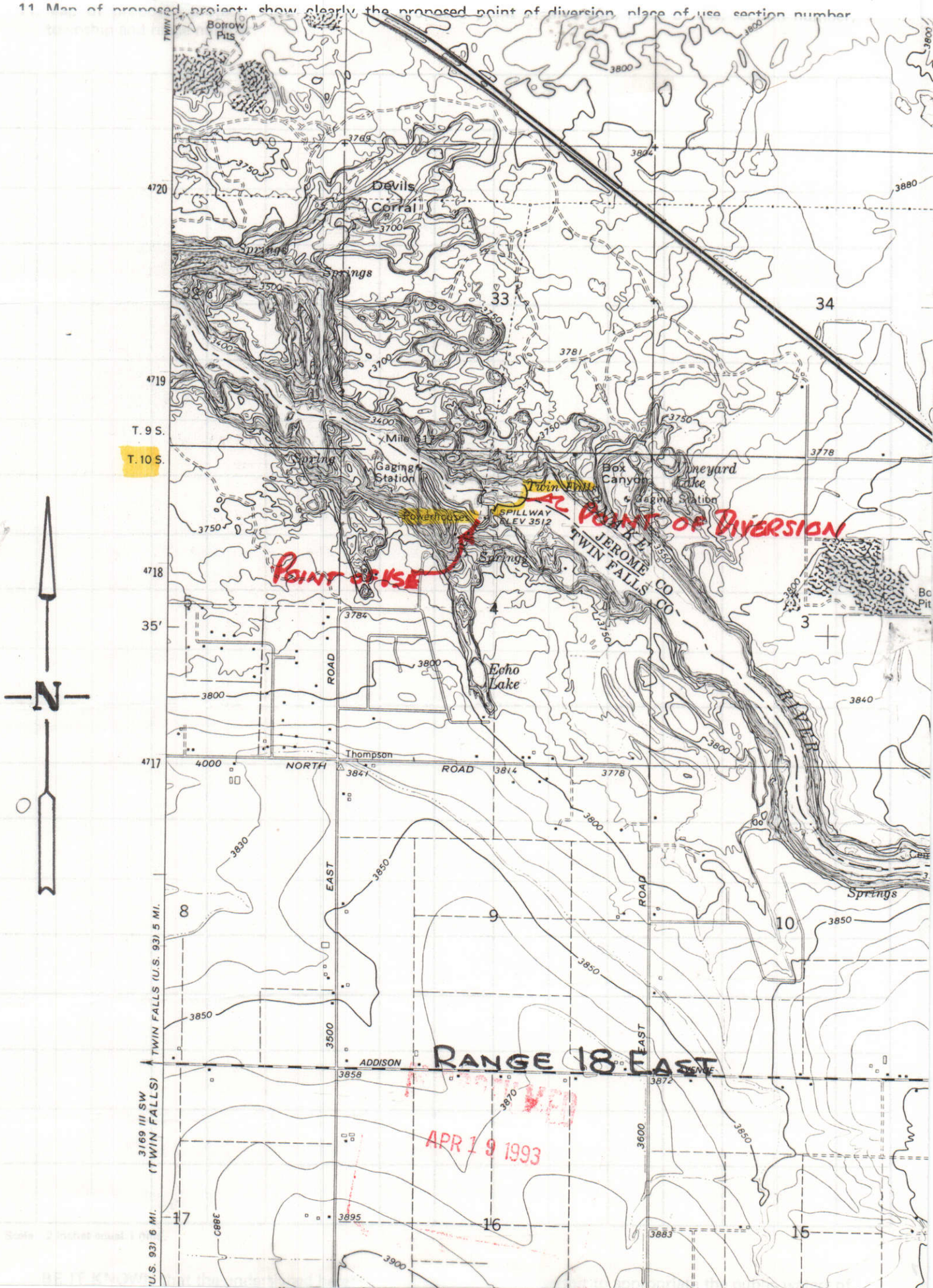
11. Map of proposed project: show clearly the proposed point of diversion, place of use, section number



the State of Idaho as herein set forth.

RECEIVED
APR 19 1993

RECEIVED
APR 19 1993

C. E. Bissell

C E Bissell (Applicant)
Vice President - Power Plant Construction
and Operations

Dnt → 02-2056 (T.F. power site)
02-2036 (Shoshone Falls power)
02-7375 (app)

P-18-001

UNITED STATES OF AMERICA

FEDERAL ENERGY REGULATORY COMMISSION

Notice of Application Filed with the Commission
(April 26, 1985)

Take notice that the following hydroelectric application has been filed with the Federal Energy Regulatory Commission and is available for public inspection:

a. Type of Application: Revised Relicense Application

b. Project No.: 18-001

c. Date Filed: February 19, 1985

d. Applicant: Idaho Power Company

e. Name of Project: Twin Falls Hydroelectric

f. Location: On the Snake River in Jerome and Twin Falls Counties, Idaho, partially on lands of the United States administered by the Bureau of Land Management.

g. Filed Pursuant to: Federal Power Act [16 U.S.C. §§791(a) - 825(r)]

h. Contact Person: Lee Sherline, Leighton & Sherline, Suite 803, 1701 K Street, NW, Washington, DC 20006

i. Comment Date: ~~JUN 10 1985~~ July 12, 1985 per letter from IPCO dated May 13, 1985

j. Expiration of Initial License: June 10, 1984

k. Description of Project: The project proposed for relicensing would consist of the facilities currently licensed as Project No. 18, including: (1) the Twin Falls dam, which has three sections, a concrete arch dam across the north falls with a 474-foot-long overflow crest at elevation 3508 feet, 3511.4 feet with flashboards, a non-overflow concrete gravity dam across the south falls with a 203-foot-long crest at elevation 3520 feet, and a concrete dike across the island between the north and south falls in two sections, one 108 feet long with the crest at elevation 3516 feet and the other 207 feet long with the crest at elevation 3509 feet, 3512 feet with flashboards; (2) the Twin Falls reservoir, which has a storage capacity of about 1000 acre-feet at normal pool elevation 3511.4 feet; (3) a gated intake structure in the non-overflow gravity section; (4) a 10-foot-diameter, 136-foot-long inclined penstock; (5) a 40-foot-long, 37-foot-wide concrete powerhouse containing a generating unit with a rated capacity of 9 MW and an average annual energy output of 65.8 GWh; and (6) a 1-mile-long, 138 kV transmission line connecting to the Applicant's distribution system. The existing project will be subject to Federal takeover upon expiration of the initial license under Sections 14 and 15 of the Federal Power Act. As of July 1, 1983, the Applicant's estimated net investment in the project is $1,074,017 and estimated severance damages are $126,079,341.

l. This notice also consists of the following standard paragraphs: A3, A9, B, and C.

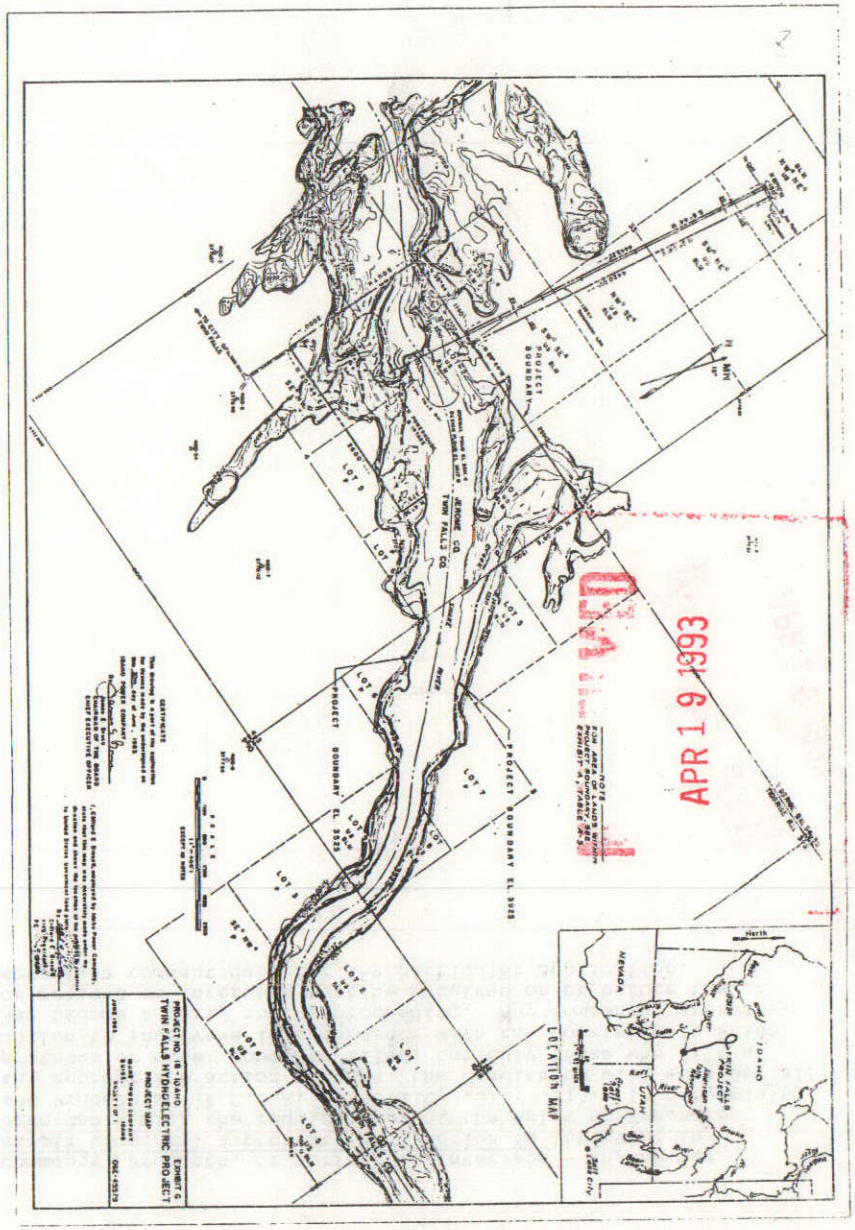
RECEIVED
MAY 3 1985
Department of Water Resources

RECEIVED
APR 19 1993

DC-A-4

C. Filing and Service of Responsive Documents - Any filings must bear in all capital letters the title "COMMENTS", "NOTICE OF INTENT TO FILE COMPETING APPLICATION", "COMPETING APPLICATION", "PROTEST" or "MOTION TO INTERVENE", as applicable, and the Project Number of the particular application to which the filing is in response. Any of the above named documents must be filed by providing the original and the number of copies required by the Commission's regulations to: Kenneth F. Plumb, Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N.E., Washington, D.C. 20426. An additional copy must be sent to: Fred E. Springer, Deputy Director, Project Management, Division of Hydropower Licensing, Federal Energy Regulatory Commission, Room 208 RB at the above address. A copy of any notice of intent, competing application or motion to intervene must also be served upon each representative of the Applicant specified in the particular application.

Kenneth F. Plumb
Secretary





TWIN FALLS RELICENSE

FERC Project No. 18

Consultation Packet

Idaho Power

Dec. 1982

APR 1 9 1993

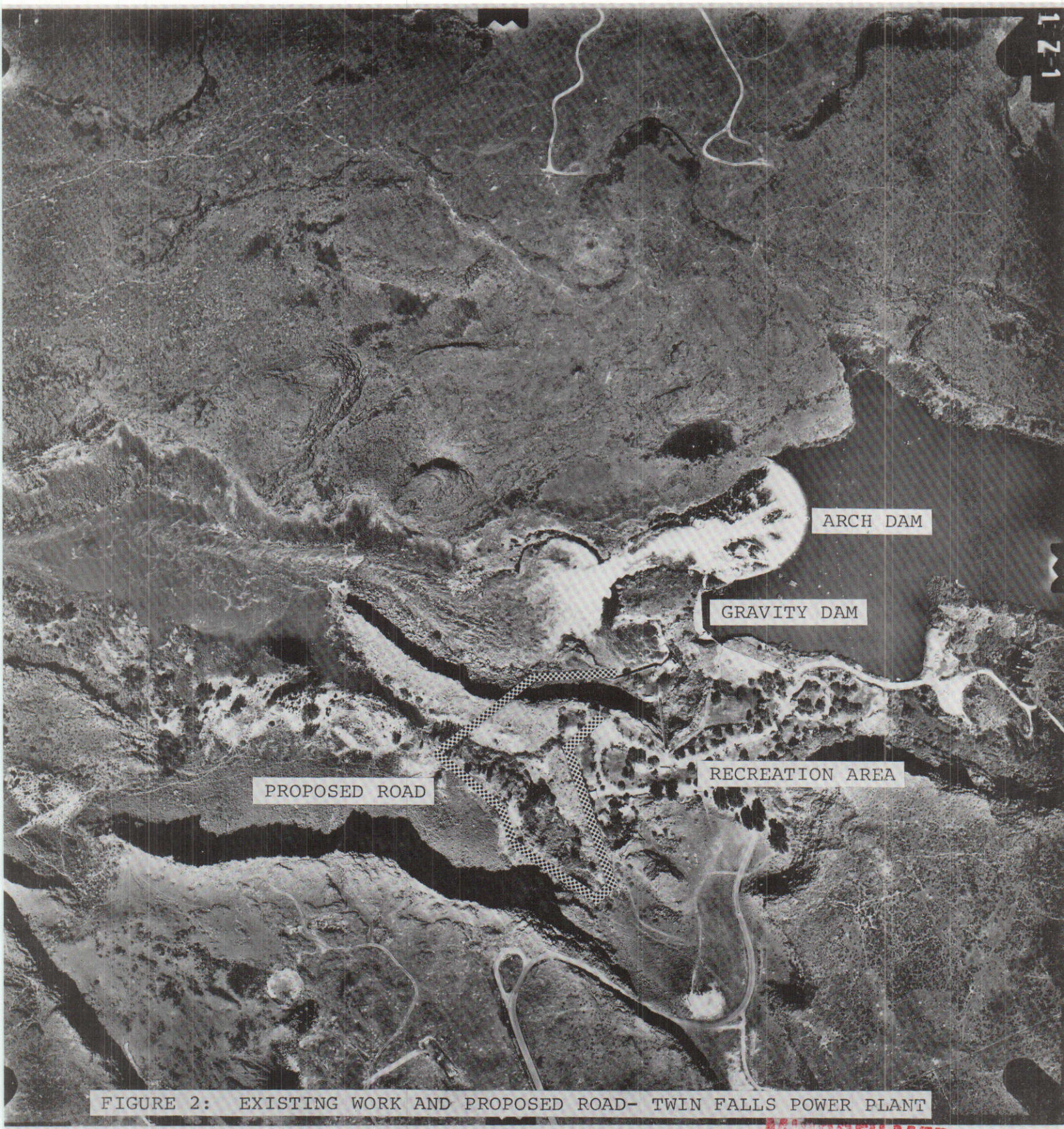


FIGURE 2: EXISTING WORK AND PROPOSED ROAD- TWIN FALLS POWER PLANT

RECEIVED
APR 19 1993

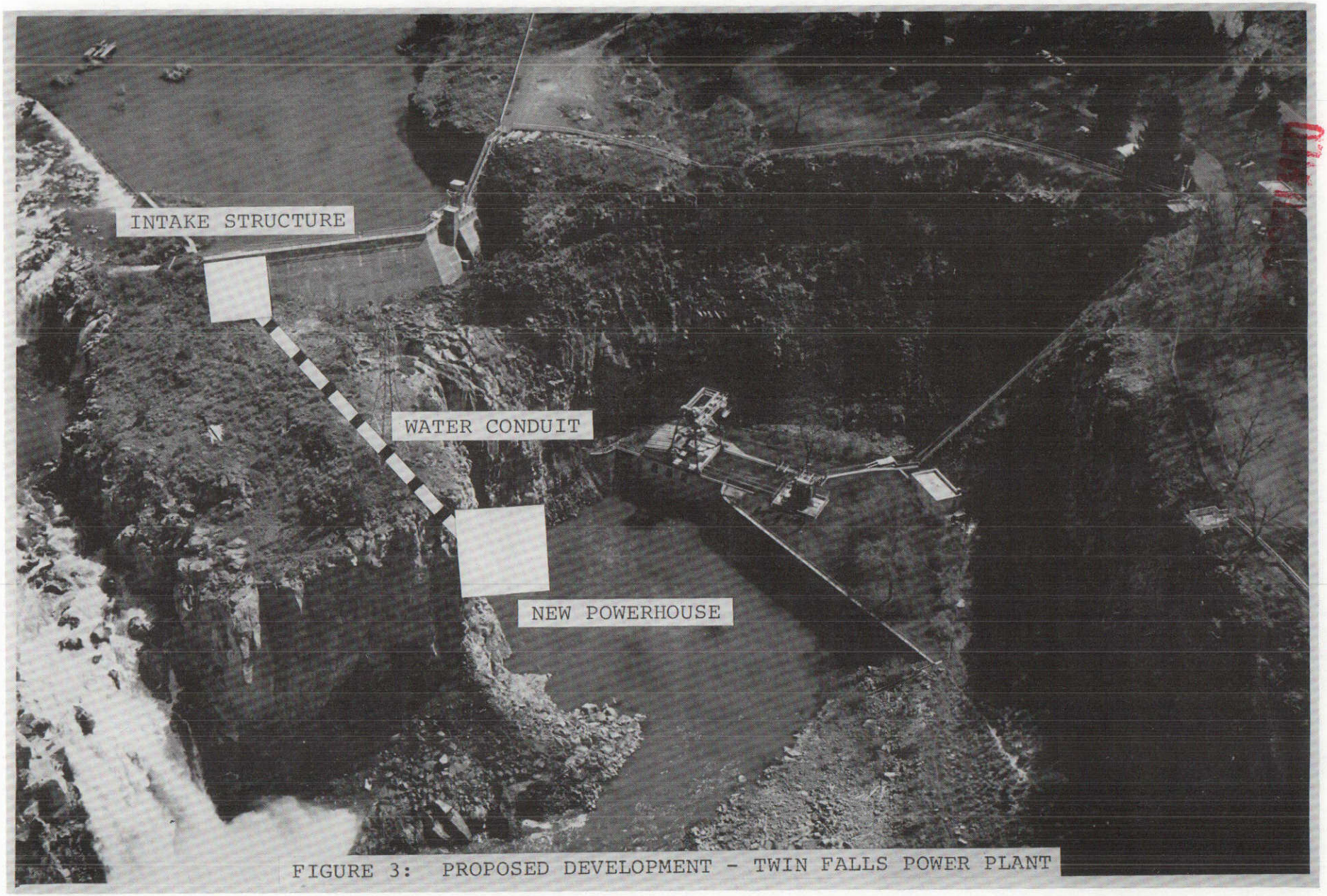
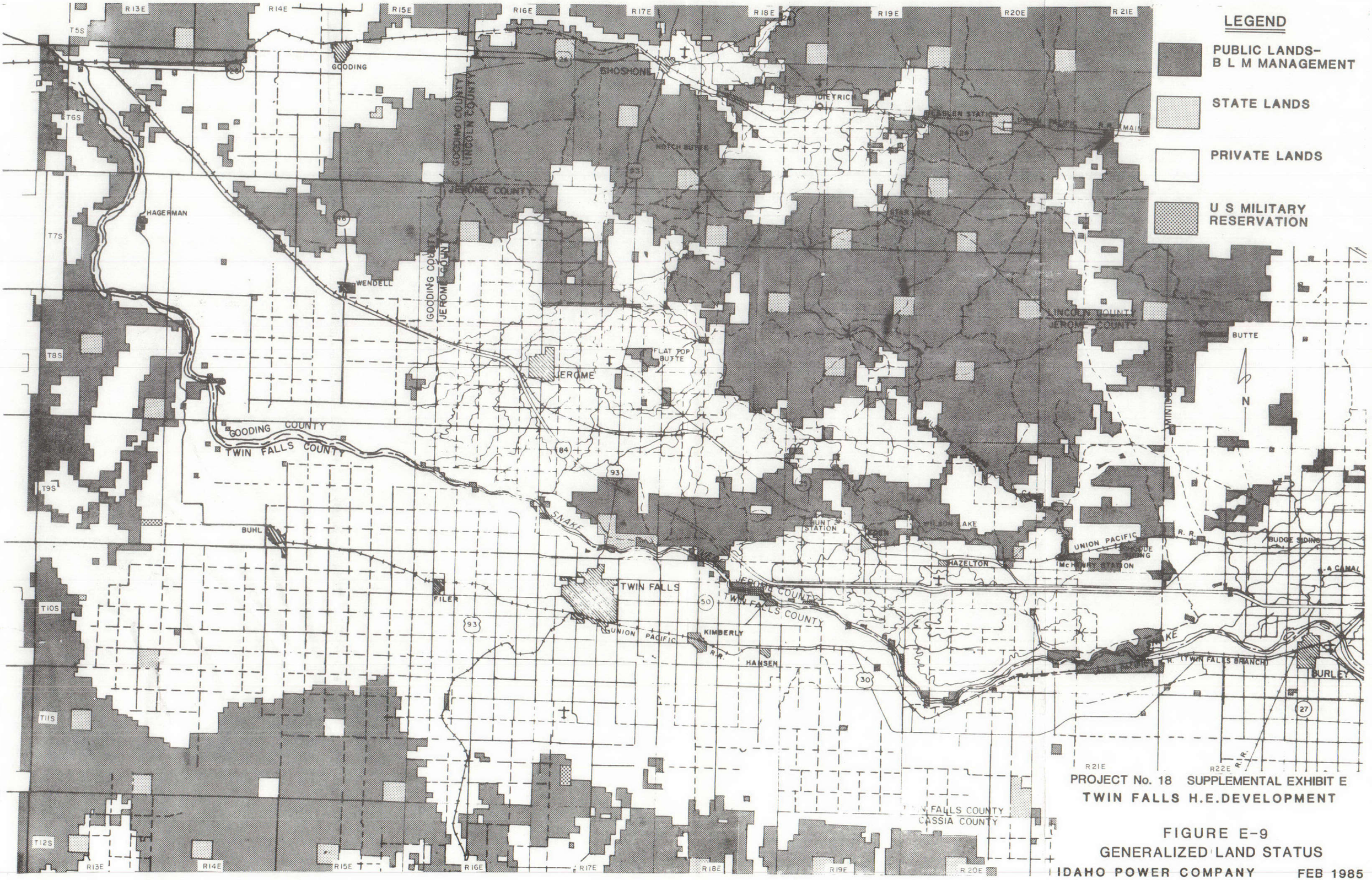


FIGURE 3: PROPOSED DEVELOPMENT - TWIN FALLS POWER PLANT

APR 19 1993



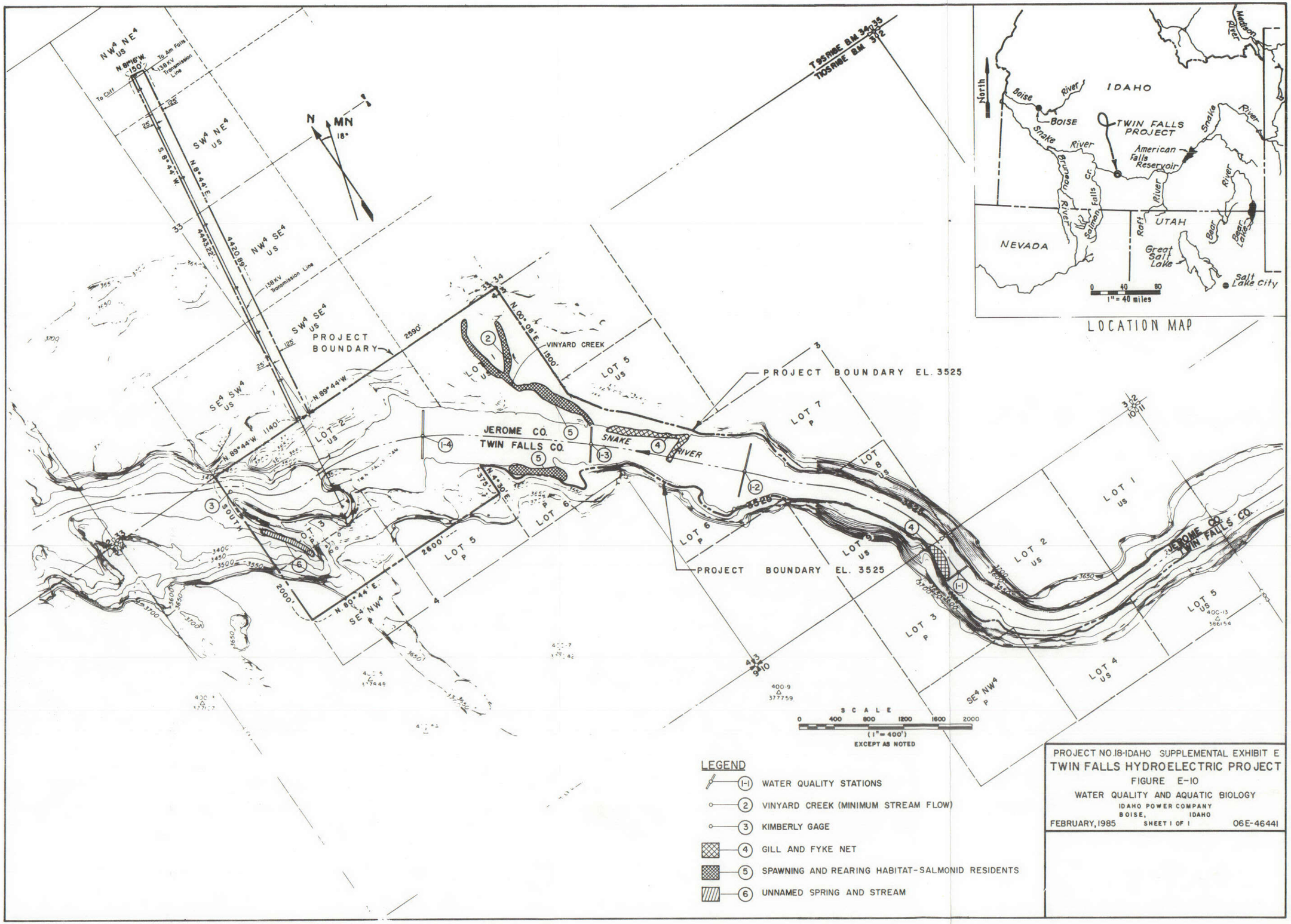
PROJECT No. 18 SUPPLEMENTAL EXHIBIT E

TWIN FALLS H.E.DEVELOPMENT

FIGURE E-9

GENERALIZED LAND STATUS

IDAHO POWER COMPANY FEB 1985



PROJECT NO.18-IDAHO SUPPLEMENTAL EXHIBIT E

TWIN FALLS HYDROELECTRIC PROJECT

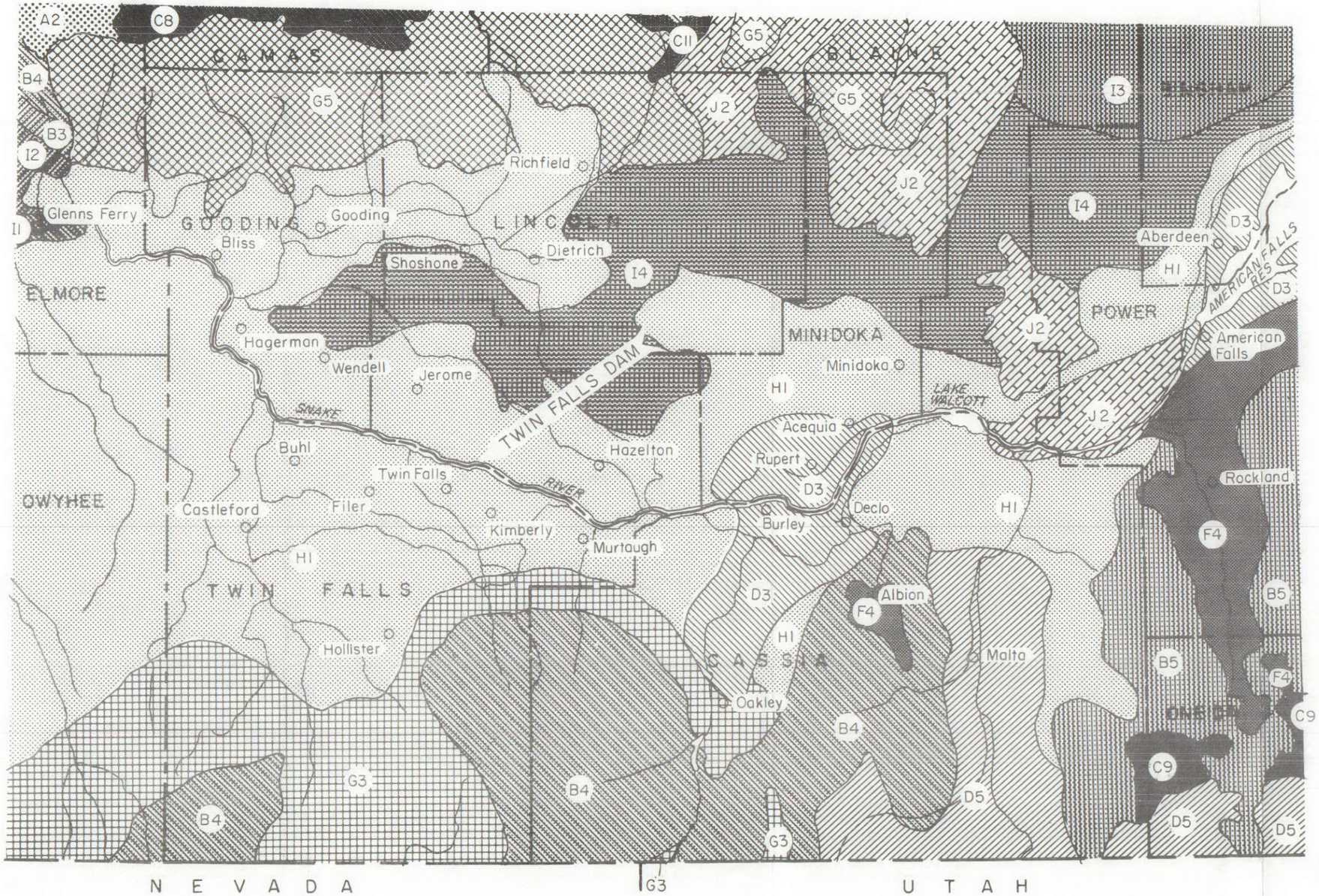
FIGURE E-10

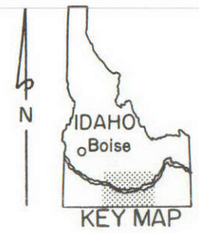
WATER QUALITY AND AQUATIC BIOLOGY

IDAHO POWER COMPANY

BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-4644I





LEGEND

A. Stony medium to coarse textured, light and dark colored soils, moderately steep and steep mountainous - dominantly forested (Inceptisols-Alfisols-Mollisols-Entisols)

A2

B. Medium and moderately coarse textured dark colored soils, steep and moderately steep, mountainous-grassland, forest (Mollisols)

B3 B4 B5

C. Moderately coarse to moderately fine textured light and dark colored soils that are nearly level to sloping, and formed in alluvium, lake sediments, and glacial outwash-grassland, forest (Entisols-Inseptisols-Mollisols-Alfisols-Histosols)

C8 C9 C11

D. Moderately coarse to moderately fine textured, light colored, nearly level to sloping soils formed in alluvium and lake sediments-grassland, sagebrush (Aridisols-Entisols-Mollisols)

D3 D5

F. Deep, medium textured, dark colored sloping to steep soils formed in wind-laid silts - dominantly grassland (Mollisols)

F4

G. Medium and gravelly medium textured, dark colored soils that are predominantly moderately deep and shallow over bedrock-grassland, shrubs (Mollisols)

G3 G5

H. Predominantly medium textured, deep and moderately deep light colored soils formed in wind-laid silts, undulating - dominantly grassland, shrubs (Aridisols)

H1

I. Medium and stony medium textured light colored soils that are mostly shallow and moderately deep over bedrock and nearly level and undulating - grassland, shrubs (Aridisols)

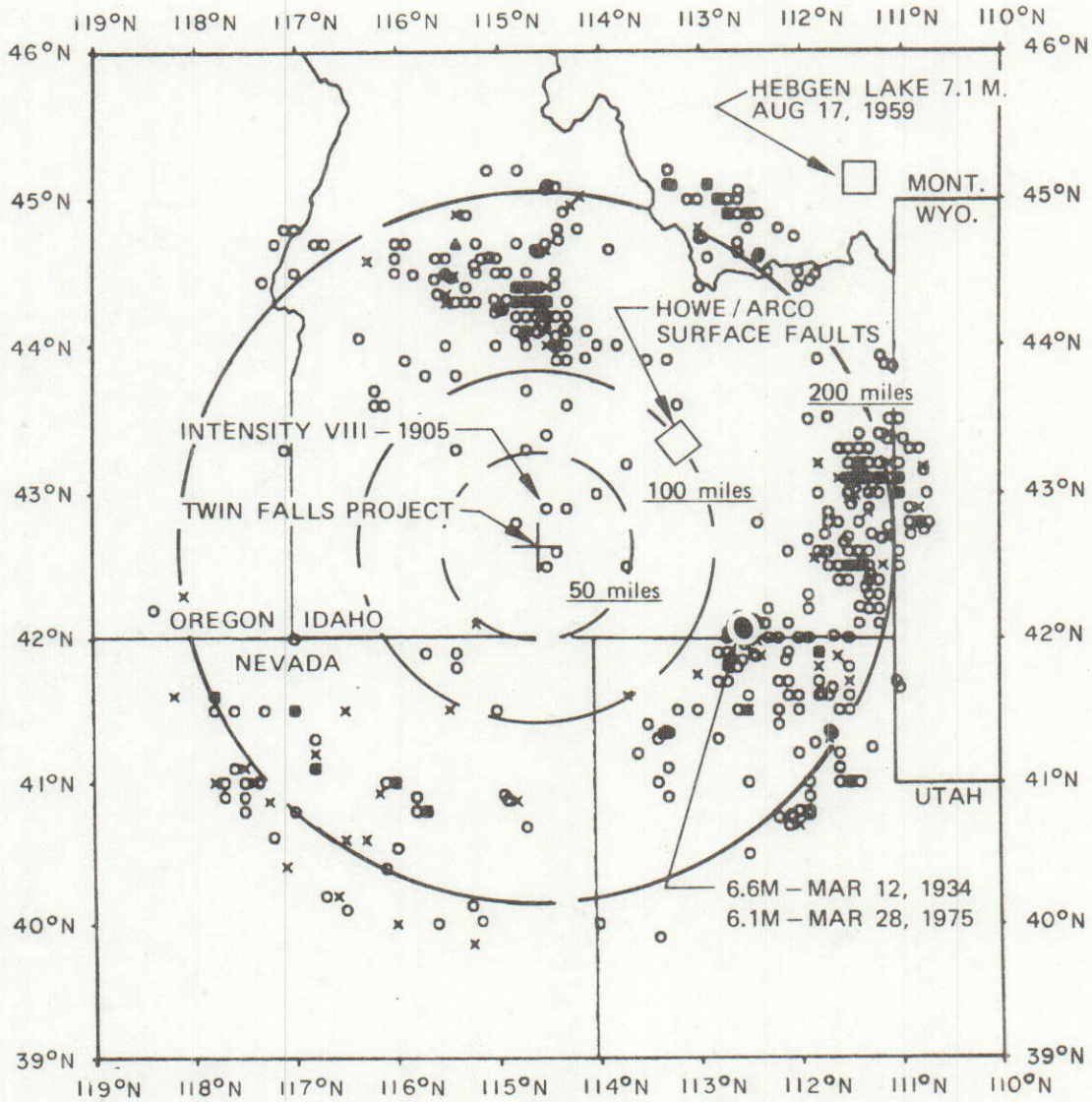
I1 I3 I2 I4

J. Rock outcrop and shallow medium and moderately coarse textured, dark colored soils

J2

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-3
GENERAL SOIL MAP
IDAHO POWER COMPANY FEB 1985



NGSDC/EDIS/NOAA BOULDER, COLORADO
783 EARTHQUAKES PLOTTED
82/05/04. 16.05.00.

MAGNITUDE

0	0.00 M 3.99
X	3.99 M 5.99
Δ	5.99 M 7.00

N

0 100 200
SCALE IN MILES

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E. DEVELOPMENT

FIGURE E-4
REGIONAL SEISMICITY PLAN

LEGEND

- GRASS, MEADOW, SAGE and BRUSH
- RANGELAND-SAGE and BRUSH
- RANGELAND-GRASS and MEADOW
- CROPLAND
- STATE HIGHWAYS
- I-84
- RAILROAD

T5S R13E R14E R15E R16E R17E R18E R19E R20E R21E

T6S

T7S

T8S

T9S

T10S

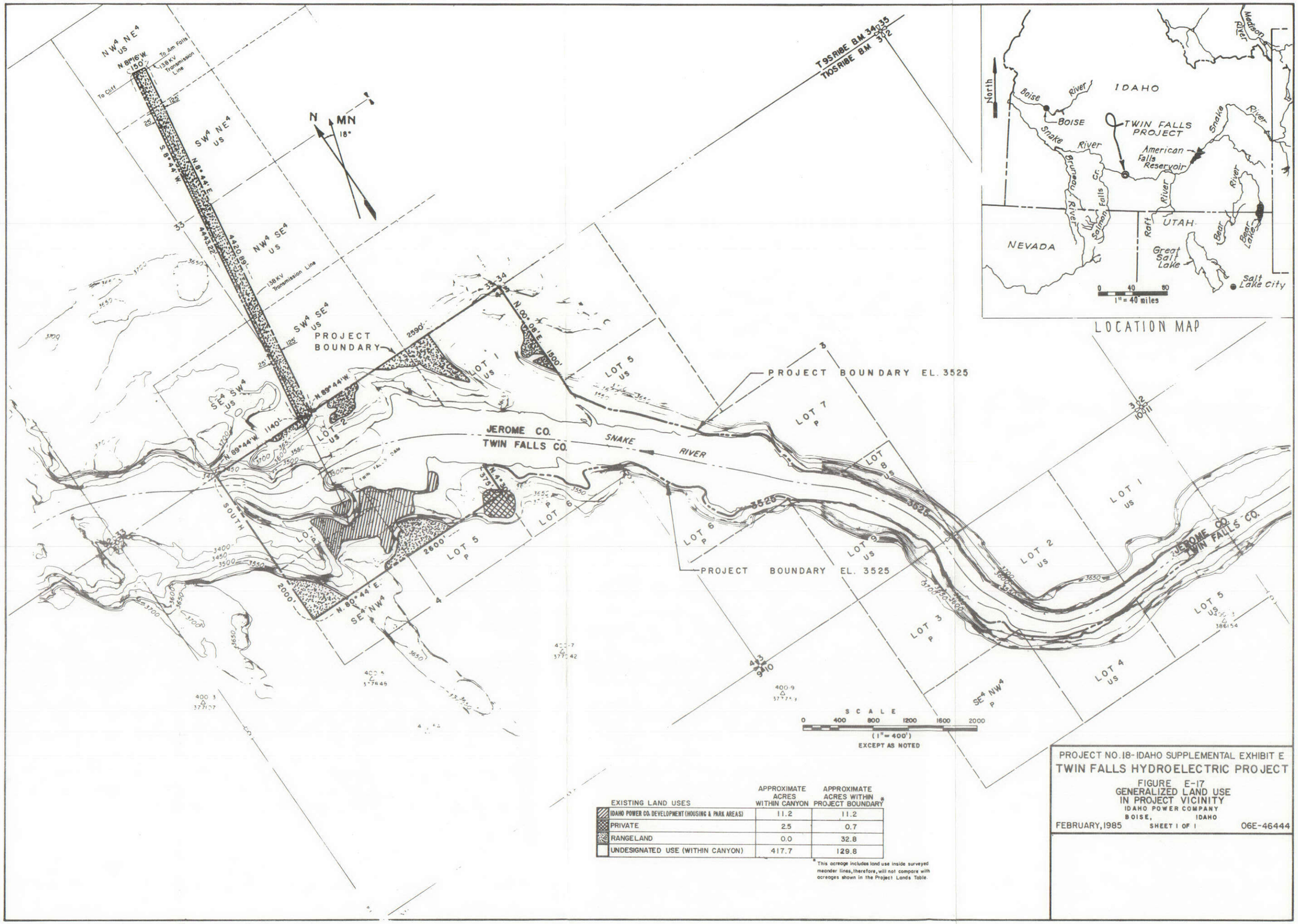
R12S

GOODING COUNTY
LINCOLN COUNTY
JEROME COUNTY
MINIDOKA COUNTY
TWIN FALLS COUNTY
CASSIA COUNTY

GOODING
SHOSHONE
DIETRICH
BEBSLEN STATION
UNION PACIFIC R.R.
NOTCH BUTTE
HAGERMAN
WENDELL
STAR LAKE
JEROME
FLAT TOP BUTTE
KIMAMA BUTTE
MILNER GOODING CANAL
BUHL
HUNT STATION
EDEN
WILSON LAKE
SCHODDE SIDING
HAZELTON
McHENRY STATION
BUDGE SIDING
TWIN FALLS
SNAKE RIVER
FILER
KIMBERLY
HANSEN
AIRPORT
BURLEY

N

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E. DEVELOPMENT
FIGURE E-7
GENERALIZED LAND USE
PROJECT VICINITY
IDAHO POWER COMPANY FEB 1985



LOCATION MAP

EXISTING LAND USES	APPROXIMATE ACRES WITHIN CANYON	APPROXIMATE ACRES WITHIN PROJECT BOUNDARY*
IDAHO POWER CO. DEVELOPMENT (HOUSING & PARK AREAS)	11.2	11.2
PRIVATE	2.5	0.7
RANGELAND	0.0	32.8
UNDESIGNATED USE (WITHIN CANYON)	417.7	129.8

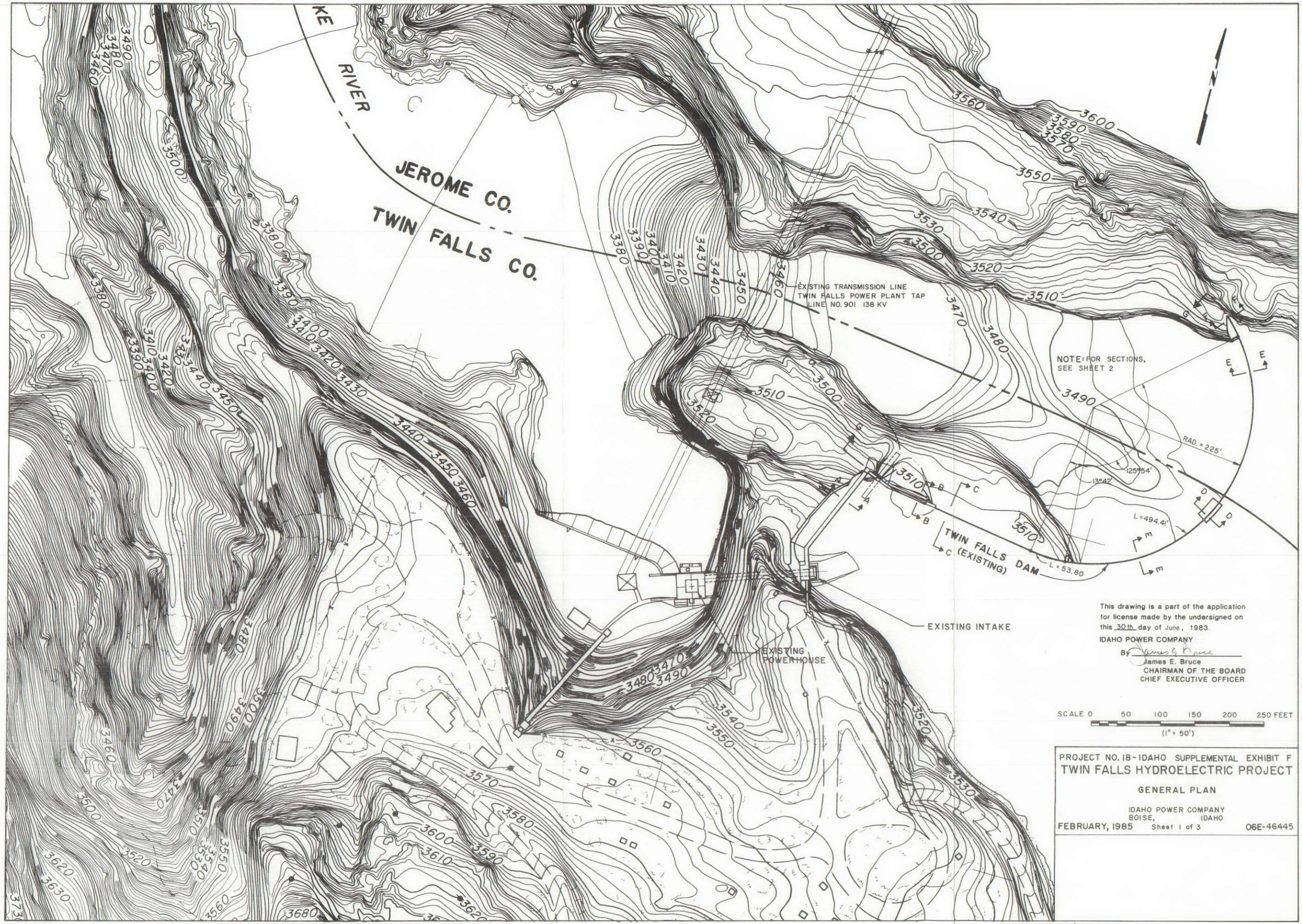
*This acreage includes land use inside surveyed meander lines, therefore, will not compare with acreages shown in the Project Lands Table.

PROJECT NO. 18- IDAHO SUPPLEMENTAL EXHIBIT E

TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-17
GENERALIZED LAND USE
IN PROJECT VICINITY
IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46444



This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983.

IDAHO POWER COMPANY

By James E. Bruce

James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

PROJECT NO. 18 - IDAHO SUPPLEMENTAL EXHIBIT F

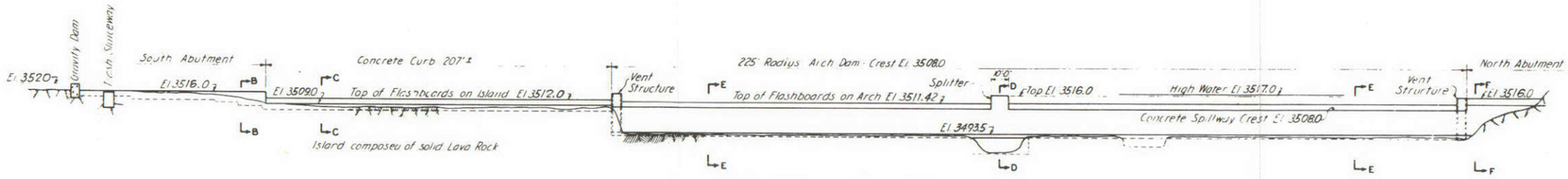
TWIN FALLS HYDROELECTRIC PROJECT

GENERAL PLAN

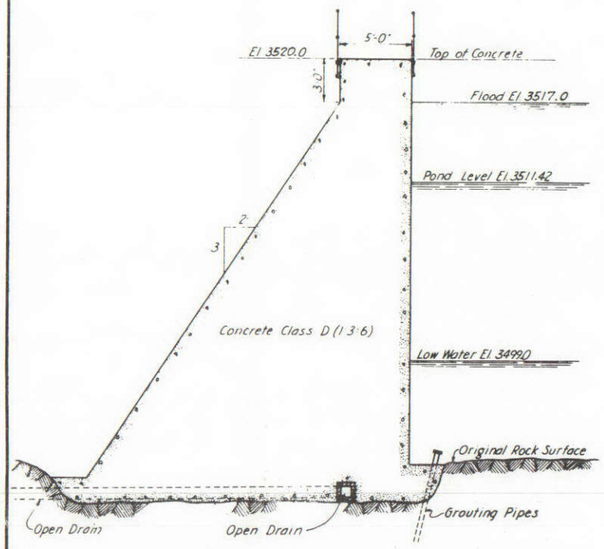
IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 Sheet 1 of 3 06E-46445

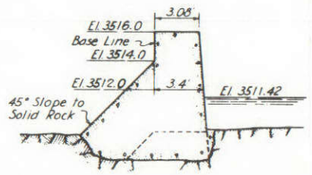
FERC Nº 18-



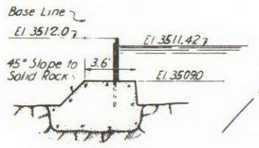
DEVELOPED PROFILE G-G OF DAM
(Looking Downstream)
Scale 1"=30'-0"



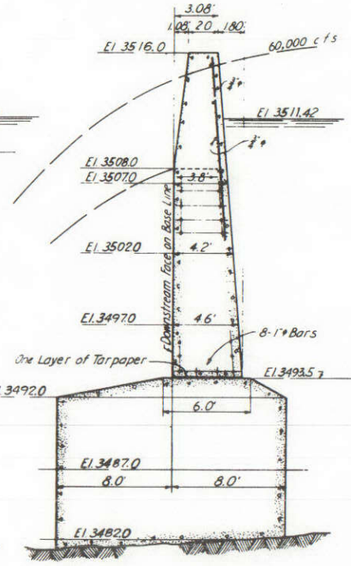
SECTION A-A
TYPICAL SECTION OF SOUTH CHANNEL DAM



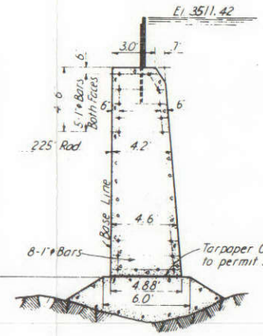
SECTION B-B



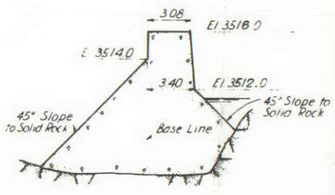
SECTION C-C



SECTION D-D



SECTION E-E

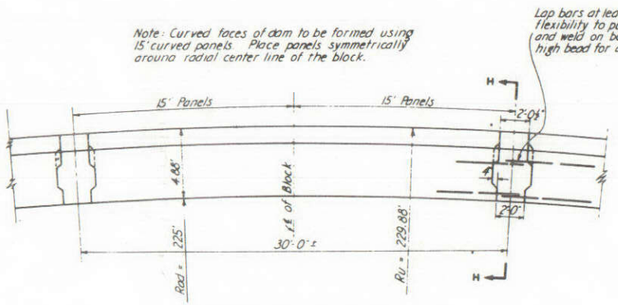


SECTION F-F

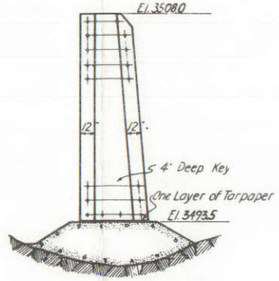
Scale of Sections - $\frac{1}{8}$"=1'-0"

Notes:

1. All elevations refer to new project datum. Elevations have been adjusted downward by 8.0' from original license project drawings. (See Exhibit A, attachment A-1)
2. Dam sections refer to exhibit F, sheet 1.



PLAN OF CONSTRUCTION BLOCKS
Scale: $\frac{1}{8}$"=1'-0"



ELEVATION H-H

Elev.	Dimensions				Normal Stresses			
					Crown		Abutment	
	r_c	t	t/r_c	2θ	Extrados	Intrados	Extrados	Intrados
3507	276.9	3.8	.0167	125°54'	270 #/s"	246 #/s"	237 #/s"	280 #/s"
# 3507	276.9	3.8	.0167	125°54'	446	406	390	466
3502	277.1	4.2	.0185	125°54'	371	337	320	390
3497	277.3	4.6	.0202	125°54'	454	412	384	484
3493.5	277.44	4.88	.0215	125°54'	503	460	427	540

NOTE: Stresses calculated for Flood Water El 3517 except as noted.
Stresses when a 4' Flashboard, topped by 2' of water is added.

NOTE:
The concrete to be used in this dam shall have compressive strength of not less than 3,000 lbs per square inch at the age of 28 days.

10 5 0 5 10 15
Scale: $\frac{1}{8}$"=1'-0"

30 20 10 0 30 60 90 120 150
Scale: 1"=30'-0"

SCALES AS NOTED

This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983

IDAHO POWER COMPANY

BY James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

PROJECT NO. 18- IDAHO SUPPLEMENTAL EXHIBIT F

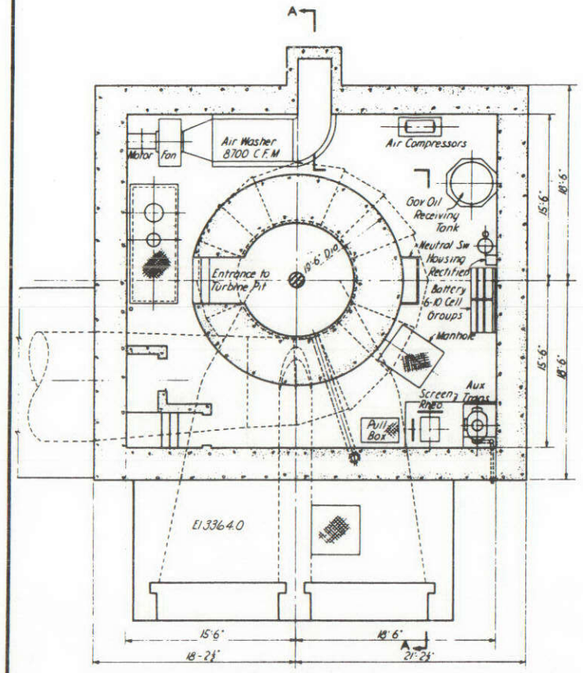
TWIN FALLS HYDROELECTRIC PROJECT

EXISTING DAM SECTIONS

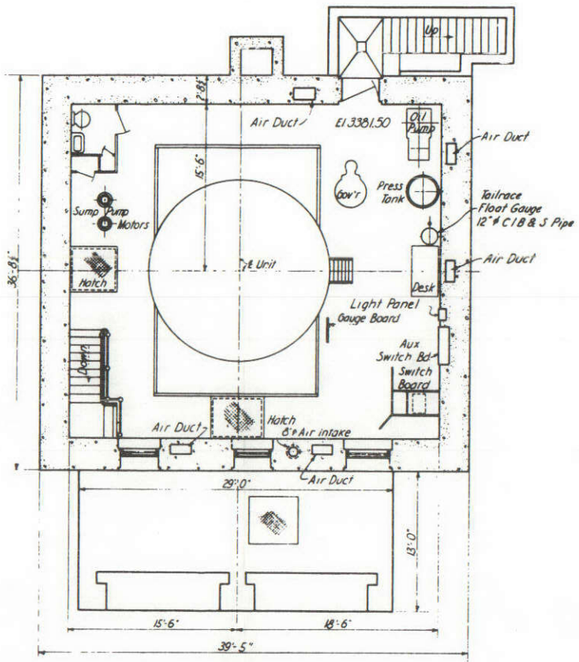
IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 Sheet 2 of 3 06E-46445

FERC Nº 18-

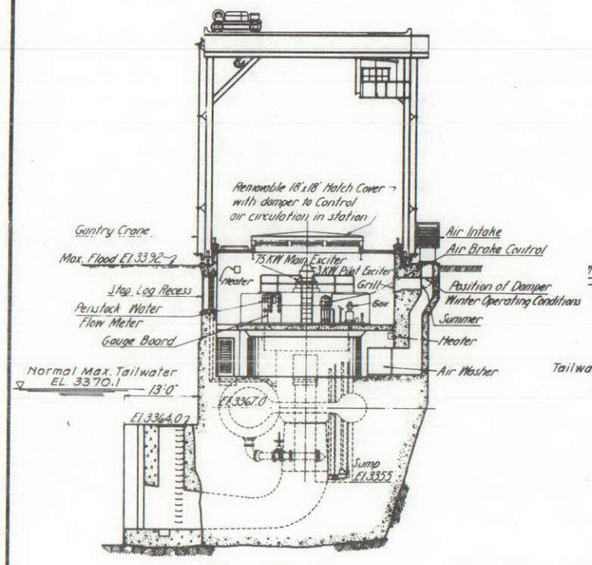


BASEMENT FLOOR

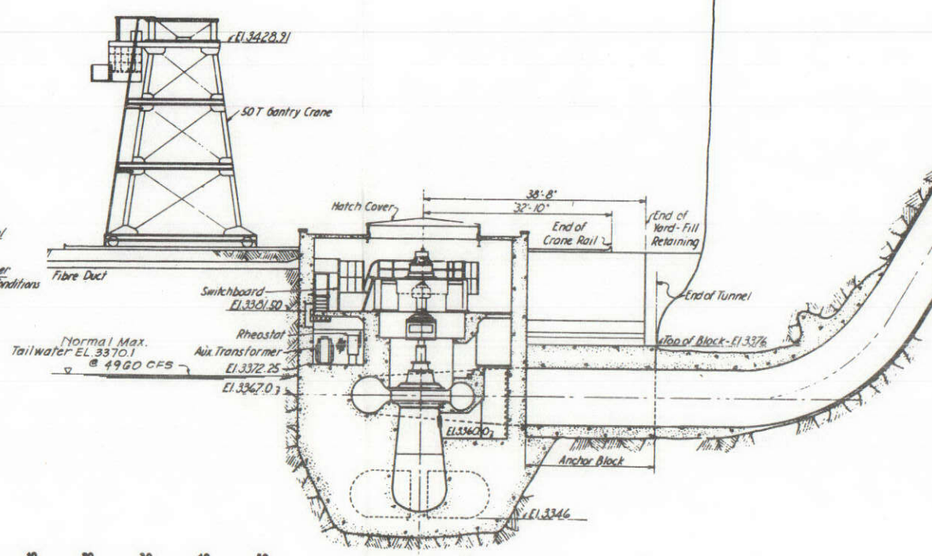


OPERATING FLOOR

Scale: ¼" = 1'-0"

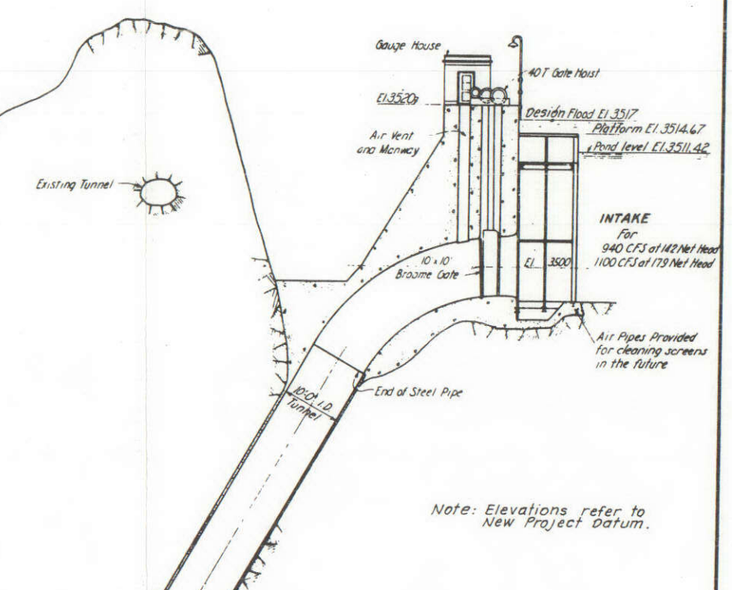


SECTION A-A



POWER HOUSE

Scale: 1" = 10'-0"



Note: Elevations refer to New Project Datum.

This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983

IDAHO POWER COMPANY

By _____

James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

SCALE AS NOTED

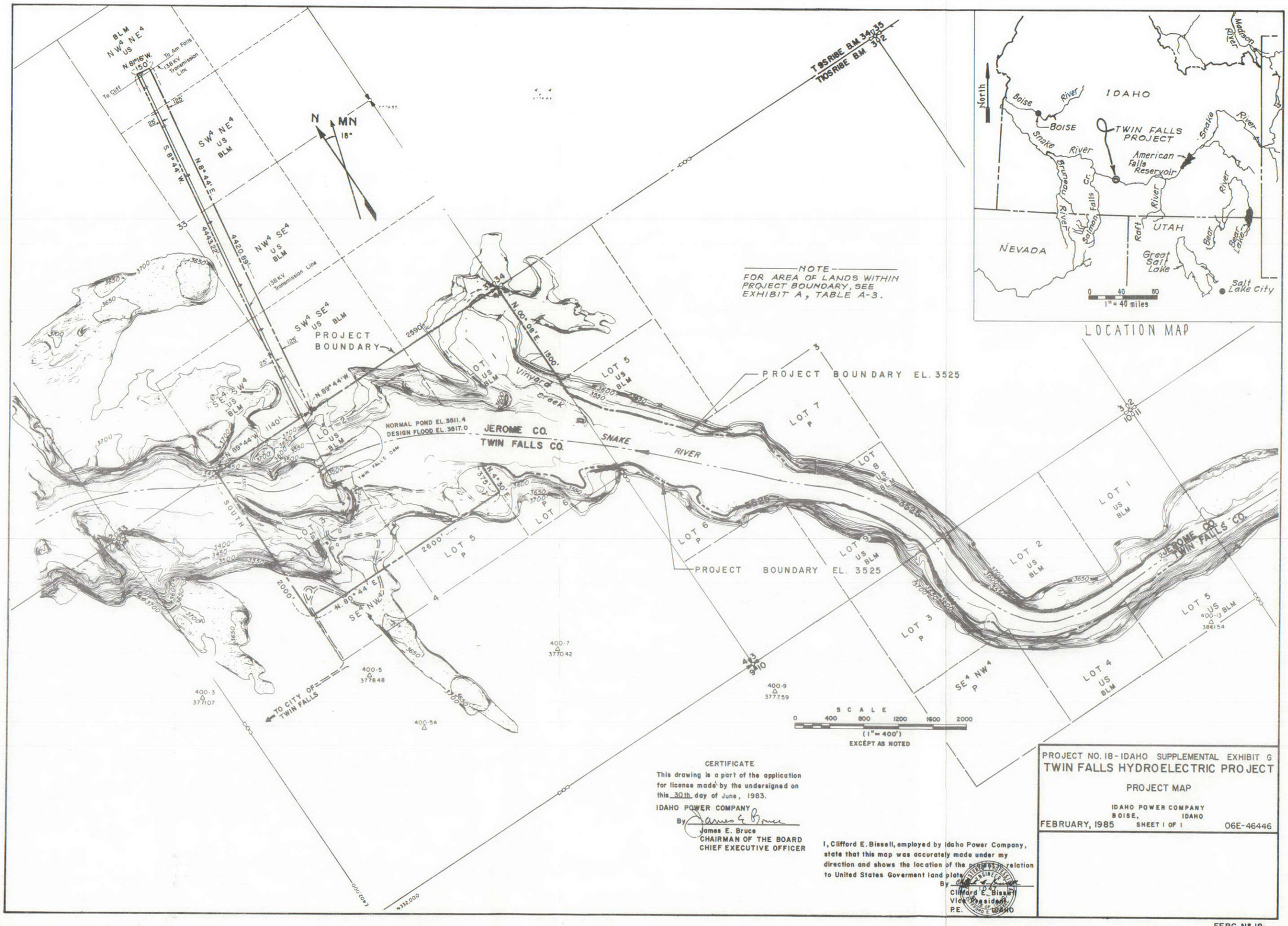
PROJECT NO. 18 - IDAHO SUPPLEMENTAL EXHIBIT F

TWIN FALLS HYDROELECTRIC PROJECT

EXISTING INTAKE AND POWER HOUSE

IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 Sheet 3 of 3 06E-46445



CERTIFICATE

This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983.

IDAHO POWER COMPANY

By James E. Bruce

James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

I, Clifford E. Bissell, employed by Idaho Power Company, state that this map was accurately made under my direction and shows the location of the Project in relation to United States Goverment land plats.

By Clifford E. Bissell

Clifford E. Bissell
Vice President
P.E. 1249

PROJECT NO. 18 - IDAHO SUPPLEMENTAL EXHIBIT G

TWIN FALLS HYDROELECTRIC PROJECT

PROJECT MAP

IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46446

FERC Nº 18-

R13E R14E R15E R16E R17E R18E R19E R20E R21E R22E

T5S

T6S

T7S

T8S

T9S

T10S

T11S

T12S

GOODING

SHOSHONE

DIETRICH

BESSLEN STATION

UNION PACIFIC R.R. (MAIN LINE)

SENTER SIDING & STATION

KIMAMA STAT

NOTCH BUTTE

GOODING COUNTY
LINCOLN COUNTY

JEROME COUNTY

HAGERMAN

STAR LAKE

SALMON FALLS

WENDELL

GOODING COUNTY
JEROME COUNTY

LINCOLN COUNTY
JEROME COUNTY

KIMAMA BUTTE

FLAT TOP BUTTE

JEROME

MINIDOKA COUNTY

MILNER

GOODING

GOODING COUNTY
TWIN FALLS COUNTY

CANAL

SHOSHONE FALLS

SNAKE RIVER

HUNT STATION

EDEN

WILSON LAKE

UNION PACIFIC R.R.

SCHODDE SIDING

McHENRY STATION

BUDGE SIDING

BUHL

TWIN FALLS DAM

HAZELTON

E-A CANAL

TWIN FALLS

JEROME COUNTY
TWIN FALLS COUNTY

FILER

UNION PACIFIC R.R.

KIMBERLY

HANSEN

MILNER DAM

SNAKE

CALDRON LINN

UNION PACIFIC R.R. (TWIN FALLS BRANCH)

BURLEY

TWIN FALLS MAIN CANAL

MURTAUGH LAKE

OREGON TRAIL

TWIN FALLS COUNTY
CASSIA COUNTY

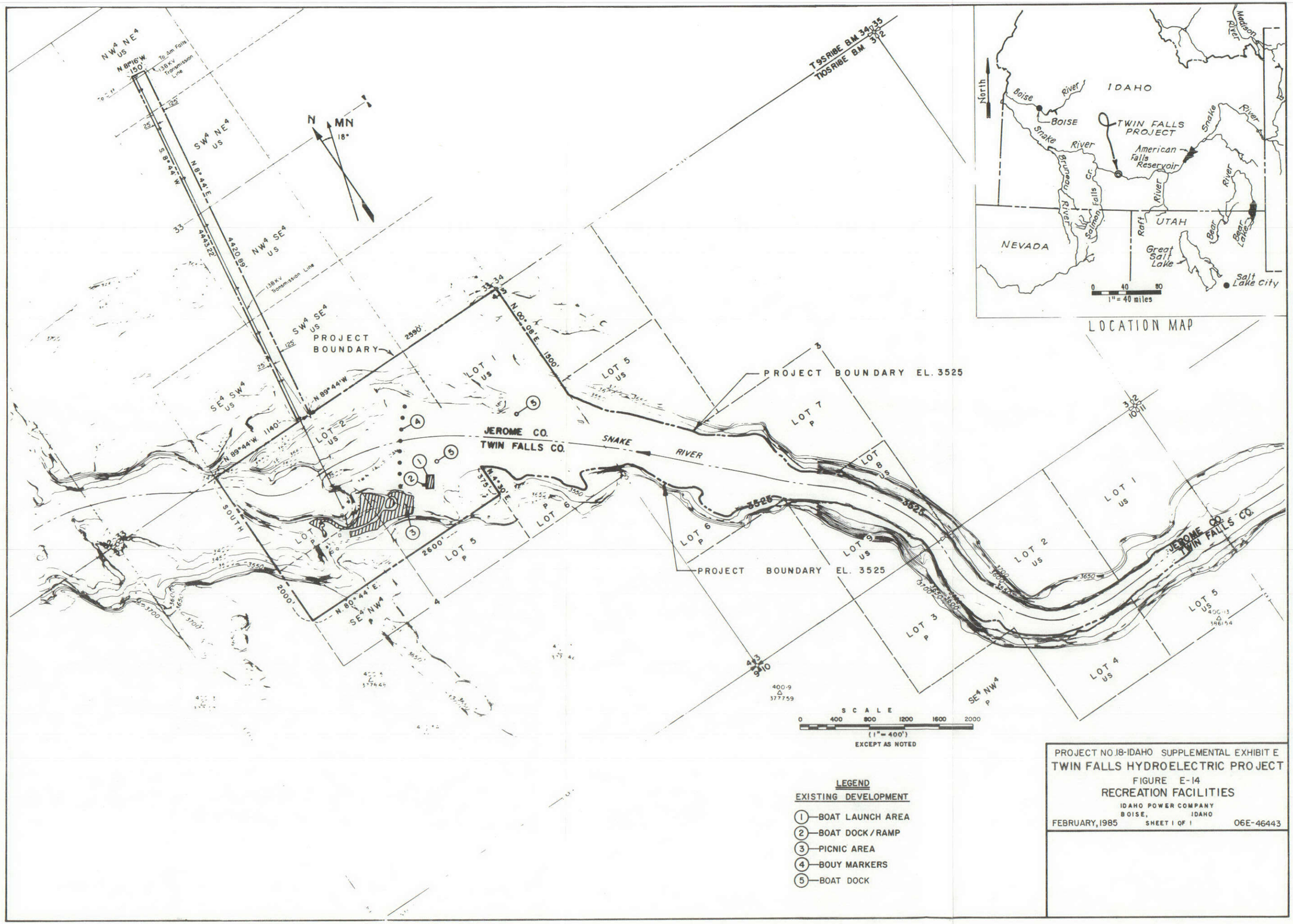
PROJECT No. 18 SUPPLEMENTAL EXHIBIT E

TWIN FALLS H.E.DEVELOPMENT

FIGURE E-13

HISTORICAL / ARCHAEOLOGICAL RESOURCES

IDAHO POWER COMPANY FEB 1985



PROJECT NO. 18-IDAHO SUPPLEMENTAL EXHIBIT E

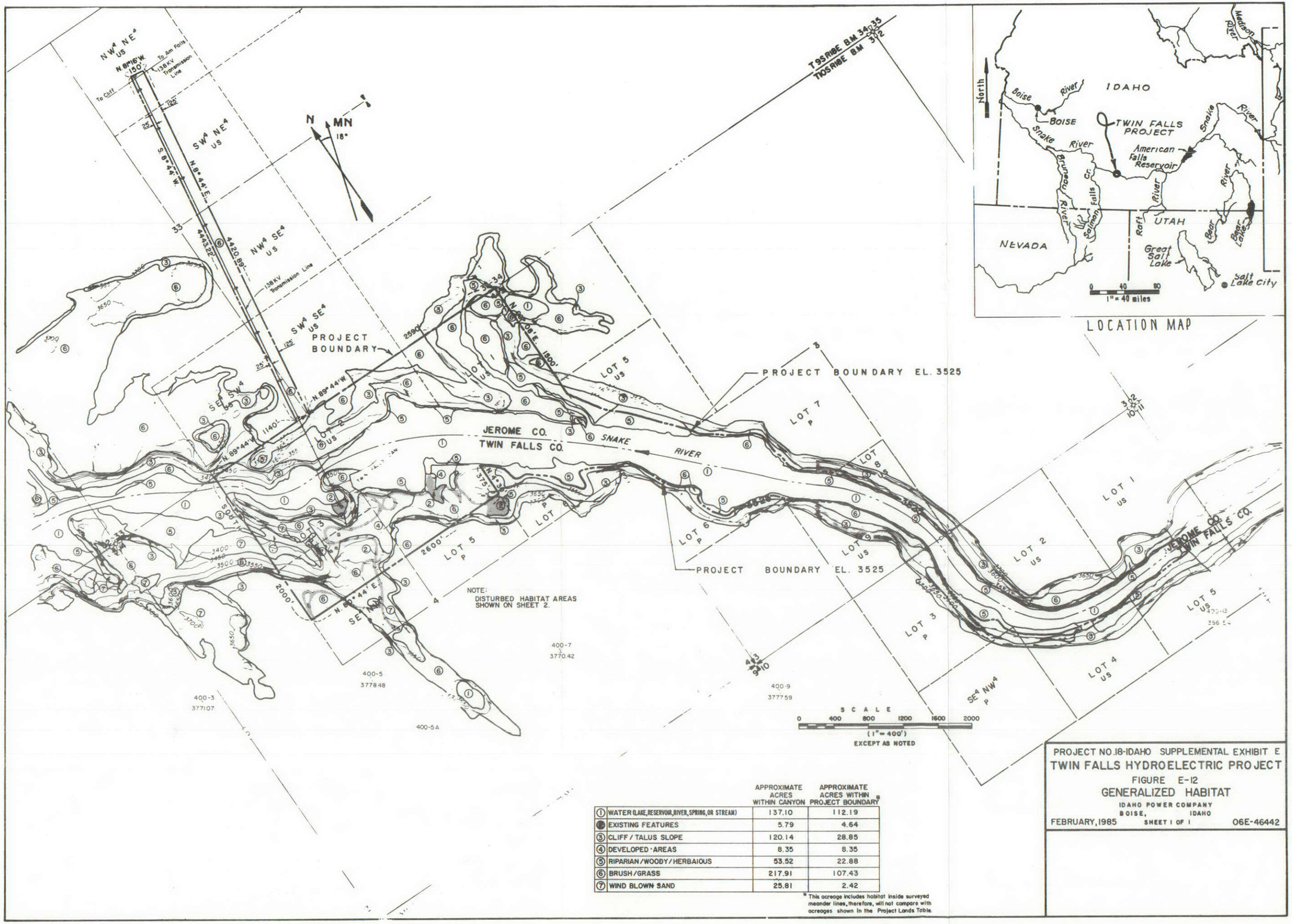
TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-14

RECREATION FACILITIES

IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46443



		APPROXIMATE ACRES WITHIN CANYON	APPROXIMATE ACRES WITHIN PROJECT BOUNDARY*
①	WATER (LAKE, RESERVOIR, RIVER, SPRING, OR STREAM)	137.10	112.19
●	EXISTING FEATURES	5.79	4.64
⑤	CLIFF / TALUS SLOPE	120.14	28.85
④	DEVELOPED AREAS	8.35	8.35
⑤	RIPARIAN / WOODY / HERBAIOUS	53.52	22.88
⑥	BRUSH / GRASS	217.91	107.43
⑦	WIND BLOWN SAND	25.81	2.42

* This acreage includes habitat inside surveyed meander lines, therefore, will not compare with acreages shown in the Project Lands Table.

PROJECT NO. 18-IDAHO SUPPLEMENTAL EXHIBIT E

TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-12

GENERALIZED HABITAT

IDAHO POWER COMPANY

BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46442

AUGER FALLS

SNAKE

TWIN FALLS

HILLSDALE HIGHWAY DISTRICT

EDEN Pop 426

HAZELTON Pop 433

MILNER DAM

MILNER RES.

STAR FALLS

RIVER

TWIN FALLS

KIMBERLY

HANSEN Pop 415

MURTAUGH Pop 274

TWIN FALLS HIGHWAY DISTRICT

MURTAUGH HIGHWAY DISTRICT

BURLEY HIGHWAY D

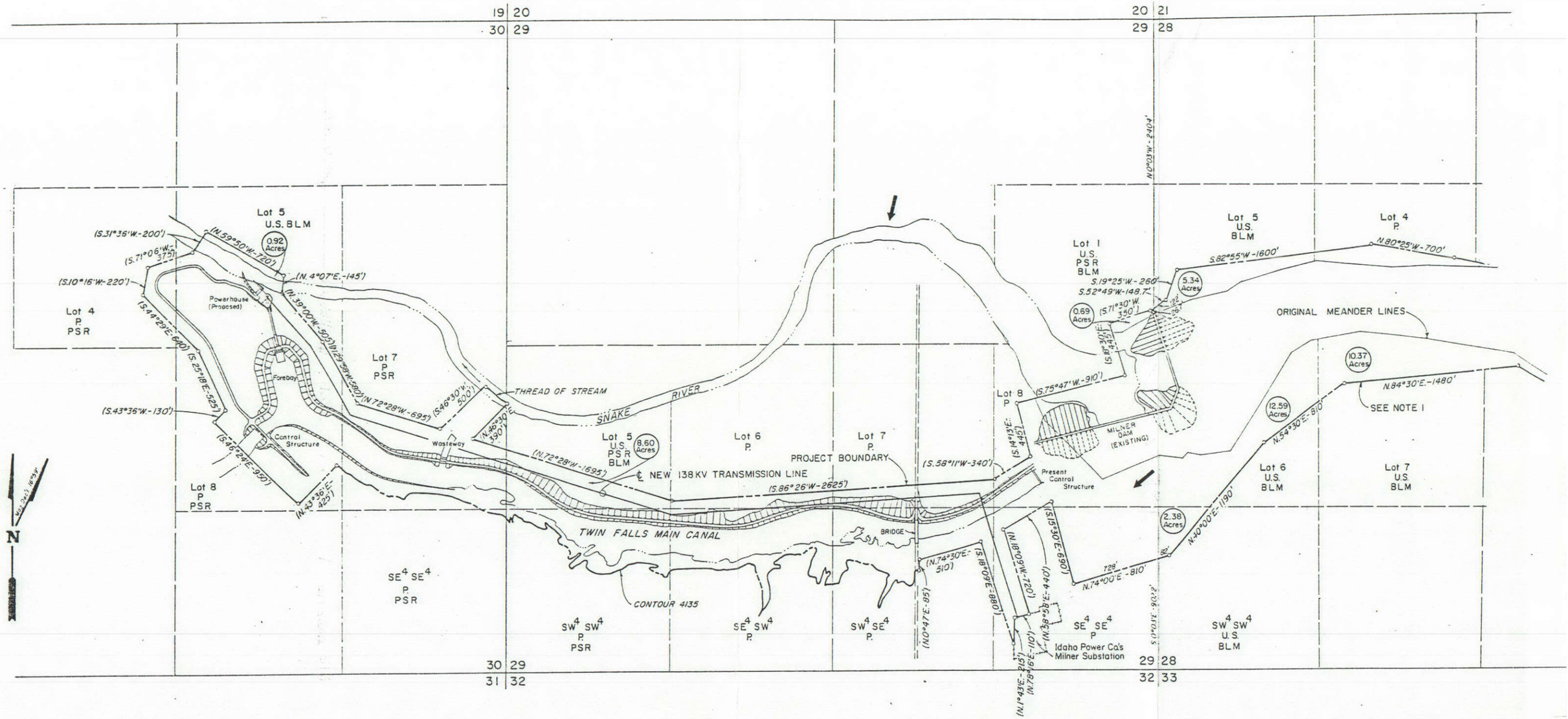
0 1 2 3 4MI.

MICROFILMED
APR 19 1993

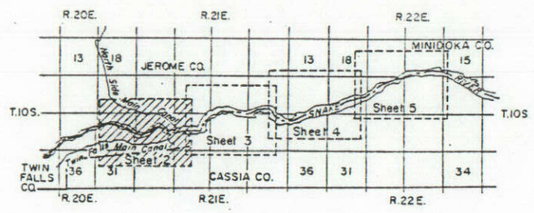
Figure 1. HYDROPOWER PROJECT LOCATIONS

CH2M HILL

817582.A0



T. 10 S., R. 21 E., B.M.



KEY MAP

This drawing is part of the application for license made by the undersigned on this 27th day of July, 1984.

TWIN FALLS CANAL COMPANY

By Maurice Klaas

MAURICE KLAAS
PRESIDENT

NORTH SIDE CANAL COMPANY, LTD.

By C.J. Marshall

C.J. MARSHALL
PRESIDENT

PROJECT NO. 2899

MILNER PROJECT

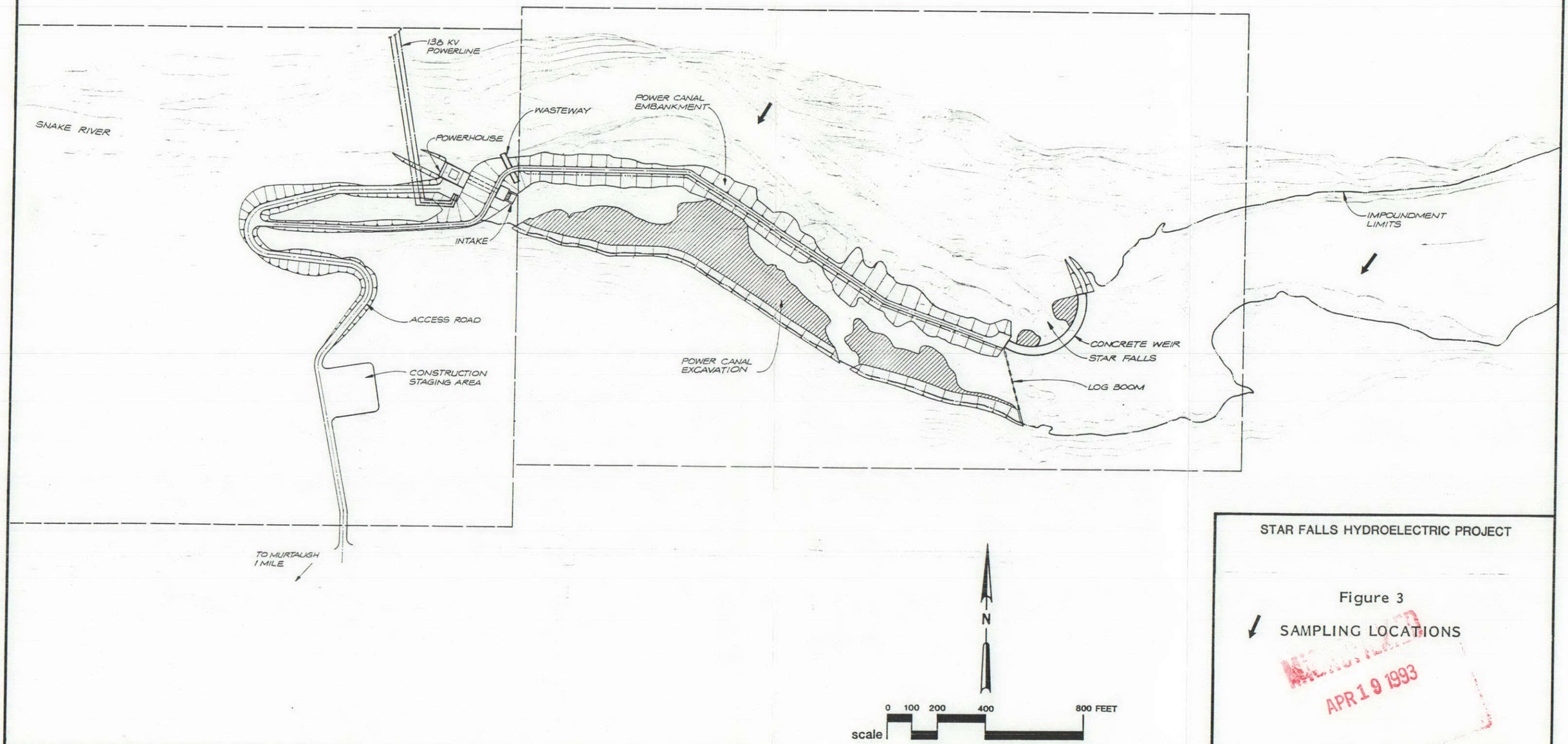
RECEIVED
APR 19 1993

Figure 2

SAMPLING LOCATIONS

REVISED 3-14-85

FERC Nº 2899



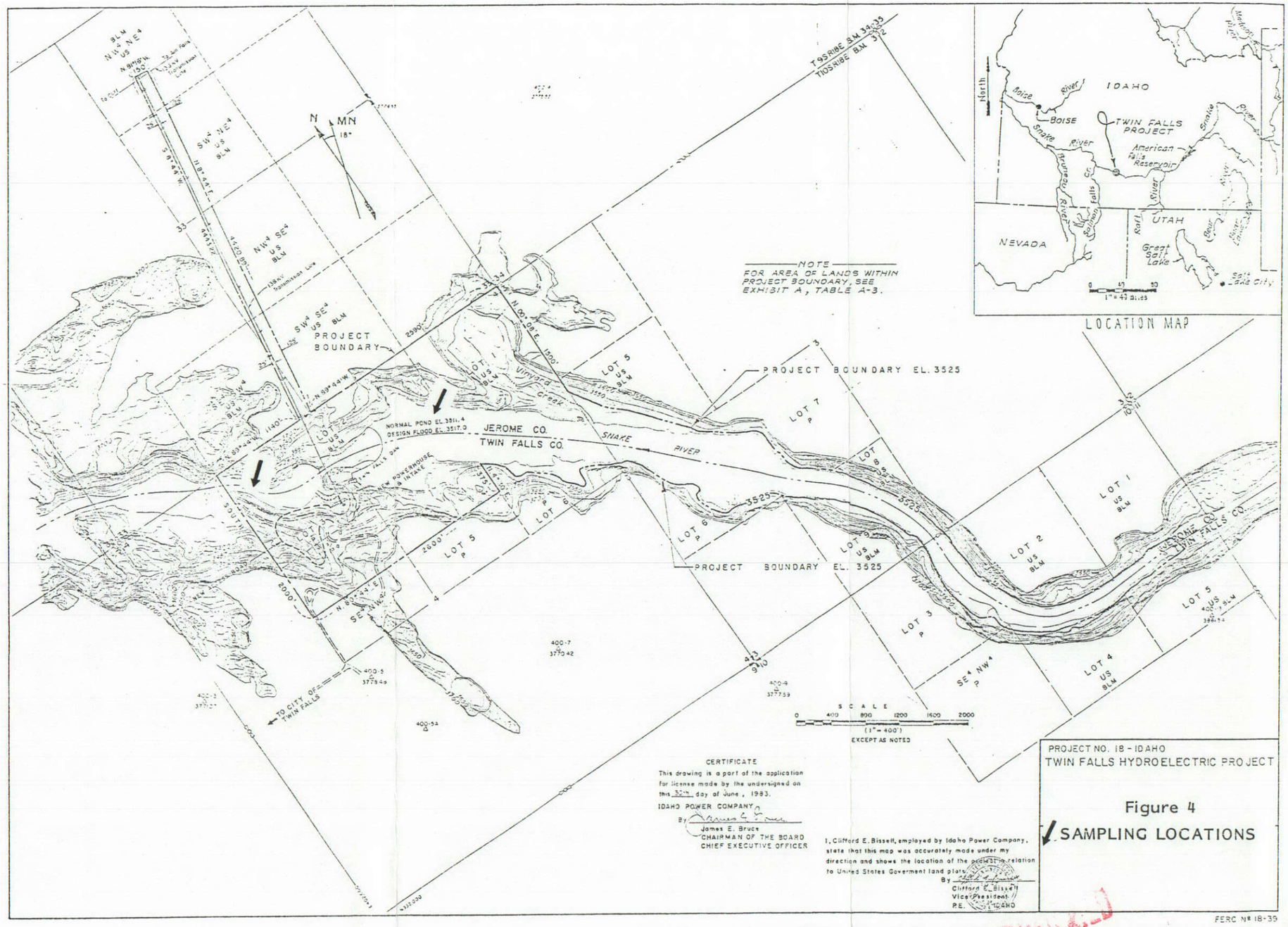
STAR FALLS HYDROELECTRIC PROJECT

Figure 3

SAMPLING LOCATIONS

APR 19 1993

FERC PROJECT NO. 5797



CERTIFICATE

This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983.

IDAHO POWER COMPANY

By _____

James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

I, Clifford E. Bissell, employed by Idaho Power Company, state that this map was accurately made under my direction and shows the location of the project in relation to United States Government land plats.

By _____

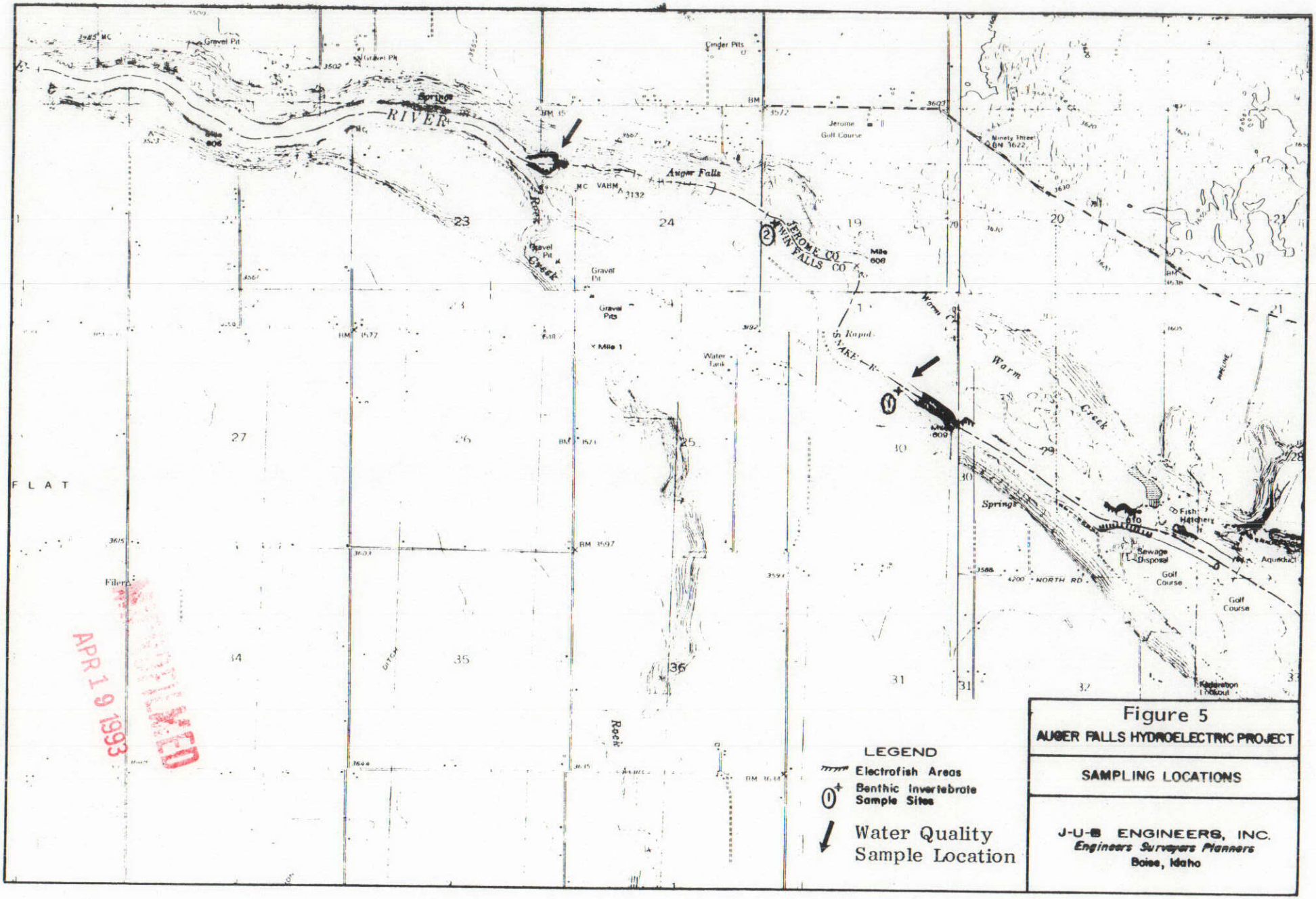
Clifford E. Bissell
Vice President
P.E. IDAHO

PROJECT NO. 18 - IDAHO
TWIN FALLS HYDROELECTRIC PROJECT

Figure 4
SAMPLING LOCATIONS

FERC № 18-39

MICROFILMED
APR 19 1993


Auger Falls
RIVER
Rock Creek
Gravel Pit
Gravel Pits
Water Tank
Mile 1
Mile 606
Mile 608
Mile 609
Mile 610
JEROME CO
TWIN FALLS CO
Warm Creek
Rapid
SNAKE R.
Jerome Golf Course
Ninety Three
BM 3622
Cinder Pits
Fish Hatchery
Sewage Disposal
Golf Course
NORTH RD.
Aquaduct
Kilgerton Outlet
FLAT
Filter
DITCH
Rock
Springs
PIPELINE
23
24
25
26
27
34
35
36
19
20
21
30
31
32
33
28
29
10
1
APR 19 1993
LEGEND
Electrofish Areas
Benthic Invertebrate Sample Sites
Water Quality Sample Location
Figure 5
AUGER FALLS HYDROELECTRIC PROJECT
SAMPLING LOCATIONS
J-U-B ENGINEERS, INC.
Engineers Surveyors Planners
Boise, Idaho

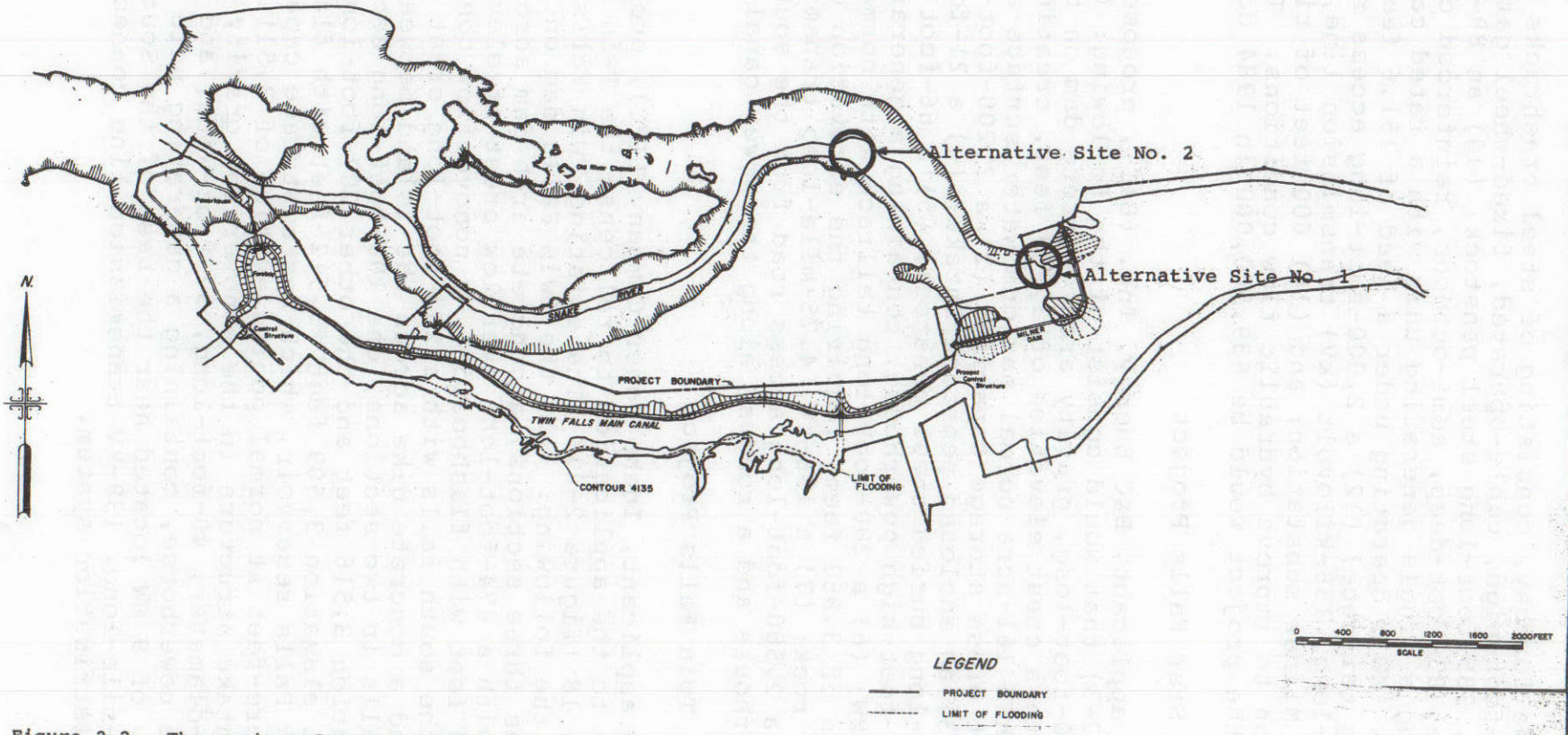


Figure 2-2. The project features of the proposed Milner Project with the two proposed alternative design sites (Source: the staff, modified from the Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

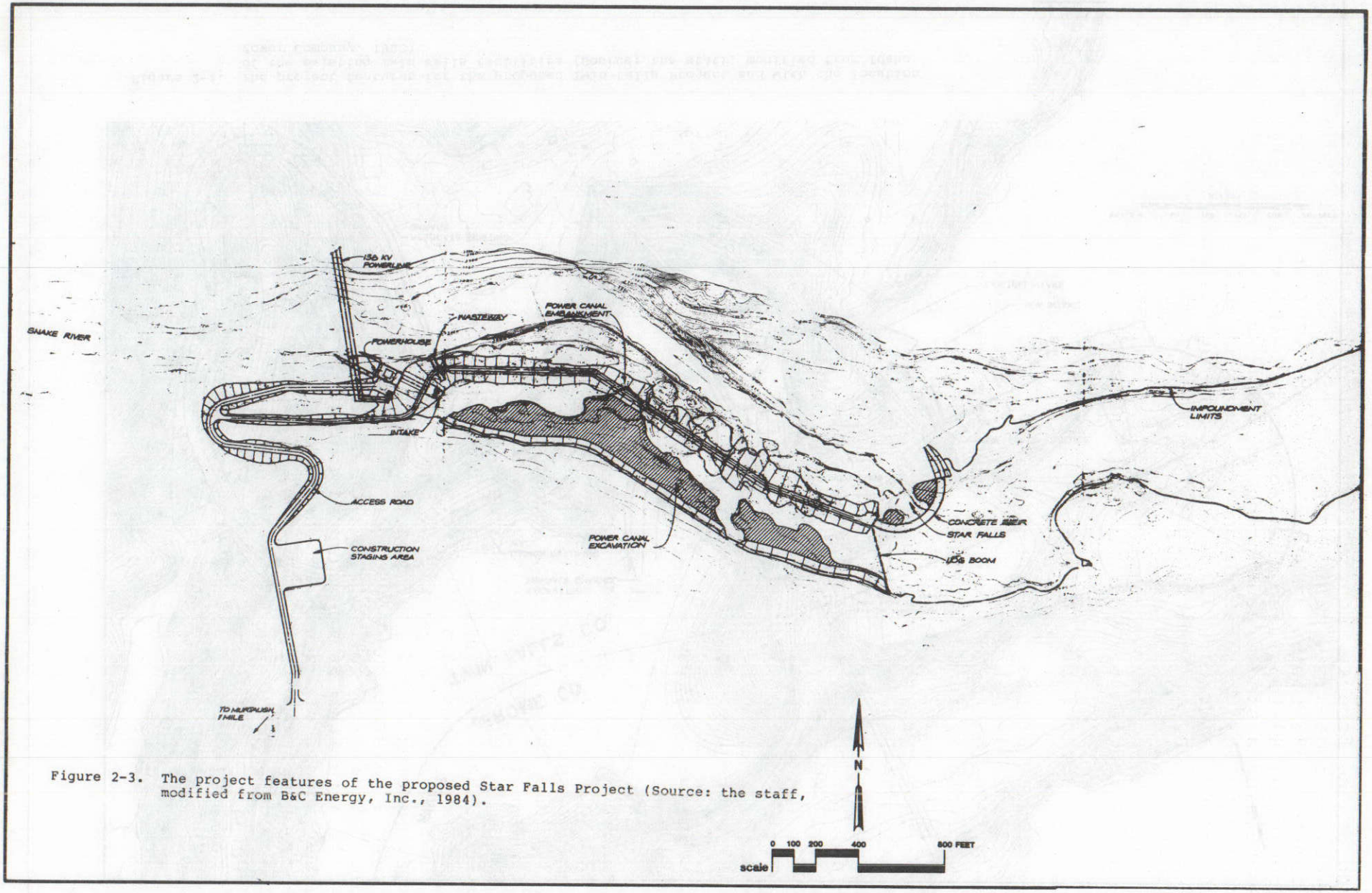


Figure 2-3. The project features of the proposed Star Falls Project (Source: the staff, modified from B&C Energy, Inc., 1984).

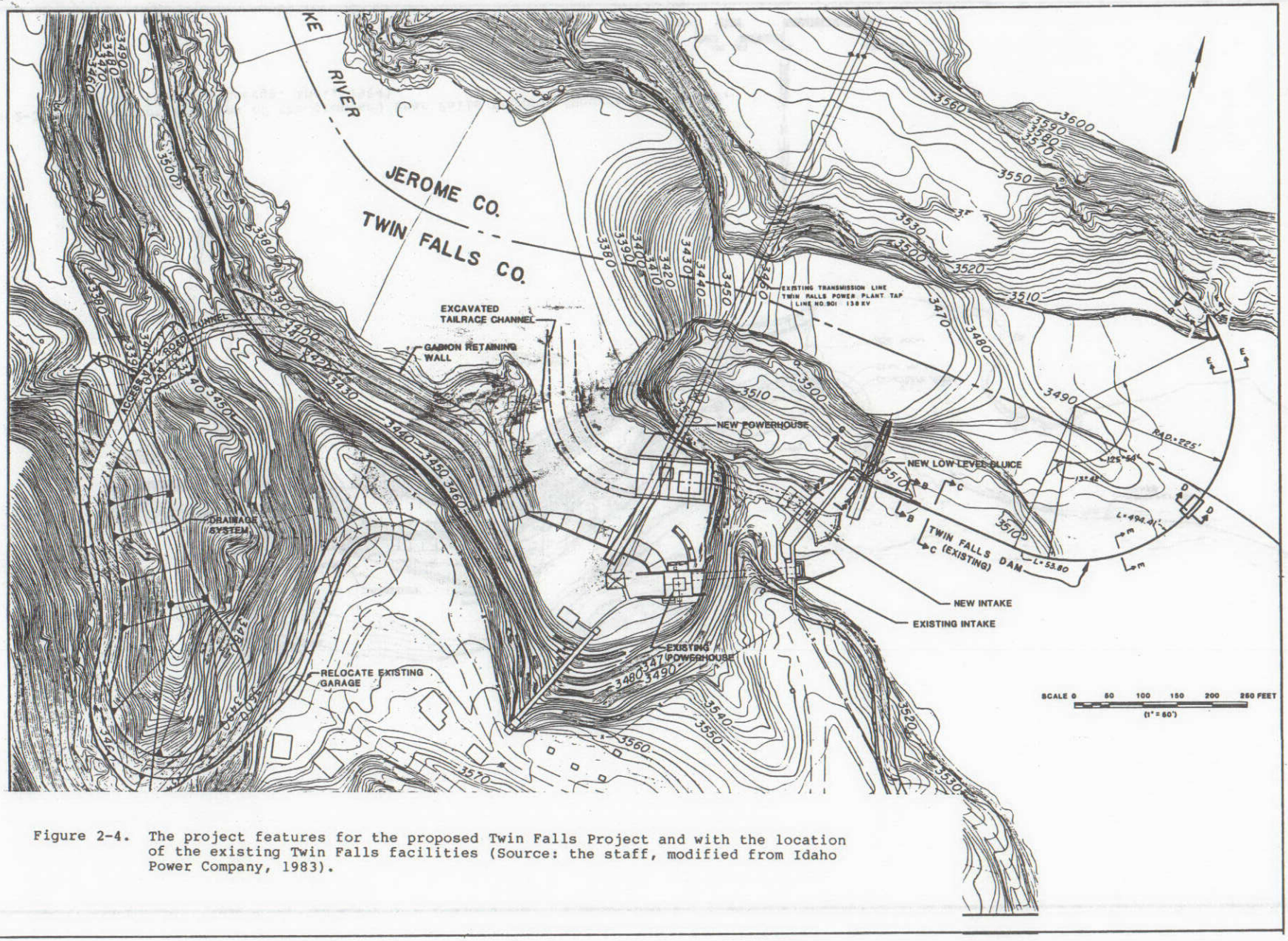


Figure 2-4. The project features for the proposed Twin Falls Project and with the location of the existing Twin Falls facilities (Source: the staff, modified from Idaho Power Company, 1983).

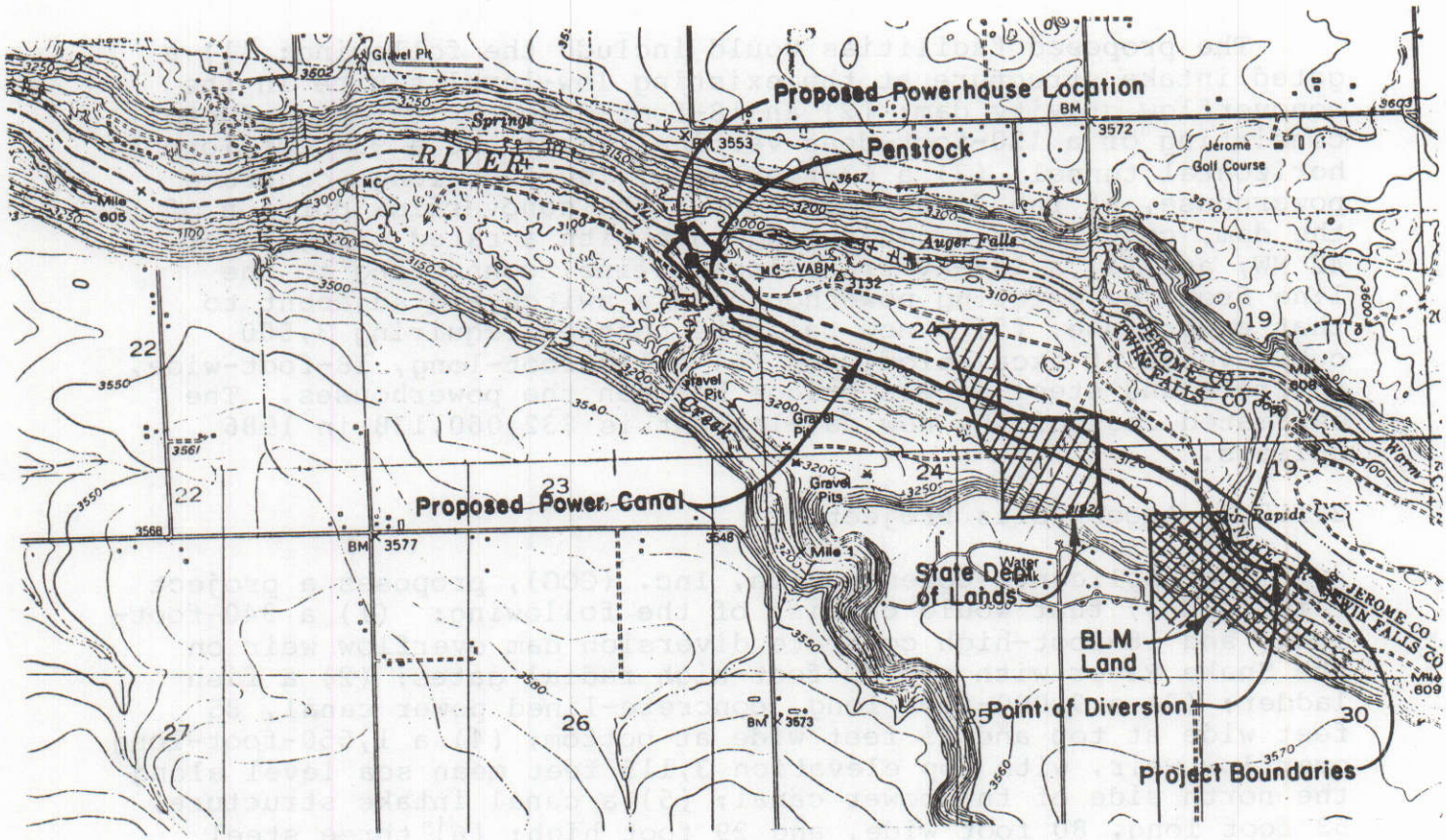


Figure 2-5. The project features for the proposed Auger Falls Project with location of nearby public lands (Source: the staff, modified from Cogeneration, Inc., 1981).

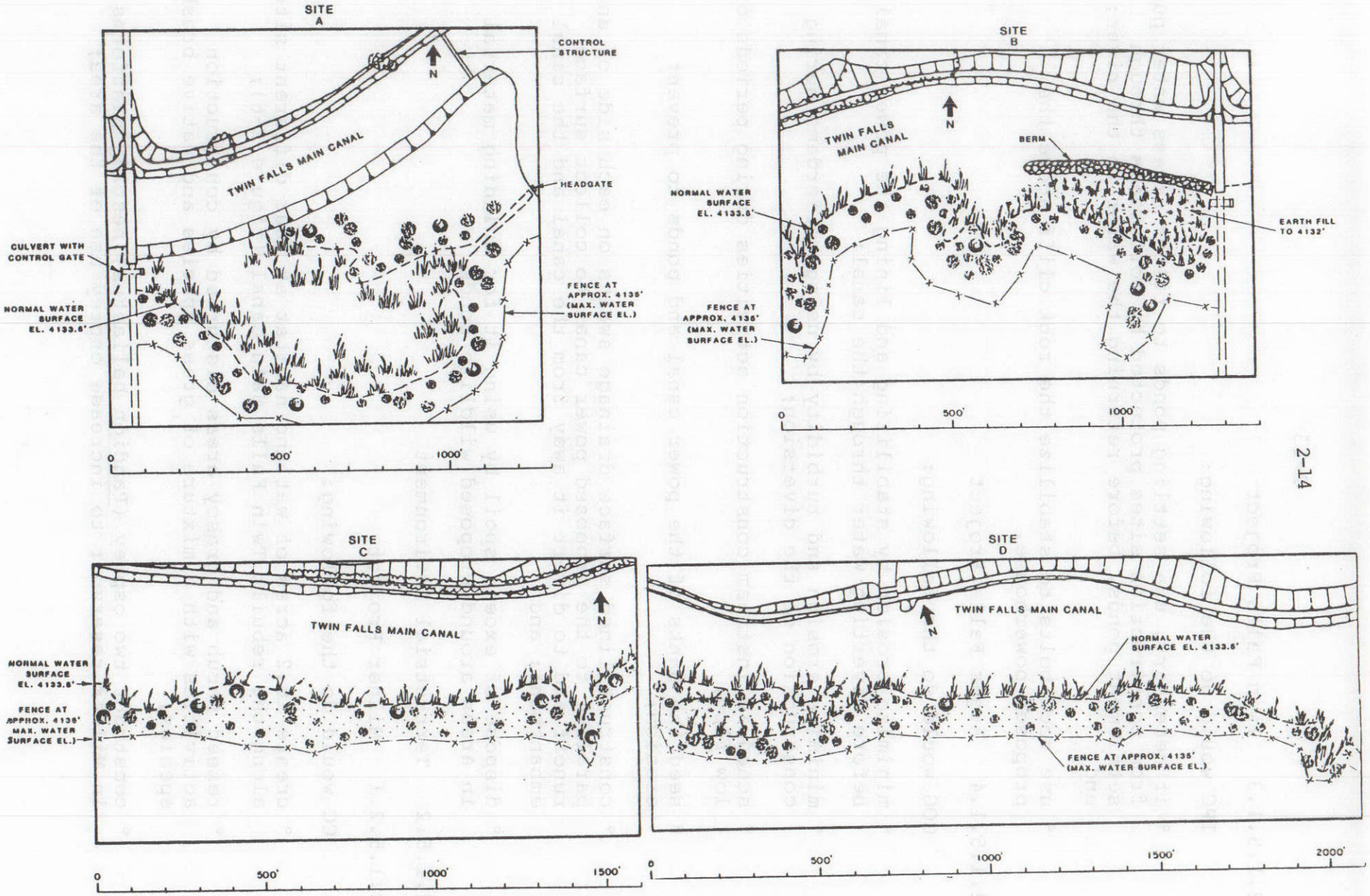


Figure 2-6. Wetland mitigation sites located along the Twin Falls Main Canal (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1986).

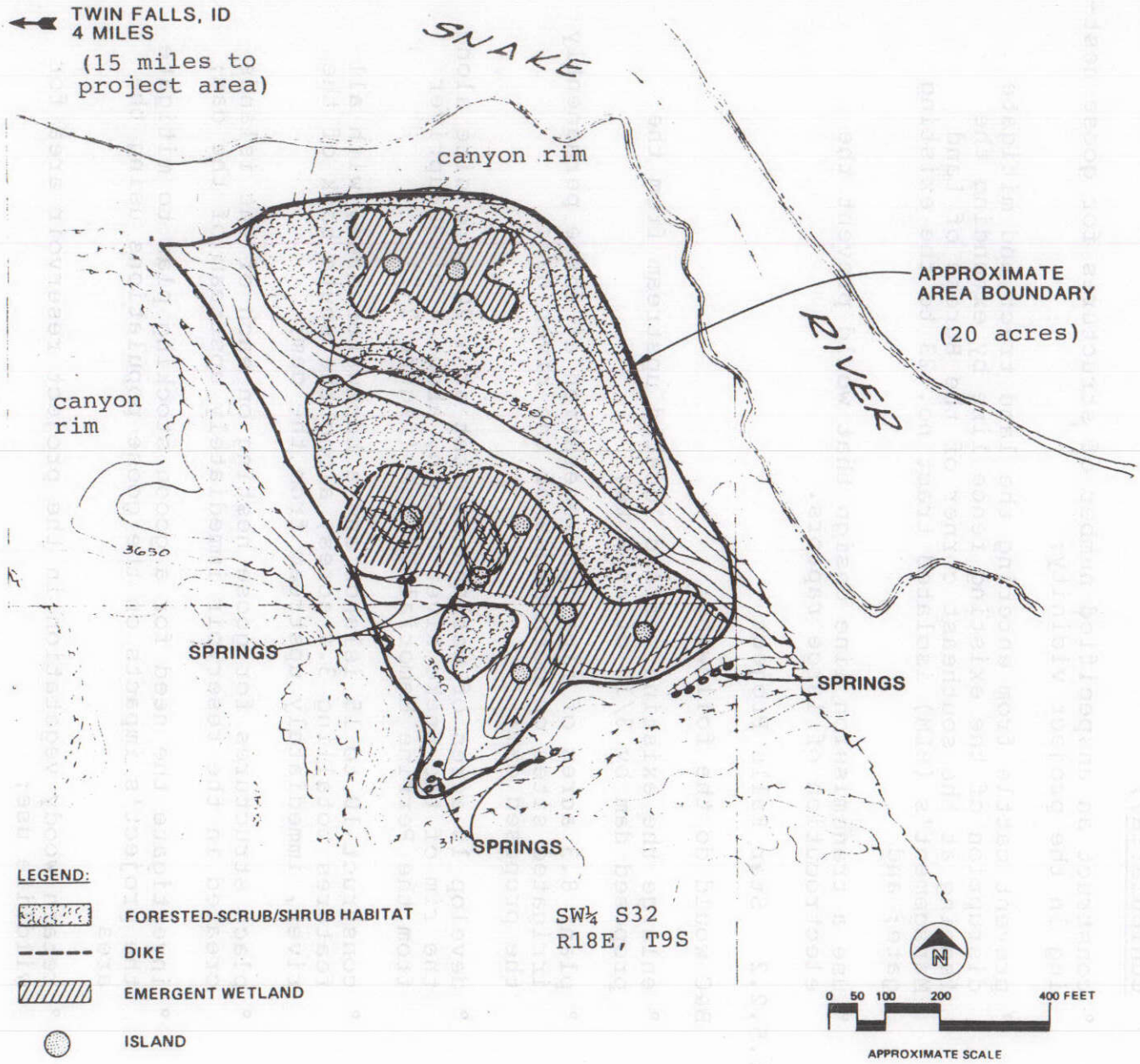


Figure 2-7. Conceptual development plan for the off-site wetlands mitigation area for the Star Falls Project (Source: CH_2M Hill, 1985).

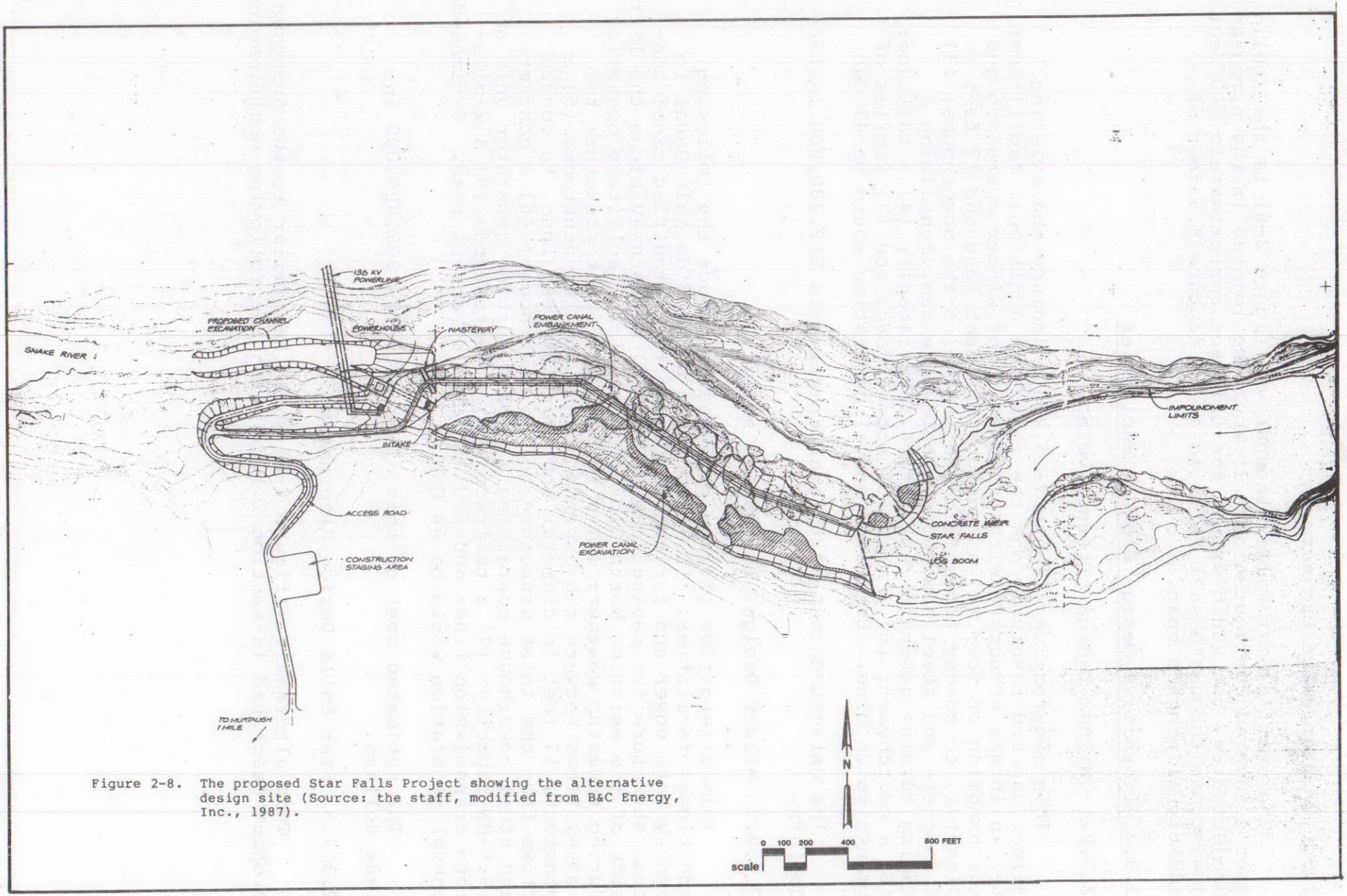


Figure 2-8. The proposed Star Falls Project showing the alternative design site (Source: the staff, modified from B&C Energy, Inc., 1987).

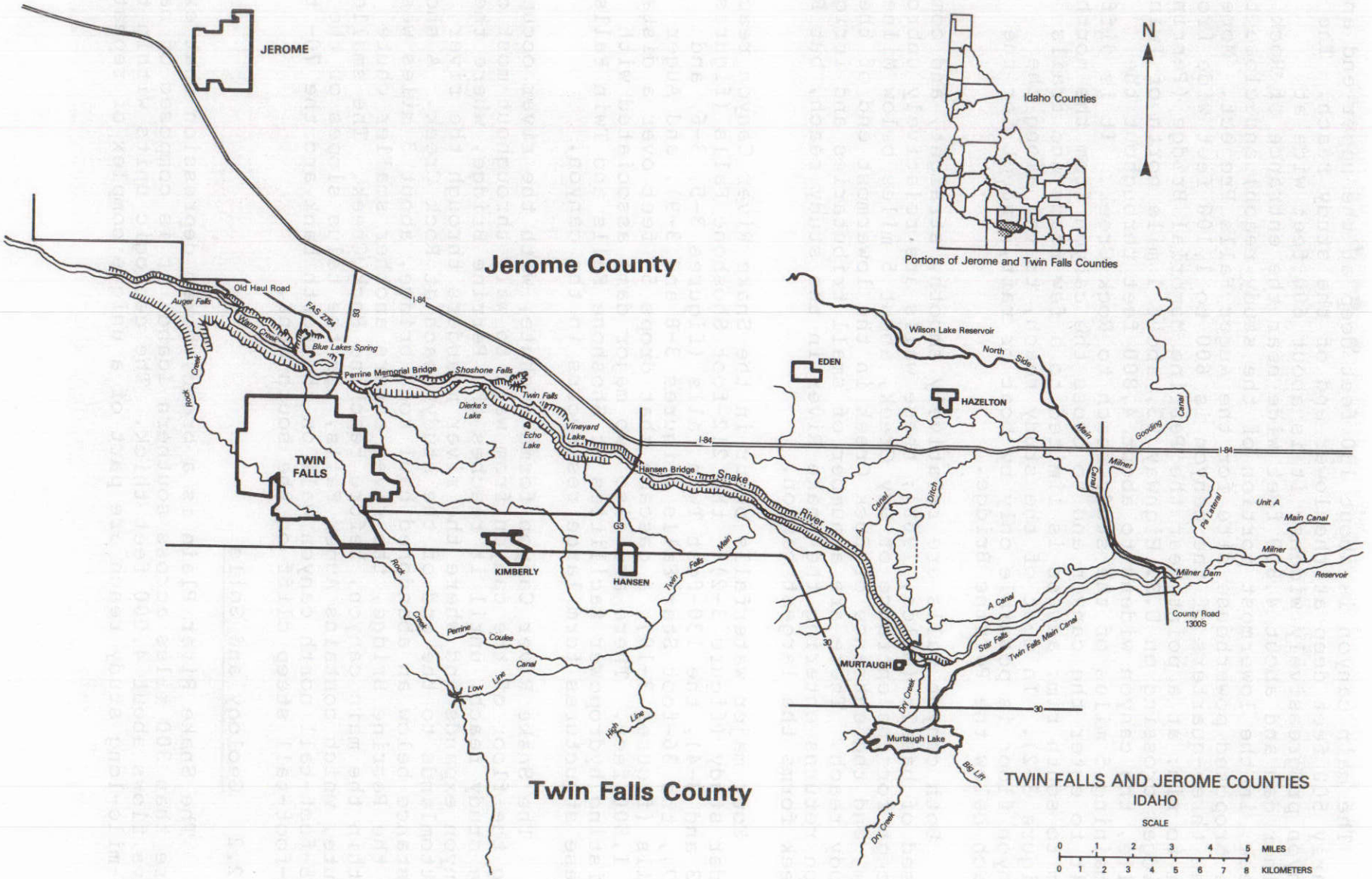


Figure 3-2. The 32-mile-long study reach of the Snake River between Milner dam and Rock Creek, showing the four major waterfalls, roads crossing the Snake River Canyon, and portions of the major irrigation canals (Source: the staff).

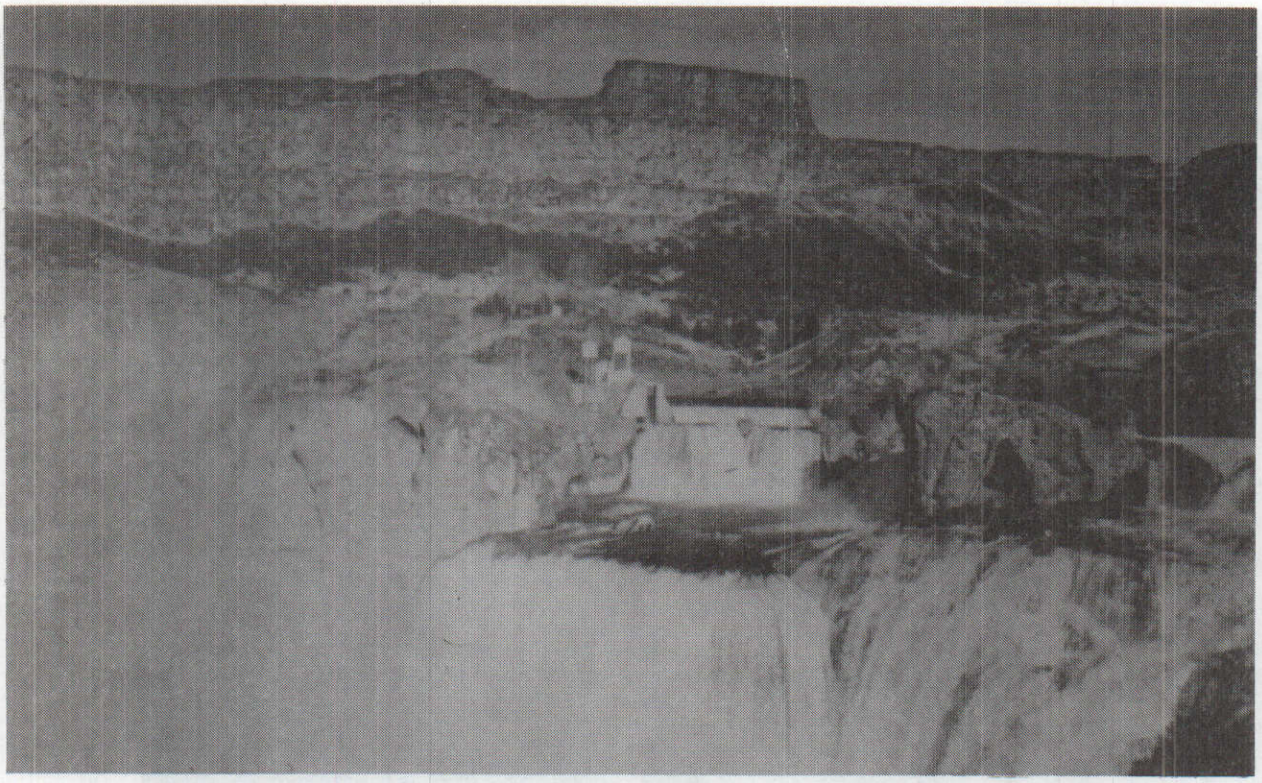


Figure 3-3. Shoshone Falls on December 10, 1986, with flows of about 10,400 cubic feet per second. The Shoshone Falls powerhouse (lower left) is almost completely obscured by mist from the falls (Source: the staff, photograph by Lee Emery).

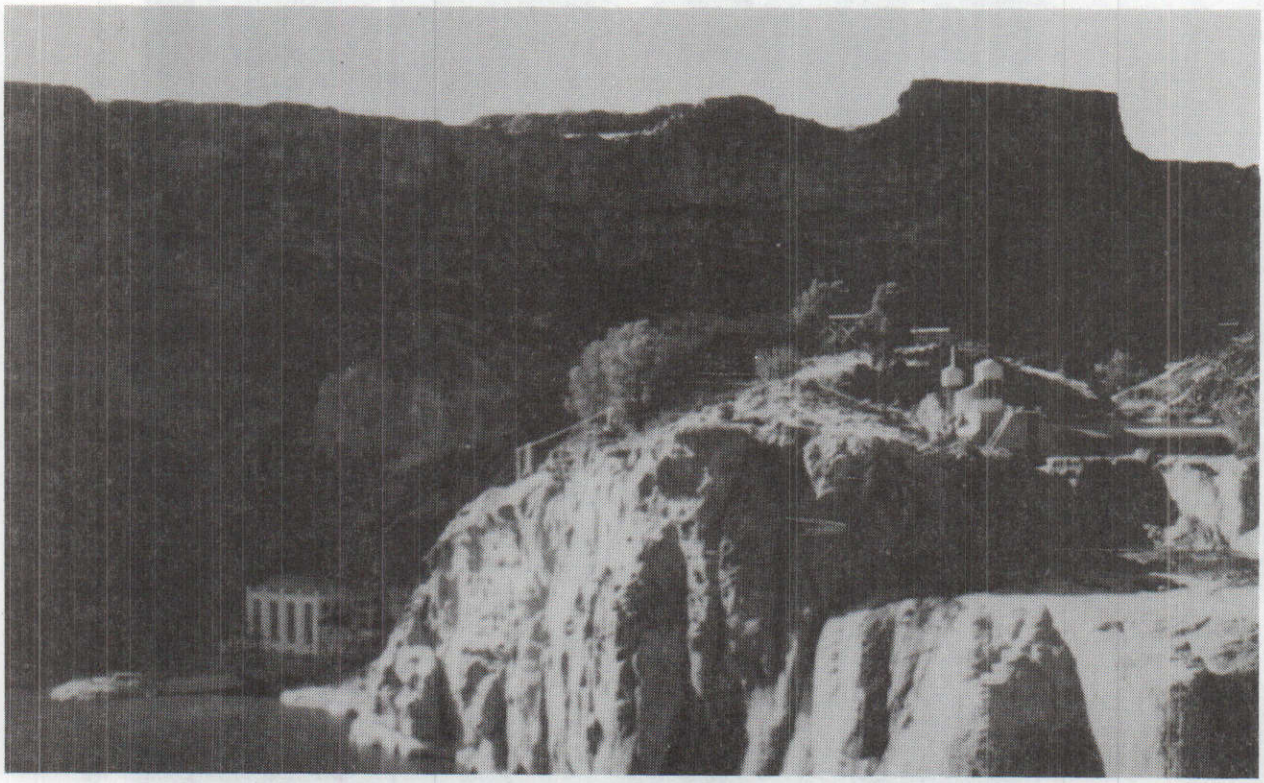


Figure 3-4. Shoshone Falls on June 1, 1987, with flows greatly reduced to about 80 cubic feet per second by irrigation diversions upstream at Milner dam and by the operation of three generating units at the Shoshone Falls Project (Source: the staff, photograph by Kathleen Sherman).



Figure 3-5. Twin Falls around 1914, before hydropower development at the site (Source: Twin Falls Historical Society).

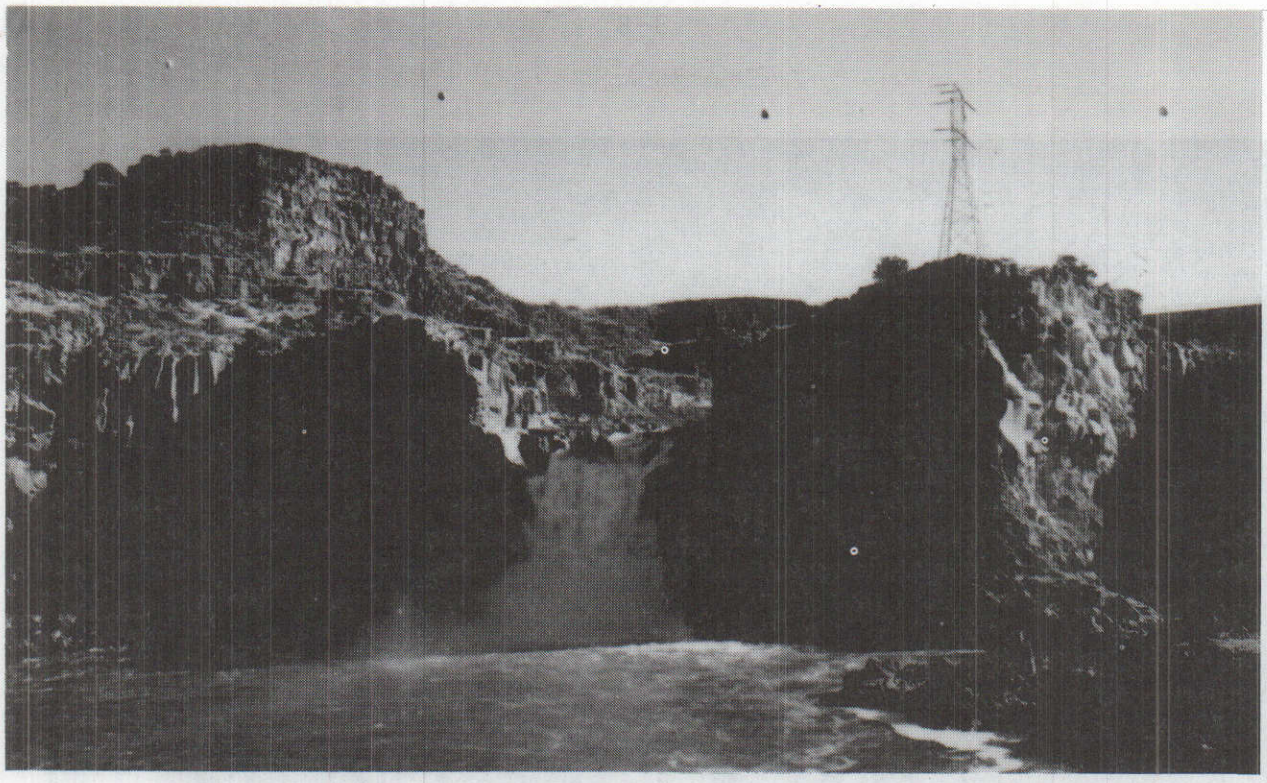


Figure 3-6. Twin Falls on November 4, 1986, with flows of about 2,800 cubic feet per second. (On the extreme right of the picture is a wall of the dam which is part of the existing Twin Falls Project)(Source: the staff, photograph by Lee Emery).



Figure 3-7. Twin Falls on June 2, 1987, with flows of less than 10 cubic feet per second. The river flows over the falls are drastically reduced by irrigation diversions upstream at Milner dam and by the operating Twin Falls Project. (The dam and portions of the existing Twin Falls Powerhouse are on the right side of the picture) (Source: the staff, photograph by Kathleen Sherman).



Figure 3-8. Star Falls on November 3, 1986, with flows of about 6,600 cubic feet per second. (These and other higher water flows produce smaller cascades similar to the ones seen on the right side of the photograph)(Source: the staff, photograph by Alan Mitchnick).



Figure 3-9. Star Falls on June 2, 1987, with flows of about 39 cubic feet per second. The flows illustrate the effects of the diversion of river water at Milner dam for irrigation (Source: the staff, photograph by John Estep).



Figure 3-10. Auger Falls on November 5, 1986, with flows of about 1,800 cubic feet per second (Source: the staff, photograph by Lee Emery).



Figure 3-11. A section of the Snake River below Milner dam on November 3,1986, with flows of about 6,600 cubic feet per second. (The proposed Milner Project would bypass this whitewater stream reach)(Source: the staff, photograph by Alan Mitchnick).



Figure 3-12. A section of the Snake River below Milner dam (same as figure 3-11) on June 3, 1987, with flows of about 39 cubic feet per second. All water has been diverted from the river for irrigation at Milner dam and the flows visible in the river represent water that is leaking through Milner dam. The powerhouse for the proposed Milner Project would be located near the center left bank of the river (Source: the staff, photograph by John Estep).

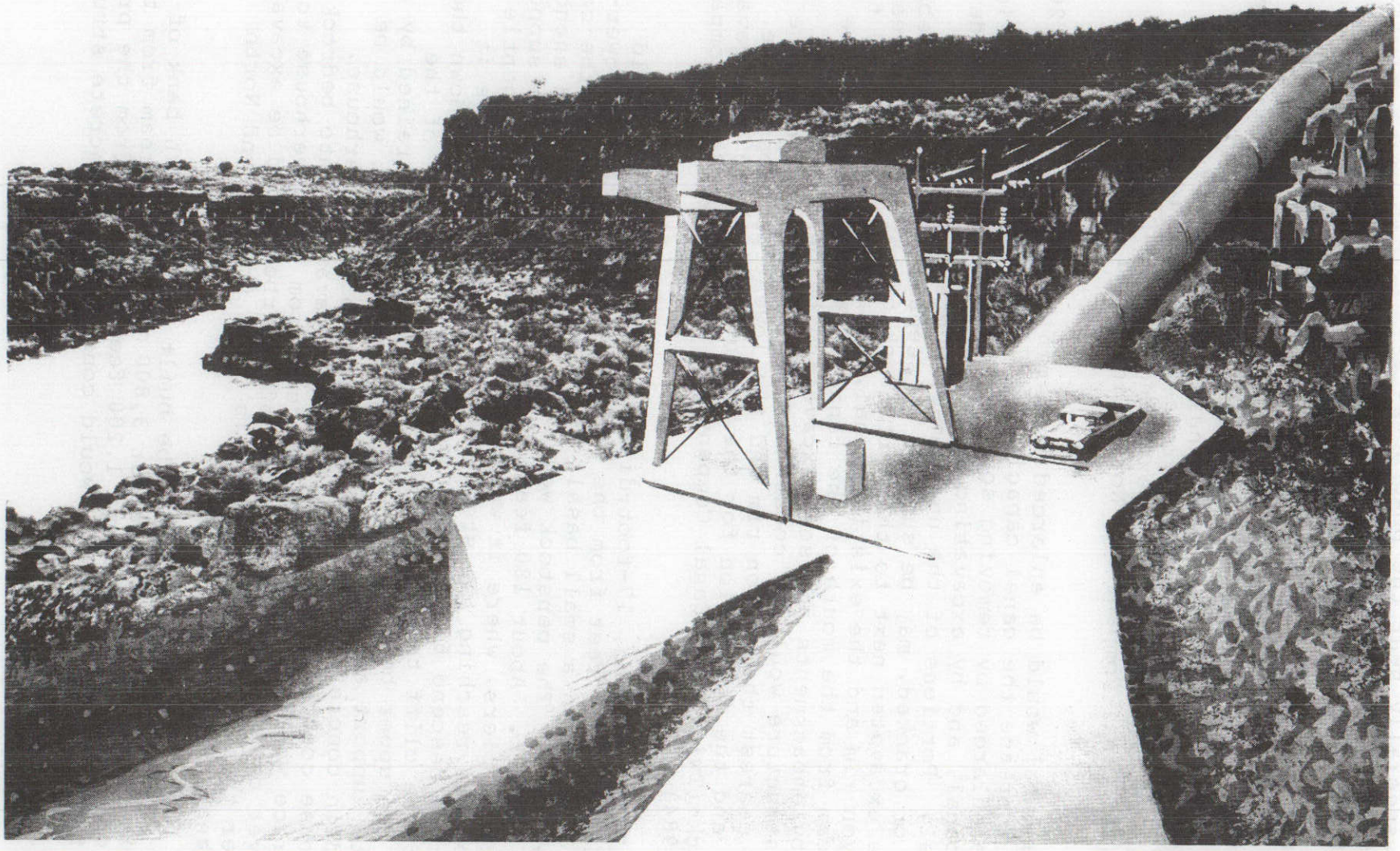


Figure 3-13. Artist's conception of penstock, powerhouse, and access road in the Snake River Canyon for the proposed Milner Project (Source: Twin Falls Canal Company and North Side Canal Company, LTD., 1984).



Figure 3-14. A sediment delta and sediment plume (center of photo) formed in the Snake River at the mouth of an unnamed stream near the Kasel Witherspoon Project. (Note the pocket of riparian habitat near the sediment delta which contrasts with the lack of riparian habitat on the opposite shore of the river (Source: the staff, photograph by John Estep on June 3, 1987).

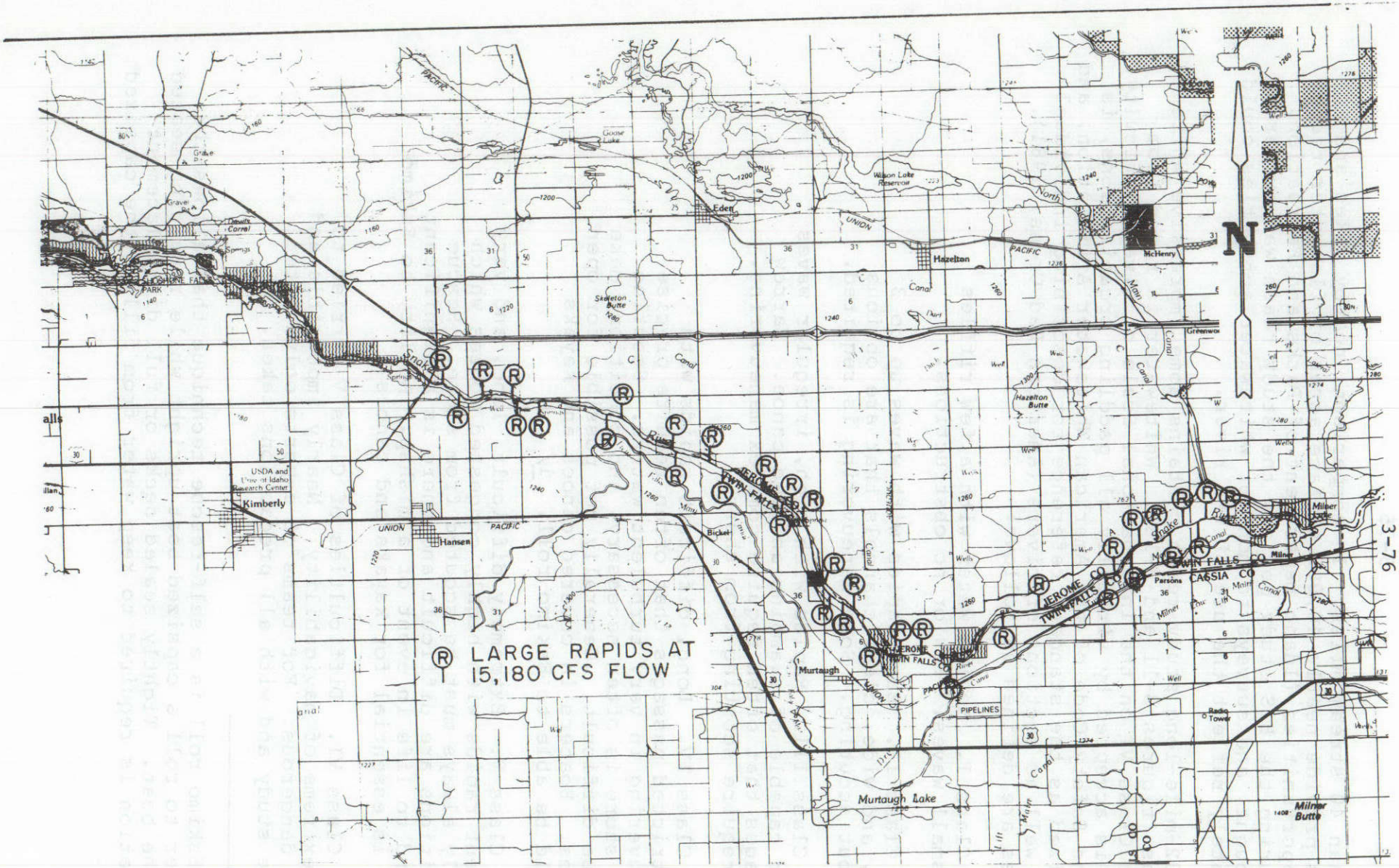


Figure 3-15. Location of large rapids on the Snake River betwee Milner dam and Twin Falls reservoir at flows of 15,180 cubic feet per second (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

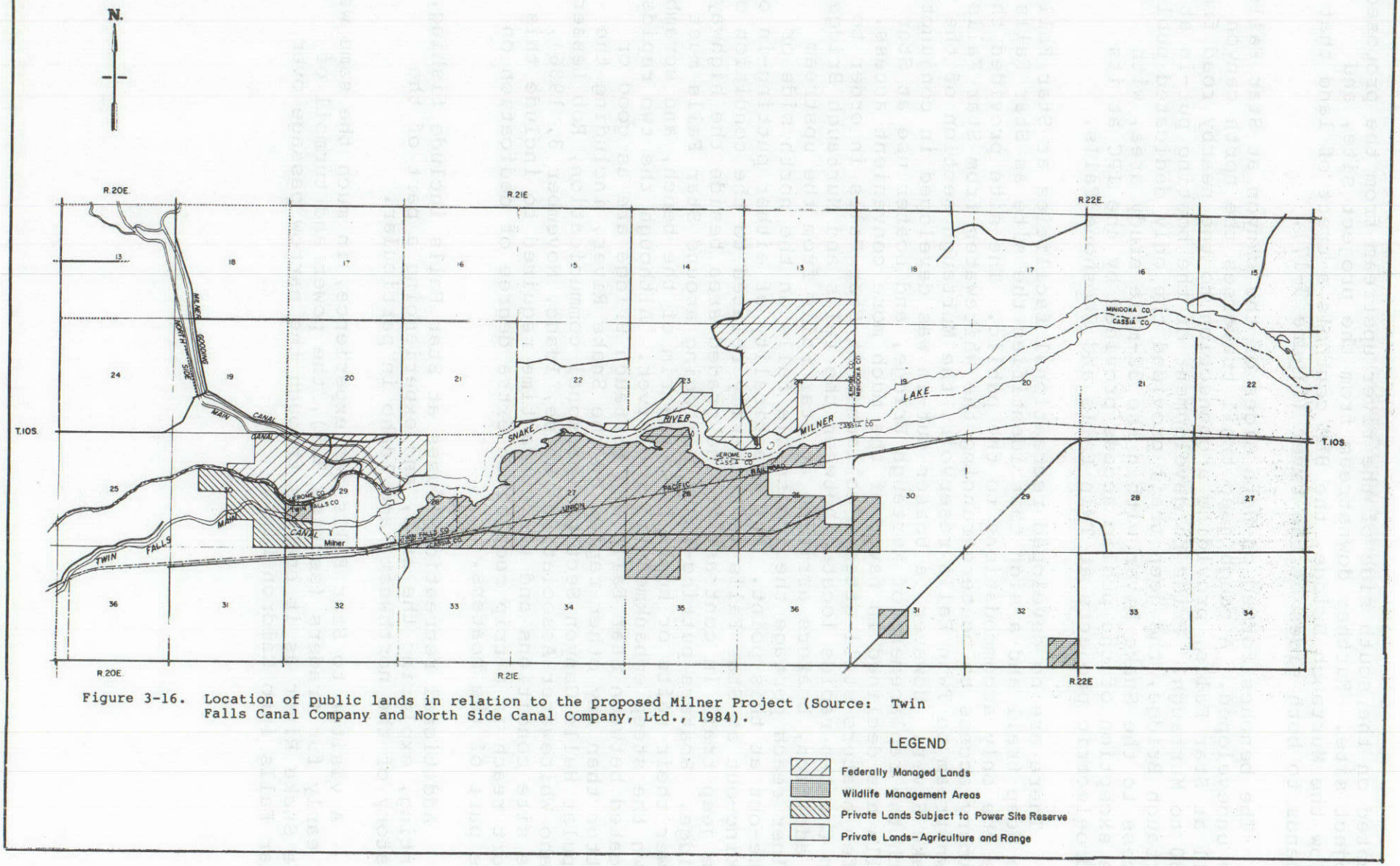


Figure 3-16. Location of public lands in relation to the proposed Milner Project (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

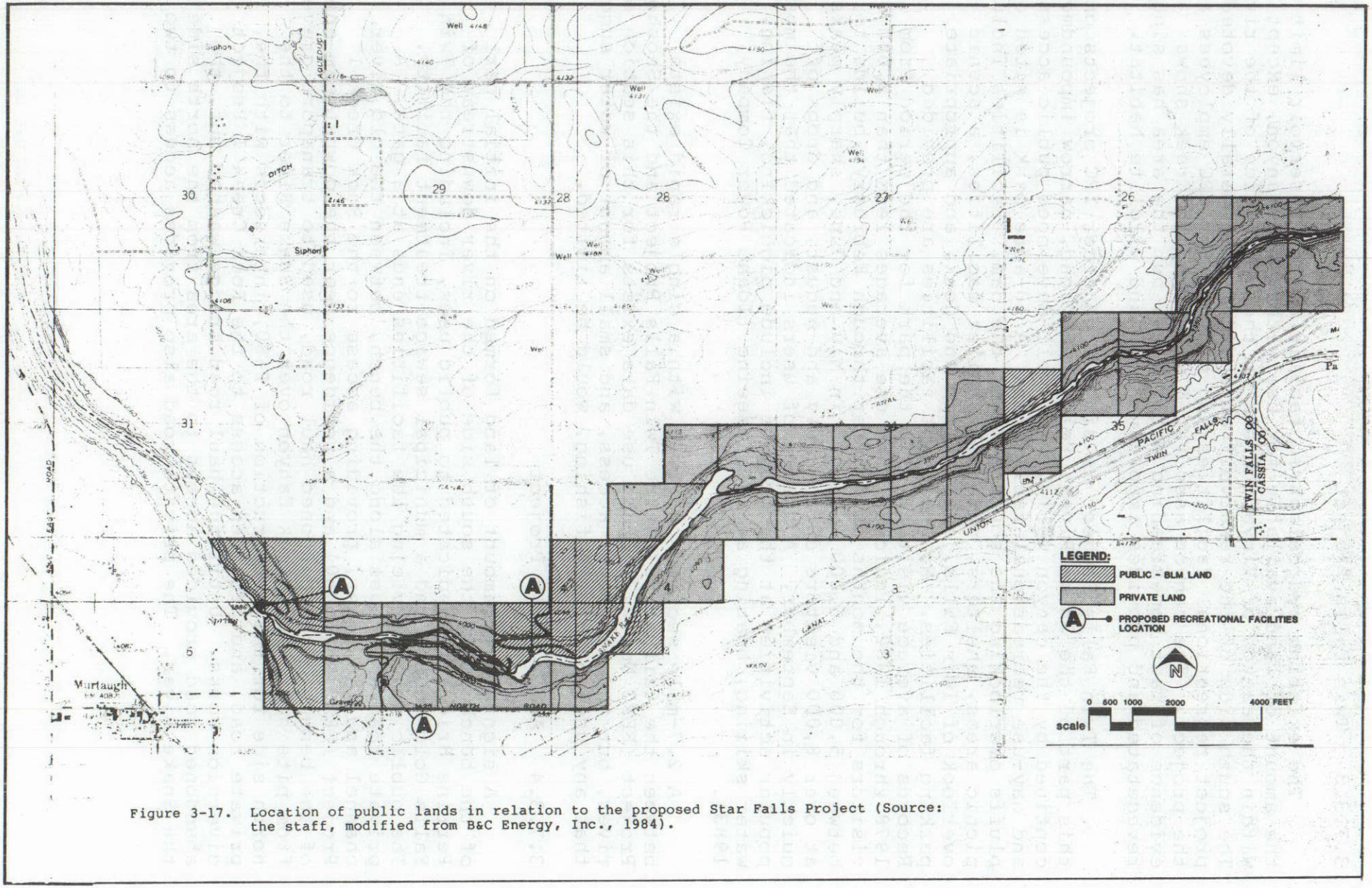
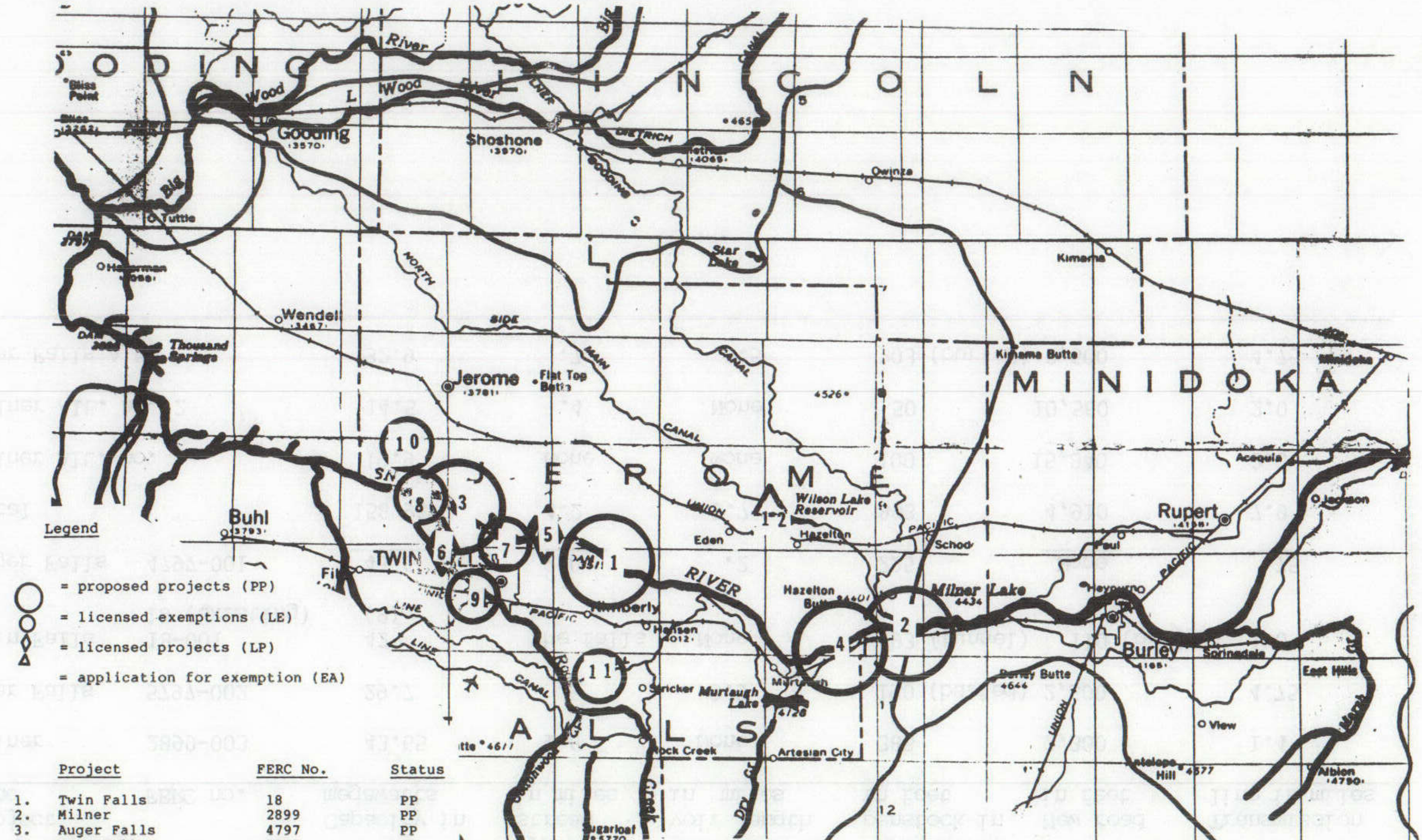


Figure 3-17. Location of public lands in relation to the proposed Star Falls Project (Source: the staff, modified from B&C Energy, Inc., 1984).



Project		FERC No.	Status
1.	Twin Falls	18	PP
2.	Milner	2899	PP
3.	Auger Falls	4797	PP
4.	Star Falls	5797	PP
5.	Shoshone Falls	2778	LP
6.	Rock Creek II	6015	LP
7.	Kasel-Witherspoon	6410	LE
8.	Rock Creek	6450	LE
9.	KTFI	6663	LE
10.	N-32	6778	LE
11.	Lower Low Line Canal	8961	LE
12.	Wilson Lake	10454	EA

Figure 4-1. Existing and proposed hydropower projects in the vicinity of the 32-mile-long study reach between Milner dam and Rock Creek (Source: the staff).

Form No. 217
7/94

FOR OFFICE USE ONLY
Amt. of Fee $: 600.00
Receipt No: 041802
Receipt By: [illegible]
Date Receipted: 3/23/98

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

RECEIVED
MAR 2 3 1998
Department of Water Resources

PROOF OF BENEFICIAL USE

The Idaho Department of Water Resources considers this form a statement that the permit holder(s) has/have completed all development that will occur under this permit and that water has been applied according to the provisions of the permit for the beneficial use(s) described below. This form must be accompanied by a license examination fee, when necessary, or be accompanied by a completed field examination report prepared by a certified water right examiner who has been appointed by the department.

1. Permit No. 02-07375 Telephone No. 734-0700 (Sharon)

2. Name(s) of Permit Holder(s): IDAHO POWER COMPANY

3. Mailing Address: P.O. BOX 70, BOISE, IDAHO 83707

4. Source of Water: SNAKE RIVER If **GROUNDWATER** (well), Date Drilled: mo._____ / yr._____

a. Well Driller: _____ Drilling Permit Number: ____ - ____ - ____ - ____

b. *OPTIONAL:*
Pump Horsepower: _____ Pressure (psi): _____ Dynamic pumping level (ft): _____

5. Use(s) (as authorized by the water right permit):

Domestic (No. of households): _____ Stockwater (No. and type of stock): _____

Irrigation (No. of acres): _____ Other: POWER

6. Total rate of diversion and/or volume for which proof is submitted: 5,000 cfs **OR** _____ acre feet

7. Measuring Device Requirement: **(refer to the approval conditions on your permit and respond accordingly)**
(This question is not optional. Please check either yes or no. Proofs returned not checked accordingly, will be considered incomplete)

Measuring Device:	Is a measuring device required?	Yes X	or	No ____
	Has the measuring device been installed?	Yes X	or	No ____
Flow Measurement Port:	Is a flow measurement port required?	Yes X	or	No ____
	Has the measurement port been installed?	Yes X	or	No ____

8. Fee Enclosed: $ 600.00 (See Fee Schedule on back of the instructions for filing proof of beneficial use)

9. Person to contact to accompany the Department representative during field examination of the water system.

Name: Jeff Brown Telephone Number: 736-3417

Address: Twin Falls Power Plant

10. The information given on this form is my true statement of the extent to which the above numbered permit has been developed and I relinquish any undeveloped portion of the permit to the State of Idaho.

MICROFILMED
MAY 0 6 1998

Signature of permit holder: [signature] Date: 3/20/98

(include your title, if on behalf of company of organization)

JAMES C. TUCKER, ATTORNEY FOR IDAHO POWER COMPANY

State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 02-07375

Proposed Priority: April 9, 1982 **Maximum Diversion Rate:** 5000.00 CFS

This is to certify, that **IDAHO POWER CO**
PO BOX 70
BOISE ID 83707

has applied for a permit to appropriate water from:

SNAKE RIVER tributary of **COLUMBIA RIVER**

and a permit is **APPROVED** for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION
POWER	01/01 to 12/31	5000.00 CFS

LOCATION OF POINT(S) OF DIVERSION: Lot 3(NWNE), Sec. 4, Township 10S, Range 18E
TWIN FALLS County

PLACE OF USE: POWER

TWN	RGE	SEC	
10S	18E	4	Lot 3(NENW)

CONDITIONS/REMARKS:

1. Proof of construction of works and application of water to beneficial use shall be submitted on or before **May 1, 1998.**
2. Subject to all prior water rights.
3. The right holder shall either install a measuring device or a flow measurement port or provide a certified measurement or computation of flow based upon system design to be prepared by a professional engineer.
4. This right is subject to the provisions of Sections 42-205 through 42-210, Idaho Code, restricting the sale, transfer, assignment, or mortgage of this right. Failure to comply with these provisions is cause for immediate cancellation of this right.
5. Water used under this right if discharged into a natural channel or subsurface system shall meet Idaho Water Quality Standards.
6. The diversion and use of water under this right and any license subsequently issued is subject to review by the Director on the date(s) of expiration of any license issued by the Federal Energy Regulatory Commission. Upon appropriate findings relative to the interest of the public, the Director may cancel all or any part of the use authorized herein and may revise, delete or add conditions under which the right may be exercised.

APPROVED

APR 19 1993

State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 02-07375

CONDITIONS/REMARKS:

7. The water right acquired under this permit for hydropower purposes shall be junior and subordinate to all rights to the use of water, other than hydropower, within the State of Idaho that are initiated later in time than the priority of this permit and shall not give rise to any right or claim against future rights to the use of water, other than hydropower, within the State of Idaho initiated later in time than the priority of this permit.
8. This right does not constitute Idaho Public Utilities Commission or Federal Energy Regulatory Commission approval that may be required.
9. Use of water under this right shall be non-consumptive.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Boise, this

8th day of April, 1993.

R. Keith Higginson, Director

APR 19 1993

Form 202
3/78

Ident. No. 02-7375

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name of applicant Idaho Power Company Phone 383-2200

   Post office address P O Box 70, Boise, Idaho 83707

2. Source of water supply Snake River which is a tributary of Columbia

3. Location of point of diversion is ~~Lots 2 and 5~~ Lot 3 (as per phone conversation this date 4/13/82) ADM of Section 4 Township 10 S

   Range 18 E B.M. Twin Falls County, additional points of diversion if any: NW NE (BC)

4. Water will be used for the following purposes:

   Amount 5,000 cfs (cfs or acre-feet per annum) for power generation purposes from Jan. 1 to Dec. 31 (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

5. Total quantity to be appropriated:

   a. 5,000 cubic feet per second and/or b. _____ acre-feet per annum.

6. Proposed diverting works:

   a. Description of ditches, flumes, pumps, headgates, etc. Concrete dam, steel penstock and powerhouse (existing Twin Falls Hydroelectric Project.)

   b. Height of storage dam _____ feet, active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet, materials used in storage dam: concrete

      Period of year when water will be diverted to storage _____ (Month/Day) to _____ (Month/Day), inclusive.

   c. Proposed well diameter is _____ inches; proposed depth of well is _____ feet.

7. Time required for the completion of the works and application of the water to the proposed beneficial use is 5 years *(minimum 1 year – maximum 5 years).*

8. Description of proposed uses:
   a. If water is **not** for irrigation:
      (1) Give the place of use of water: Lot 3 _____ of Section 4 Township 10 S

      Range 18 E B.M.

      (2) Amount of power to be generated: 80,000 horsepower under 142 feet of head.

      (3) List number of each kind of livestock to be watered _____

      (4) Name of municipality to be served _____, or number of families to be supplied with domestic water _____.

      (5) If water is to be used for other purposes describe: _____

APR 19 1983

b. If water is for irrigation, indicate acreage in each subdivision in the tabulation below:

TWP	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

Total number of acres to be irrigated _____

c. Describe any other water rights used for the same purposes as described above. License No 17070, priority April 2, 1929 for 1,050 cfs. (NEW # 02-02056)

9. a. Who owns the property at the point of diversion Idaho Power Company

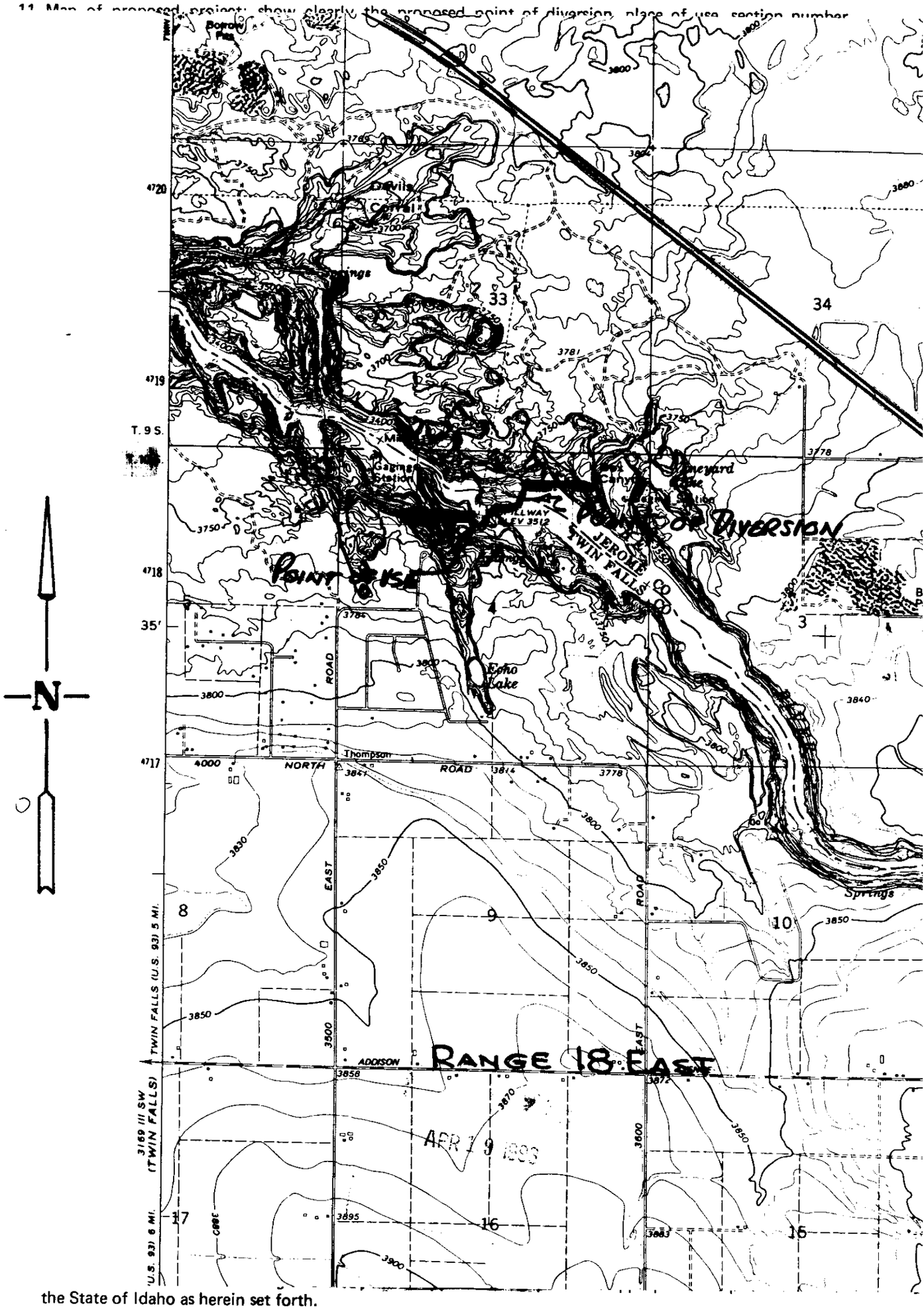
b. Who owns the land to be irrigated or place of use Idaho Power Company

c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing _____

10. Remarks As part of Idaho Power Company's federal relicensing of Twin Falls Hydroelectric Project No 18, the Company intends to uprate the project to provide for additional generating capacity. This uprating will utilize an additional 5,000 cfs of public waters for power generation purposes. Idaho Power Company currently holds a license for 1,050 cfs at the project which together with this application brings the total appropriation at the Project to 6,050 cfs.

APR

11. Map of proposed project: show clearly the proposed point of diversion, place of use, section number



the State of Idaho as herein set forth.

APR 9 1993

C. E. Bissell

C E Bissell (Applicant)
Vice President - Power Plant Construction
and Operations

Received by mcrp 4-9-82 3:30p Date 4-5-82 Time 230

Preliminary check by ADM Fee $ 7725.00 # 22130

Receipted by mcrp Date 4/9/82

Publication prepared by mcrp Date 4/12/82, 3/19/91

Published in times news, Post Register, Times News, Id. Statesman, Lewiston Tri

Publication dates 4/22 & 4/29/82; 4/4 & 4/11/91

Publication approved mcrp Date 4/20/82, 4/23/91

Protests filed by: magic valley fly fishermen, phyllis bukal, tim cochnauer, fish & game

Copies of protests forwarded by _____

Hearing held by _____ Date _____

Recommended for approval denial by _____

ACTION OF THE DIRECTOR, DEPARTMENT OF WATER RESOURCES

This is to certify that I have examined Application for Permit to appropriate the public waters of the State of Idaho No. _____, and said application is hereby _____.

1. Approval of said application is subject to the following limitations and conditions:

   a. SUBJECT TO ALL PRIOR WATER RIGHTS.

   b. Proof of construction of works and application of water to beneficial use shall be submitted on or before _____, 19____.

   c. The rate of diversion, if water is to be used for irrigation under this permit, when combined with all other water rights for the same land shall not exceed 0.02 cubic feet per second for each acre of land.

   d. Other:

IDAHO DEPARTMENT OF WATER RESOURCES
1301 N. Orchard St.
Boise, ID 83706-2237
(208) 334-7900

IDAHO DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION
222 SHOSHONE STREET EAST
TWIN FALLS, IDAHO 83301

Proof of Publication

The Post-Register

State of Idaho,
County of Bonneville } ss

I, ...Ted. Delezene....., first being duly sworn, depose and say: That I am the .....Foreman..... of The Post Company, a corporation of Idaho Falls, Bonneville County, Idaho, publishers of The Post-Register, a newspaper of general circulation, published daily, except Saturday, at Idaho Falls, Idaho; said Post-Register being a consolidation of the Idaho Falls Times, established in the year 1890, The Idaho Register, established in the year 1880 and the Idaho Falls Post, established in 1903, such consolidation being made on the 1st day of November, 1931, and each of said newspapers have been published continuously and uninterruptedly, prior to consolidation, for more than seventy-eight (78) weeks and said Post-Register having been published continuously and uninterruptedly from the date of such consolidation, up to and including the last publication of notice hereinafter referred to.

That the notice, of which a copy is hereto attached and made a part of this affidavit, was published in said Post-Register for .....Two Issues..... consecutive weeks, first publication having been made on the .....4th..... day of .....April....., 19..91., last publication having been made on the .....11th..... day of .....April....., 19..91., and that the said notice was published in the regular and entire issue of said paper on the respective dates of publication, and that such notice was published in the newspaper and not in a supplement.

Subscribed and sworn to before me, this ..12th.. day of .....April....., 19..91

.....Cathy Von Borstel.....
Notary Public

My commission expires .....March 5....., 19..96

B10

NOTICE OF APPLICATION FOR WATER RIGHT

The Following application(s) have been filed to appropriate the public waters of the State of Idaho:

02-07343 ok

COGENERATION INC.
2405 SPRING MOUNTAIN DR.
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 12 (NENW) Sec 30 T 09S R 17E
Use: POWER (800.000 CFS)
RECREATION (10.000 CFS)
FIRE PROTECTION (1.000 CFS)
Total Diversion: (811.000 CFS)
Date Filed: 4/24/ 1981
In: T09S R16E S23 Lot 13 (NWNE) Lot 12 (SENE)

02-07375 ok

IDAHO POWER CO.
P.O. BOX 70
BOISE, ID 83707
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 3 () Sec 4 T 10S R 18E
Use: POWER (5000.000 CFS)
Total Diversion: (5000.000 CFS)
Date Filed: 4/ 5/ 1982
In: T10S R18E S04 Lot 3 ()

02-07386 ok

COGENERATION INC.
2405 SPRING MOUNTAIN DRIVE
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: NENW Sec 30 T 09S R 17E
Use: POWER (4200.000 CFS)
Total Diversion: (4200.000 CFS)
Date Filed: 6/ 7/ 1983

In: T09S R16E S23 NWNE SENE

The permit(s) will be subject to all prior water rights. Protests must be filed with the Director, Dept. of Water Resources, Southern Region, 222 Shoshone Street East, Twin Falls, Idaho 83301 on or before APRIL 22, 1991.

R. KEITH HIGGINSON, Director

Published: April 4, 11, 1991

RECEIVED
APR 16 1991
Department of Water Resources
Southern Region Office

ok
mb
4-24-91

APR - 9 1993

APR 16 1991

STATEMENT

Department of Water Resources
Southern Region Office

The Post-Register

EAST IDAHO'S HOME PAPER

P.O. BOX 1800 — IDAHO FALLS, IDAHO 83403 — DIAL 522-1800

State Of Idaho
Department Of Water Resources
Southern Region
222 Shoshone Street East
Twin Falls, Idaho 83301
FEDERAL ID. #82-0220642

TEAR OFF THIS SLIP AND ENCLOSE WITH CHECK TO ASSURE PROPER CREDIT BEING GIVEN. YOUR CANCELLED CHECK WHEN RETURNED BY YOUR BANK IS A VALID RECEIPT.

$_____

DATE	INCHES - LINES	WORDS	DAYS	CHARGES	✓	CREDITS	BALANCE
				BALANCE FORWARD			
April 4, 1991							
Legal Notice: Notice of Application For Water Right 02-07343, 02-07375, 02-07386 Published April 4, 11, 1991				$56.70			$56.70

OK MB 4-24-91

I hereby certify that the foregoing account is correct and just, that the services were actually rendered as charged, and I/we have not received payment thereof.

THE POST REGISTER

Cathy von Borstel

Cathy von Borstel
Legal Secretary

EXPLANATION OF SYMBOLS:
DS DISPLAY ADV. EC ENGRAVED CUTS CL CLASSIFIED ADV. CS CASH LG LEGAL ADV. AJ ADJUSTMENT SP SPECIAL ADV. RE RE-ORDER (CLASSIFIED ADV

DIAL 522-1800 P.O. BOX 1800 The Post-Register IDAHO FALLS, IDAHO 834(

APR 19 1993

NOTICE OF APPLICATION FOR WATER RIGHT

The following application(s) have been filed to appropriate the public waters of the State of Idaho:

02-07343
COGENERATION INC.
2405 SPRING MOUNTAIN DR.
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 12 (NENW) Sec 30 T 09S R 17E
Use: POWER (800.000 CFS)
RECREATION (10.000 CFS)
FIRE PROTECTION (1.000 CFS)
Total Diversion: (811.000 CFS)
Date Filed: 4/24/1981
In: T09S R16E S23 Lot 23 (NWNE) Lot 12 (SENE).

02-07375
IDAHO POWER CO.
P.O. BOX 70
BOISE, ID 83707
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 3 () Sec 4 T 10S R 18E
Use: POWER (5000.000 CFS)
Total Diversion: (5000.000 CFS)
Date Field: 4/5/1982
In: T10S R18E S04 Lot 3 ().

02-07386
COGENERATION INC.
2405 SPRING MOUNTAIN DRIVE
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: NENW Sec 30 T 09S R 17E
Use: POWER (4200.000 CFS)
Total Diversion: (4200.000 CFS)
Date Filed: 6/7/1983
In: T09S R16E S23 NWNE SENE.

47-08255
CITY OF BUHL
203 BROADWAY
BUHL, ID 83316
Source: GROUNDWATER
Diversion Pt: SWNENE Sec 1 T 10S R 14E
Use: MUNICIPAL (4.400 CFS)
Total Diversion: (4.400 CFS)
Date Filed: 11/26/1990
In: City limits of Buhl, ID

The permit(s) will be subject to all prior water rights. Protests must be filed with the Director, Dept. of Water Resources, Southern Region, 222 Shoshone Street East, Twin Falls, Idaho 83301 on or before APRIL 22,1991.

R KEITH HIGGINSON, Director

PUBLISH: Thursday, March 4 and 11, 1991.

Affidavit of Publication

RECEIVED

№ 22221

STATE OF IDAHO } ss.
COUNTY OF TWIN FALLS }

APR 15 1991

Department of Water Resources
Southern Region Office

I, Linda Copps McGuire being first duly sworn upon oath, depose and say that I am Clerk of the TIMES-NEWS, published daily, at Twin Falls, Idaho, and do solemnly swear that a copy of the notice of advertisement, as per clipping attached, was published in the regular and entire issue of said newspaper, and not in any supplement thereof, for Two consecutive Weeks, commencing with the issue dated April 4, 1991, and ending with the issue dated April 11, 1991.

And I do further certify that said newspaper is a consolidation, effective February 16, 1942, of the Idaho Evening Times, published theretofore daily except Sunday, and the Twin Falls News, published theretofore daily except Monday, both of which newspapers prior to consolidation had been published under said names in said city and county continuously and uninterruptedly during a period of more than twelve consecutive months, and said TIMES-NEWS, since such consolidation, has been published as a daily newspaper except Saturday, until July 31, 1978, at which time said newspaper began daily publication under said name in said city and county continuously and uninterruptedly.

And I further certify that pursuant to Section 60-108 Idaho Code, Thursday of each week has been designated as the day on which legal notice by law or by order of any court of competent jurisdiction within the state of Idaho, to be published weekly, will be published; and that at the head of the editorial column of said combined newspapers, and in each issue thereof, Thursday is announced as the day on which said legal notices will be published.

STATE OF IDAHO
COUNTY OF TWIN FALLS

On this 11 day of April in the year of 1991, before me, a Notary Public, personally appeared Linda Copps McGuire, known or identified to me to be the person whose name subscribed to the within instrument, and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that he executed the same.

Sueva R. Fetterman
Notary Public for Idaho
Residing at Twin Falls County
My commission expires: 5/19/94

OK mb 4-23-91

CLASSIFIED ADVERTISING INVOICE
TWIN FALLS TIMES NEWS
132 3RD ST W.
P. O. BOX 548
TWIN FALLS ID 83303

RECEIVED
APR 15 1991
Department of Water Resources
Southern Region Office

Forwarding & address correction requested

INVOICE NO.	CLASS	BILLING DATE
22221	343	04/11/91
INDEXING TERM		
02-07343 ET AL 02-7375 02-7386		
START DATE	TELEPHONE NO.	
4/04/91	734-3578	

LINES/WORDS	TIMES	RATE	NET AMOUNT	GROSS AMOUNT
94			67.68	67.68
AFFIDAVIT			3.00	3.00
PAY THIS AMOUNT ▶			70.68	70.68

GROSS AMT DUE AFTER 04/26

RETURN THIS PORTION WITH YOUR REMITTANCE

22221 7068

THIS SPACE FOR ADDRESS ONLY

IDAHO WATER RESOURCES
222 SHOSHONE ST E
TWIN FALLS ID 83301

OK mb 4-23-91

APR 19 1993

RECEIVED

APR 16 1991

Department of Water Resources
Southern Region Office

The Idaho Statesman

P.O. BOX 40, BOISE, IDAHO 83707

LEGAL ADVERTISING INVOICE

Amount Due
61.32

Account Number	Identification
100632	Notice of Application for Water Right

Ordered By	P.O. Number	Rate	Run Dates
Mary Baldwin		nt	April 4, 11, 1991

Idaho Department of Water Resources
Southern Region
222 Shoshone St. East
Twin Falls, ID 83301

Estimated Inches	Real Inches
= Affidavits: 1	Legal Number: 7968

OK MB 4-23-91

NOTICE OF APPLICATION FOR WATER RIGHT

The following application(s) have been filed to appropriate the public waters of the State of Idaho:

02-07343 OK
COGENERATION INC.
2405 SPRING MOUNTAIN RD.
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 12 (NENW) Sec 30 T 09S R 17E
Use: POWER (800.000 CFS)
RECREATION (10.000 CFS)
FIRE PROTECTION (1.000 CFS)
Total Diversion (811.000 CFS)
Date Filed: 4/24/1981
In: T09S R16E S23 Lot 13 (NWNE) Lot 12 (SENE)

02-07375 OK
IDAHO POWER CO.
P.O. BOX 70
BOISE, ID 83707
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 3 () Sec 4 T10S R18E
Use: POWER (5000.000 CFS)
Total Diversion: (5000.000 CFS)
Date Filed: 4/5/1982
In: T10S R18E S04 Lot 3 ()

02-07386 OK
COGENERATION INC.
2405 SPRING MOUNTAIN DRIVE
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: NENW Sec 30 T09S R17E
Use: POWER (4200.00 CFS)
Total Diversion: (4200.00 CFS)
Date Filed: 6/7/1983
In: T09S R16E S23 NWNE SENE

The permit(s) will be subject of all prior water rights. Protests must be filed with the Director, Dept. of Water Resources, 222 Shoshone St. East, Twin Falls, Idaho 83301 on or before APRIL 22, 1991.

R. Keith Higginson, Director

Pub. Apr. 4, 11, 1991 7968

Denise Richardson, being duly sworn, deposes and says: That she is the Principal Clerk of The Idaho Statesman, a daily newspaper printed and published at Boise, Ada County, State of Idaho, and having a general circulation therein and which said newspaper has been continuously and uninterruptedly published in said County during a period of twelve consecutive months prior to the first publication of the notice, a copy of which is attached hereto; that said notice was published in The Idaho Statesman in conformity with Section 60-108, Idaho Code as amended, for two

☒ consecutive weekly ☐ consecutive daily ☐ single ☐ odd skip

insertion(s) beginning with the issue of Apr. 4, 1991

and ending with the issue of Apr. 11, 1991

Denise Richardson

STATE OF IDAHO)
ss.
COUNTY OF ADA)

On this 11th day of April in the year of 1991, before me, a Notary Public, personally appeared Denise Richardson, known or identified to me to be the person whose name subscribed to the within instrument, and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that she executed the same.

Notary Public for Idaho
Residing at Boise, ID
My commission expires: APR 9 1993

TRIBUNE PUBLISHING COMPANY, INC.
The Lewiston Morning Tribune
505 C St., P.O. Box 957
Lewiston, Idaho 83501
(208) 743-9411

Date 041191 INVOICE No. 225380

Account No. 446620 02-07343

Description 2538ONOTIC

Times 2 Lines 61

Tab Lines

LEGAL ADVERTISING
INVOICE

SOLD TO:

DEPT. OF WATER RESOURCES
2148 4TH AVE. E.
TWIN FALLS
ID 83301

RECEIVED
APR 16 1991
Department of Water Resources
Southern Region Office

$ 68.63

NOTICE: This is an invoice of Purchase made by you. Statement will be rendered the first of the month.
Please Retain This Invoice as Your Statement Will Refer To Invoice by No. Only.

AFFIDAVIT OF PUBLICATION

STATE OF IDAHO, ss.
County of Nez Perce

Sue Baumeister, being duly sworn, deposes and says, I am the Legal Clerk of the Tribune Publishing Company, a corporation organized and existing under and by virtue of the laws of the State of Idaho, publishers of the LEWISTON MORNING TRIBUNE, a newspaper of general circulation published at Lewiston, Nez Perce County, Idaho; That the said Lewiston Morning Tribune is an established paper and has been published regularly and issued regularly at least once a day for more than 21 consecutive years next immediately preceding the first publication of this notice, and has been so published uninterrupted for said period; that the

NOTICE OF APPLICATION

attached hereto and which is made a part of this affidavit was published in the said Lewiston Morning Tribune, 2 time(s). Publication being on 040491, or once a WEEK for 2 consecutive WEEKS, the first publication thereof being on the 040491, and the last publication thereof being on the 041191, and said NOTICE OF APPLICATION was so published in the regular and entire issue of said newspaper and not in a supplement thereof and was so published in every issue and number of the said paper, during the period and times of publication as set forth above.

Sue Baumeister

SUBSCRIBED AND SWORN BEFORE ME THIS THE 12 day of April 1991

Notary Public in and for the State of Idaho, residing at Lewiston, therein.

MY COMMISSION EXPIRES 9 1993.

OK MB 4-23-91

NOTICE OF APPLICATION FOR WATER RIGHT

The Following application(s) have been filed to appropriate the public waters of the State of Idaho:

02-07343 ✓ OK
COGENERATION INC.
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Use: POWER (800.000 CFS)
RECREATION (10.000 CFS)
FIRE PROTECTION (1.000 CFS)
Total Diversion: (811.00 CFS)
Dated Filed: 4/24/1981
In: T09S R16E S23 Lot 13 (NWNE) Lot 12 (SENE)

02-07375 / OK
IDAHO POWER CO.
P.O. BOX 70
BOISE, ID 83707
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: LOT 3 () Sec 4 T 10S R 18E
Use: POWER (5000.000 CFS)
Total Diversion: (5000.000 CFS)
Date Filed: 4/ 5/ 1982
In: T10S R18E S04 Lot 3 ()

02-07386 / OK
COGENERATION INC.
2405 SPRING MOUNTAIN DRIVE
BOISE, ID 83702
Source: SNAKE RIVER
Tributary: COLUMBIA RIVER
Diversion Pt: NENW Sec 30 T 09S: R 17E
Use POWER (4200.00 CFS)
Total Diversion: (4200.00 CFS)
Dated Filed: 6/ 7/ 1983
In: T09S R16E S23 NWNE-SENE

The permit(s) will be subject to all prior water rights. Protests must be filled with the Director, Dept. of Water Resources, Southern Region, 222 Shoshone Street East, Twin Falls, Idaho 83301 on or before APRIL 22, 1991.

R. KEITH HIGGINSON, Director

State of Idano
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, P.O. Box 83720, Boise, Idaho 83720-0098
Phone: (208) 327-7900 FAX: (208) 327-7866

PHILIP E. BATT
GOVERNOR

KARL J. DREHER
DIRECTOR

May 1, 1998

IDAHO POWER CO
PO BOX 70
BOISE ID 83707

PROOF ACKNOWLEDGMENT LETTER

RE: PERMIT NO. 02-07375

Dear Permit Holder:

The department acknowledges receipt of the proof of beneficial use form submitted for the above referenced permit. The next step in the process of developing a water right is for the department to conduct a field examination to determine and confirm the use being made of the water.

Be advised that Section 42-248, Idaho Code, requires you or the owner of this water right to maintain current ownership and address records on file with the department. Forms to file a change of ownership of a water right and/or a change in the address of the water right owner are available from any department office.

If you have questions concerning the field examination, please contact the department's **SOUTHERN** Regional Office in Twin Falls at (208)736-3033.

Sincerely,

Julie L. Yarbrough

JULIE L. YARBROUGH
Senior Secretary, Water Allocation Bureau

c: IDWR - Regional Office

MICROFILMED
MAY 0 6 1998

RECEIVED
MAR 2 3 1993
Department of Water Resources

LIMITED POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

Idaho Power Company, an Idaho corporation, hereby nominates and appoints James C. Tucker of the law firm of Rosholt, Robertson & Tucker, with offices in Boise, Idaho, and Twin Falls, Idaho, as attorney-in-fact with full authority to act for and on behalf of Idaho Power Company, to authorize, prepare, and/or sign any and all documents, claim forms, amendments, or any other document or instrument required or necessary to protect the interest of Idaho Power Company related to its water rights, including, but not limited to, any and all documents necessary to be filed in the Snake River Basin Adjudication.

Idaho Power Company's agent is hereby authorized to sign, seal, and deliver, as its act and deed, those said instruments of writing that may be necessary or proper to carry into execution and effect all claims relating to Idaho Power Company's water rights as above-mentioned. Further, Idaho Power Company hereby declares that each and every agreement, receipt, or payment which shall be by its said agent given, made or done for the aforesaid purposes shall be as good, valid, and effectual as if they had been signed, sealed, and delivered by Idaho Power Company in its own proper representative; and Idaho Power Company hereby undertakes at all times to ratify whatsoever its said agent shall lawfully do or cause to be done in or concerning the said premises by virtue of these presents.

IN WITNESS WHEREOF, Idaho Power Company has hereunto executed this Limited Power of Attorney this 14th day of August, 1992.

IDAHO POWER COMPANY

By: J. L. Hart Keen

ATTEST:

By: Kelt W. Earl
Secretary

MICROFILMED
MAY 0 6 1998

STATE OF IDAHO)
)ss.
County of Ada)

On this 14th day of August, 1992, before me, a Notary Public, in and for said County and State, personally appeared J. LaMont Keen and Robert W. Stahman, known or identified to me to be the Vice-President and Secretary, respectively, of the Idaho Power Company, the corporation that executed the foregoing instrument, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

Sally A. Manwaring
NOTARY PUBLIC FOR IDAHO
Residing at: Boise
My commission expires: 12.31.92

MICROFILMED
MAY 0 6 1998

February 28, 1998

IDAHO POWER CO
PO BOX 70
BOISE ID 83707

PROOF DUE NOTICE

RE: PERMIT NO. 02-07375

Dear Permit Holder:

One of the conditions of approval of the above referenced water permit was that proof of the extent of your beneficial use must be submitted to this office on or before May 1, 1998. (See last page of your approved permit or your last approved extension request.) Enclosed is a form which when accompanied by the license examination fee or a complete field examination report prepared by a certified water right examiner may be used to submit the required proof.

If you have not fully completed your project, and you or a previous owner of this permit have not received a prior extension of time, you may request an extension of time if the delay is for reasonable cause as provided in Section 42-204, Idaho Code. If you have been prevented from proceeding by a governmental agency or by litigation which might bring title to the water in question, more than one extension of time can be granted. An extension of time request form is enclosed for your convenience.

Either an acceptable proof of beneficial use submittal or an acceptable request for an extension of time must be received by this department on or before the above described proof due date. If neither is received, the department will send you a lapse notice. Within sixty (60) days of the mailing of the lapse notice, the permit will no longer be of any force nor effect.

SINCERELY,

JULIE L. YARBROUGH
Senior Secretary

Enclosures

MICROFILMED
MAY 0 6 1998

CERTIFIED MAIL
NO. 590062410

RECEIVED
JUN 27 1994
Department of Water Resources

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Idaho Power Company	)	Project No. 2778
	)	Idaho A 02-7375

NOTICE OF INTENT TO FILE AN APPLICATION FOR A NEW LICENSE

(June 22, 1994)

Take notice that Idaho Power Company, the existing licensee for the Shoshone Falls Hydroelectric Project No. 2778, filed a timely notice of intent to file an application for a new license, pursuant to 18 CFR 16.6 of the Commission's Regulations. The original license for Project No. 2778 was issued effective June 1, 1949, and expires May 31, 1999.

The project is located on the Snake River in Jerome and Twin Falls Counties, Idaho. The principal works of the Shoshone Falls Project include a dam divided into four sections by natural solid rock islands in the river, section one and three being Ambursen reinforced concrete, section two a concrete gravity, and section four a gated concrete, all overflow types and above the Falls; a reservoir of about 750 acre-feet storage; a reinforced concrete intake, a concrete lined tunnel and a steel penstock, together 176 feet long; a powerhouse on the right bank of the river below the falls and with 12,500 kW installed capacity; a 46 kV substation; and appurtenant facilities.

Pursuant to 18 CFR 16.7, the licensee is required henceforth to make available certain information to the public. This information is now available from the licensee at 1221 West Idaho Street, Corporate Library, Second Floor, P.O. Box 70, Boise, Idaho 83707, Phone: (208) 383-2491.

Pursuant to 18 CFR 16.8, 16.9 and 16.10, each application for a new license and any competing license applications must be filed with the Commission at least 24 months prior to the expiration of the existing license. All applications for license for this project must be filed by May 31, 1997.

Lois D. Cashell
Secretary

MICROFILMED
MAY 06 1998

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Statehouse Mail, Boise, Idaho 83720-9000
Phone: (208) 327-7900 FAX: (208) 327-7866

CECIL D. ANDRUS
GOVERNOR

R. KEITH HIGGINSON
DIRECTOR

April 8, 1993

IDAHO POWER CO
PO BOX 70
BOISE ID 83707

PERMIT APPROVAL NOTICE

RE: PERMIT NO. 02-07375

Dear Permit Holder:

Enclosed is a copy of your approved application for permit. We direct your attention to the conditions of approval on the final page.

Be sure to note the special condition requiring you to install a measuring device, or a flow measurement port, or to provide a certified measurement or computation of flow based upon the design of the system to be prepared by a professional engineer.

Please be advised that water quality is subject to regulations of the Idaho Department of Health and Welfare. We suggest that you check with them before starting construction.

Sincerely,

Brenda L. Chapman

BRENDA L. CHAPMAN
Water Resource Agent

BLC:cz

Enclosures

APR 9 1993

MEMORANDUM

To: File 02-07375

From: L. Glen Saxton

RE: TWIN FALLS DAM AND POWERPLANT ADDITION

Date: April 1, 1993

On January 18, 1991, FERC issued an order granting a new license (major) to Idaho Power Company (IPCO) for the addition of generating capacity at the existing Twin Falls dam and powerplant. More specifically IPCO plans to add a second intake structure, and increase the installed capacity of 9 MW by an additional 42 MW generatng unit.

Department final review of this application for issuance of a permit has been delayed since protests against approval of the application needed to be resolved.

I recommend that the department issue a permit to IPCO with the usual power related conditions.

APR 19 1993

RECEIVED
JUN 21 1991
Department of Water Resources
Southern Region

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO

WITHDRAWAL OF PROTEST

I, TIM COCHNAUER, hereby withdraw protest filed in the matter of application No. 02-7375 in the name of Idaho Power Company.

Dated this 18 day of June, 1991.

Signature Tim Cochnauer

Protestant

APR 19 1993

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO

WITHDRAWAL OF PROTEST

I, Will Reed for Id. Fish & Game, hereby withdraw protest filed in the matter of application No. 02-7375 in the name of Idaho Power Company.

Dated this 11 day of June, 1991.

Signature Will Reed

Protestant

RECEIVED

JUN 14 1991

Department of Water Resources
Southern Region Office

RECEIVED

APR 19 1993

HOWARD Doug & Laurie
575 E 3600 North 537-6933
HUDSON E M 203 Elm 537-6575
Earl 647 E 3800 North 537-6538
HULSE Russell 384 Maple 537-6634
HURLEY John & Patti
3341 N 900 East 537-6836

I

IDAHO POWER COMPANY
Business Office 1007 Main Buhl 543-4384
After 5 PM Weekdays Weekends
& Holidays Call 1-800-632-8000
C J Strike Lakes Power Plant
1578-C Clear Lakes Grade Buhl 543-4664
For Buried Cable Location Call
Toll Free 1-800-342-1585

IDAHO VETERINARY MEDICAL ASSOC
NW Of Castleford 537-6664
IRCHAUSTI Pete 771-A E 3400 North .. 537-6971

J

J & D PRINTING ENTERPRISES
300 Main 537-6688
JACKSON Roy 2448 N 700 East 537-6907
JAGUENDE Mikal 360 Elm 537-6826
JENNY'S TRUCK & EQUIPMENT REPAIR
224 Main 537-9941
JEWELL Leonard & Catherine
966 E 3400 North Buhl 537-6822
JOHNSON Lynn 576-A E 3800 North ... 537-6640

K

KEEN Elroy 400 Oak 537-6872
KENDALL LaMar 771 B E 3400 North .. 537-6854
KENNEDY Paul 3884 N 700 East Buhl .. 537-6527
KING & HARTS CLUB 248 Main 537-6863
KINYON Alan R 3525-B N 700 East 537-6623
Bill 618 E 3500 North 537-6590
David W S E Of Castleford 537-6535
Denver 891 E 3300 North 537-6555
G E 778 E 3600 North 537-6678
Jack 602 E 3600 North 537-6842
Joe 3203 N 900 East 537-6545
Norma Lee S W Of Castleford 537-6970
Robert J 3625-A N 700 East 537-6669
KNUDSON Doug 803 E 3500 North 537-6832
KRAMER Alfred 3658 N 800 East 537-6547
Donald 3664 N 800 East 537-6614
Terry Ray 711 E 3800 North 537-6895
KUDLAC Gus 935 E 3800 North 537-6565
KURT'S KARPET KARE 180 Maple 537-6837

L

LAGRONE James R 3680 N 800 East .. 537-6532
LANGDON V 480 Elm 537-6716
LOPEZ Marco Rev
3864 N 700 East Buhl 537-6527
LOTT LaDawn 3427 N 1000 East Buhl .. 537-6508

M

MCCLAIN C W 874 E 3800 North 537-6765
MCCREERY David 902 E 3800 North .. 537-6583
MENDIVIL Noe 315 Maple 537-9926
MIGUEL Antonio 224 Maple 537-6627
MINGS Michael 351 Oak 537-6804
MITTON Richard L
3199 N 1000 East Buhl 537-6671
Terry 285 Oak 537-6811
MITTWUCKER Bob 348 Elm 537-6909
MOORE Tonya 3442 N 700 East 537-9918
MURPHEY Kelly A S W Of Castleford .. 537-6501

N

NIHILL Mike 3358 N 800 East 537-6561
NOLEVANKO Michael & Linda
3330 N 1000 East Buhl 537-6633

O

O AND C DAIRY 3682 N 800 East 537-9909
O'NEIL Kathy N W Of Castleford 537-6562
OWEN R D 212 Maple 537-6502
Willis 448 Oak 537-6725

P

PARKER Darrell W 940 E 3400 North .. 537-6635
PARKSON Galley
3703-C N 800 East Buhl 537-6974
PECKHAM Richard C 3409 N 900 East 537-6638
PEPPER Kirk 3563 N 700 East 537-9908
PETERSON John C N E Of Buhl 537-6975
John C 1060 E 3600 North 537-6906
John Pat 387 Maple 537-6705
Steve 1060 E 3600 North 537-6906
PHILLIPS Darrel 418 Main 537-6733
PINKSTON E F 324 Oak 537-6707

POLICE DEPT
336 Main 537-6701

POTUCEK Joe 3775 N 800 East Buhl ... 537-6609
PRETL Joe 871 E 3400 North 537-6524
PUSCHEL Dan 363 Elm 537-6866

Q

QUICK RESPONSE UNIT
Call 1-800-632-8000

QUIGLEY Clinton W
3703-A N 800 East Buhl 537-6773
Gene 3640-B N 1000 East Buhl 537-6922
Lawrence Jr
3640-A N 1000 East Buhl 537-6531
M M 3703-B N 800 East Buhl 537-6517
T F 3447 N 700 East 537-6516
Ted M 690 E 3700 North Buhl 537-6648

R

RAMOS Joe 339 Poplar 537-9930
RANDALL Everett 202 Jonathan 537-6718
RED BARREL 903 Main 537-6810
REED Van 771 E 3500 North 537-6553
REESE Arthur 3453 N 800 East 537-6573
Chris 1061 E 3500 North 537-6548
Danny 316 Oak 537-6706
REEVES Edgar 436 Main 537-6622
REYES Moises 823-B E 3600 North 537-6924
REYNOLDS Charlene 338 Elm 537-6817
Dan 3498 N 700 East 537-6929
Dean 812 E 3400 North 537-6819
Mike 697 E 3700 North Buhl 537-6834
RODGERS Frank Jr 2563 N 800 East .. 537-6802
Richard A 2806 N 700 East 537-6681
RONERO Braulio 2691 N 700 East 537-6953
RUFFING J L 212 Oak 537-6631
RUFFING MIKE ACCT
Office 112 Main 537-6787
Res 324 Maple 537-6926
RUFFING Norbert 3357 N 800 East 537-6606
Raymond J 646 E 3800 North Buhl ... 537-6772
Robert Tom 646 E 3800 North Buhl ... 537-6772
Tom 3829 N 800 East 537-6831
RUNYAN Rodney 2589 N 700 East 537-6615
RUNYON Charles 276 Main 537-6665

S

SAMPLE Cheryl 112 Maple 537-6728
Rodney & Anne W Of Castleford 537-6503
SCHAER Robert W & Judy
1078 E 3300 North Buhl 537-6626
Winnifred Mrs
1078 E 3300 North Buhl 537-6680
SCHLUND Richard 472 Oak 537-6871
SCHOOLS-PUBLIC
Courthouse Both 222 W Main 537-6511
SCHORZMAN Bill
3851-D N 1000 East Buhl 537-6580
Dennis 3248 N 800 East 537-6523
LeWayne 2701 N 700 East 537-6512
LeWayne 1103 E 3500 North Buhl ... 537-6954
Maurice 3672 N 1000 East Buhl 537-6693
Wade 870 E 2700 North 537-6601
SENFTEN Leo 3520-A N 700 East 537-6868
Roland R 988 E 3400 North Buhl 537-6678
SHAFER Harold 203 Maple 537-6777

SHERIFF 543-4200

SILVA Angelo S 823 E 3600 North 537-6829
SILVER SPOON CAFE 113 E Main 537-6781
SMITH David R 1028 E 3600 North 537-6920
Jed C 1024 E 3600 North Buhl 537-6542
Vernon R 3567-A N 1000 East Buhl ... 537-6528
STAHLECKER Howard
761 E 3500 North 537-6504
Jake 649 E 3500 North 537-6549
STALEY Susan & Roger 372 Maple 537-6720
SULLENDER Richard Rev 287 Poplar ... 537-6825
SURILLO Laverne 22' W Elm 537-6894
SWANSON Gary L 360 Maple 537-6519

T

TESCHLER Warren N E Of Castleford ... 537-6609
THE CHICKEN COOP 384 Elm 537-9927
THOMSON John H 844 E 3600 North .. 537-6680
Kirk & Brenda 3623 N 800 East 537-6906
TITUS Kelli
1051 E 3400 North Buhl 537-9923
TVERDY Ken S W Of Castleford 537-6559
TWIN FALLS CANAL CO
Watermaster 400 Maple 537-6661
If No Answer Call Castleford 537-6518

U

U S WEST COMMUNICATIONS
New Service-Changes In Service-Billing
Residence Customers
Toll Free From Our Serving Area 1-333-8440
Business Customers
Toll Free From Our Serving Area 1-385-8342
Repair
Residence Customers
Toll Free Within Idaho 1-561-1631
Business Customers
Toll Free Within Idaho 1-561-1633
Directory Assistance
Within Your Area Code 1-411
Outside Your Area Code
Dial 1 Plus Area Code & Then 555-1212

U S GOVERNMENT
Post Offices
Castleford 117 Main 537-6670

V

VANDERWALKER John G
1044 E 3500 North 537-6883
VAUGHN Charles & Doris
3802 N 1000 East Buhl 537-6820
Jerry 3802 N 1000 East Buhl 537-6820
VILLALOBOS Francisco
N W Of Castleford 537-6562
VINCENT Sam 236 Elm 537-6736
VULGAMORE Brigg 351 Elm 537-6618
Tracy 1061 E 3300 North Buhl 537-6850

W

WALDEN Lester 272 Maple 537-6727
WARE Paul 251 Poplar 537-6608
WEIGHALL James & Kay
N W Of Castleford 537-6804
WELCH Gary
3851-E N 1000 East Buhl 537-6851
Jay 3514 N 900 East 537-6604
Nick 3473 N 900 East 537-6846
WELLS Frank 811 E 3800 North Buhl ... 537-6578
James 790 E 3800 North Buhl 537-6525
Jon 3788 N 800 East 537-6958
Walter N W Of Castleford 537-6709
WHALEY Lisl 227 Elm 537-6620
WHEELER Ed Roseworth 537-6801
F T 260 Oak 537-6625
Jim 287 Oak 537-6828
Thomas V 284 Oak 537-6847
WHITELEY Monroe 248 Elm 537-6812
WIGGINS David 821 E 3600 North 537-6903
Janet 893 E 3400 North 537-6541
John L S E Of Castleford 537-6579
Rob & Lisa 905 E 3400 North 537-6843
Sidney 945 E 3400 North 537-6505
WIGGS Jack L 743 E 3500 North 537-6836
WILKINSON LeRoy & Tamie
3520 N 700 East 537-6918
WINSON Bob 780 E 3600 North 537-6708
WISECAVER Joe & Sandra
903 E 3800 North Buhl 537-6902
Z 894 E 3700 North 537-6582
WYATT Terry 698 E 3400 North 537-6833

Z

ZACH Eugene & Camille
3833 N 900 East Buhl 537-6563
Lumir 3833 N 900 East Buhl 537-6563
ZAMORA Carmelo
3238 N 1000 East Buhl 537-6518
ZIDRASHKO Pavel & Lillie
248 Maple 537-6849
ZIMMERS Jesse
3644 N 1000 East Buhl 537-6857

CASTLEFORD 837321

4-6-92
T/C To
Mrs. Vanderwalker
that the address
is really Buhl,
though listed
in phone book
as Castleford.
MB

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 222 Shoshone St. East, Twin Falls, Idaho 83301 (208) 736-3033

30-Mar-1992

CECIL D. ANDRUS
Governor

R. KEITH HIGGINSON
Director

ATTN JOHN G VANDERWALKER
MAGIC VALLEY FLY FISHERMEN
1044 E 3500 N
CASTLEFORD ID 83321

RE: Application for Permit No. 02-07375 (Idaho Power Co.)

Dear Mr. Vanderwalker:

This office acknowledges receipt of the withdrawal of your protest against the above referenced application.

Since there were multiple protestants, the concerns of the other protestants will need to be addressed by the Department before final processing of the application can be completed.

The Department will continue review of the application without further contact with you unless information is requested.

Please feel free to contact this office if you have any questions regarding this procedure.

Very truly yours,

Loren O. Holmes, P.E.
Southern Region Manager

LH:MB

APR 9 1993

RECEIVED

MAR 30 1992

Department of Water Resources
Southern Region Office

MAGIC VALLEY FLY FISHERMEN

Loren O. Holmes, P. E.
Southern Region Manager
Idaho Department of Water Resources
222 Shoshone St. East
Twin Falls, Idaho 83301

RE: APPLICATION FOR PERMIT 02-7375
IDAHO POWER COMPANY/TWIN FALLS HYDRO PROJECT

Dear Mr. Holmes:

On behalf of the Magic Valley Fly Fishermen, we hereby withdraw the protest filed on May 10, 1982, by the Magic Valley Fly Fishermen against the above-referenced application.

Sincerely,

John G. Vanderwalker
MAGIC VALLEY FLY FISHERMEN
1044 E. 3500 N.
Castleford, Idaho 83321
208-537-6883

APR 19 1993

ROSHOLT, ROBERTSON & TUCKER
Chartered
ATTORNEYS AT LAW
142 3rd AVENUE NORTH
P.O. BOX 1906
TWIN FALLS, IDAHO 83303-1906
TELEPHONE (208) 734-0700
FAX (208) 736-0041

JOHN A. ROSHOLT
J. EVAN ROBERTSON
JAMES C. TUCKER
GARY D. SLETTE
JERRY V. JENSEN
BRUCE M. SMITH
GARY L. QUIGLEY
JUSTIN R. SEAMONS
JOHN O. FITZGERALD
D. BERNARD ZALEHA

Boise Office
1020 MAIN ST., SUITE 400
P.O. BOX 2139
BOISE, IDAHO 83701-2139
TELEPHONE (208) 336-0700
FAX (208) 344-6034

RECEIVED
JAN 07 1992
Department of Water Resources
Southern Region Office

January 6, 1992

Dick Bonamarte
Magic Valley Fly Fisherman
P. O. Box 1037
Twin Falls, Idaho 83303-1037

RE: Application for Permit Number 02-7375 IPC Twin Falls Hydro Project

Dear Mr. Bonamarte:

As you know, our client Idaho Power has completed the FERC licensing process on the above-referenced project (FERC License #2778).

Two of the four protests filed against this application have been withdrawn (Tim Cochnauer and Idaho Fish & Game). We note that the IDWR's May 30, 1991, letter to a third protestant, Phyllis Kukal, was returned marked "undeliverable" with the notation that her forwarding order had expired 6 years ago.

This leaves only the Magic Valley Fly Fisherman as an outstanding protestant to the application. We would like to move forward with this matter, and ask that you contact us as soon as possible to discuss any concerns you may still have.

Very truly yours,

James C. Tucker

JCT/kab
17101

cc: Loren Holmes
Idaho Dept. of Water Resources

APR 19 1993

MEMORANDUM

TO: File No. 02-7375 in the Name of Idaho Power Company
FROM: Gary Spackman GS
DATE: May 31, 1991

RE: Resolution of Protests Against Application

I spoke to Loren Holmes today regarding the status of application no. 02-7375. Loren agreed to contact the parties to determine whether they were interested in further pursuing the protests since a FERC license has now been issued.

cc: Loren Holmes

RECEIVED
JUN 0 1991
Department of Water Resources
Southern Region Office

APR 19

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 222 Shoshone St. East, Twin Falls, Idaho 83301 (208) 734-3578

CECIL D. ANDRUS
Governor

R. KEITH HIGGINSON
Director

30-May-1991

Tim Cochnauer
2320 Government Way
Couer d'Alene, ID 83814

Re: Application for permit 02-7375, IPCO Twin Falls Hydro Project

Dear Mr. Cochnauer:

In 1982, you filed a protest against the granting of the above application.

A copy of the application and your original correspondence is enclosed for your information.

The department has not acted on the water right application pending completion of the power plant licensing process before the Federal Energy Regulatory Commission (FERC). That process is now complete and the applicant is ready to proceed with the water right.

Since you may have been involved in the FERC process, and as a result, may have resolved your objections to the project, I am enclosing a form for your use in withdrawing your protest. If you do not wish to withdraw your protest, no notice to the department will be necessary.

I plan to start scheduling this matter for hearing in the near future if any protests remain outstanding.

If you have any questions, please feel free to contact this office.

Sincerely,

Loren O. Holmes, P. E.
Southern Region Manager

Encl

APR 19 1993

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 222 Shoshone St. East, Twin Falls, Idaho 83301 (208) 734-3578

CECIL D. ANDRUS
Governor

R. KEITH HIGGINSON
Director

30-May-1991

Carl Nellis, Supervisor,
Idaho Dept. of Fish & Game Region 4
P.O. Box 428
Jerome, ID 83338

Re: Application for permit 02-7375, IPCO Twin Falls Hydro Project

Dear Mr. Nellis:

In 1982, your office filed a protest against the granting of the above application.

A copy of the application and your original correspondence is enclosed for your information.

The department has not acted on the water right application pending completion of the power plant licensing process before the Federal Energy Regulatory Commission (FERC). That process is now complete and the applicant is ready to proceed with the water right.

Since you may have been involved in the FERC process, and as a result, may have resolved your objections to the project, I am enclosing a form for your use in withdrawing your protest. If you do not wish to withdraw your protest, no notice to the department will be necessary.

I plan to start scheduling this matter for hearing in the near future if any protests remain outstanding.

If you have any questions, please feel free to contact this office.

Sincerely,

Loren O. Holmes, P. E.
Southern Region Manager

Encl

APR 19 1993

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 222 Shoshone St. East, Twin Falls, Idaho 83301 (208) 734-3578

CECIL D. ANDRUS
Governor

R. KEITH HIGGINSON
Director

30-May-1991

Phyllis Kukal
600 South Fillmore #19
Jerome, ID 83338

Re: Application for permit 02-7375, IPCO Twin Falls Hydro Project

Dear Ms. Kukal:

In 1982, you filed a protest against the granting of the above application.

A copy of the application and your original correspondence is enclosed for your information.

The department has not acted on the water right application pending completion of the power plant licensing process before the Federal Energy Regulatory Commission (FERC). That process is now complete and the applicant is ready to proceed with the water right.

Since you may have been involved in the FERC process, and as a result, may have resolved your objections to the project, I am enclosing a form for your use in withdrawing your protest. If you do not wish to withdraw your protest, no notice to the department will be necessary.

I plan to start scheduling this matter for hearing in the near future if any protests remain outstanding.

If you have any questions, please feel free to contact this office.

Sincerely,

Loren O. Holmes, P. E.
Southern Region Manager

Encl

APR 19 1993

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 222 Shoshone St. East, Twin Falls, Idaho 83301 (208) 734-3578

CECIL D. ANDRUS
Governor

R. KEITH HIGGINSON
Director

30-May-1991

Magic Valley Fly Fishermen
P.O. Box 1037
Twin Falls, ID 83301

Re: Application for permit 02-7375, IPCO Twin Falls Hydro Project

Gentlemen:

In 1982, you filed a protest against the granting of the above application.

A copy of the application and your original correspondence is enclosed for your information.

The department has not acted on the water right application pending completion of the power plant licensing process before the Federal Energy Regulatory Commission (FERC). That process is now complete and the applicant is ready to proceed with the water right.

Since you may have been involved in the FERC process, and as a result, may have resolved your objections to the project, I am enclosing a form for your use in withdrawing your protest. If you do not wish to withdraw your protest, no notice to the department will be necessary.

I plan to start scheduling this matter for hearing in the near future if any protests remain outstanding.

If you have any questions, please feel free to contact this office.

Sincerely,

Loren O. Holmes, P. E.
Southern Region Manager

Encl

REPRODUCED

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 222 Shoshone St. East, Twin Falls, Idaho 83301 (208) 734-3578

CECIL D. ANDRUS
Governor

30-May-1991

R. KEITH HIGGINSON
Director

RECEIVED
JUN 03 1991
Department of Water Resources
Southern Region Office

Phyllis Kukal
600 South Fillmore #19
Jerome, ID 83338

Re: Application for permit 02-7375, IPCO Twin Falls Hydro Project

Dear Ms. Kukal:

In 1982, you filed a protest against the granting of the above application.

A copy of the application and your original correspondence is enclosed for your information.

The department has not acted on the water right application pending completion of the power plant licensing process before the Federal Energy Regulatory Commission (FERC). That process is now complete and the applicant is ready to proceed with the water right.

Since you may have been involved in the FERC process, and as a result, may have resolved your objections to the project, I am enclosing a form for your use in withdrawing your protest. If you do not wish to withdraw your protest, no notice to the department will be necessary.

I plan to start scheduling this matter for hearing in the near future if any protests remain outstanding.

If you have any questions, please feel free to contact this office.

Sincerely,

Loren O. Holmes, P. E.
Southern Region Manager

Encl

RECEIVED
APR 19 1993

May 3, 1982

RECEIVED
MAY 4 1982
Department of Water Resources
South... District Office

Department of Water Resources
1041 Blue Lakes Blvd. No.
Twin Falls, ID 83301

Re: Idaho Power Company Application #02-7375
Snake River, Twin Falls Dam

Gentlemen:

I wish to protest the above application for the following reasons:

1. Raising the height of the existing dam, or building a higher one, would inundate Vinyard Creek. I have enjoyed this area for the past several years and feel it is one of the few areas close to the Twin Falls area that has not been overtaken by people. I know many people that feel the same as I do and I have urged them to protest this application also.

2. Vinyard Creek supports an excellent cutthroat, rainbow and cutthroat-rainbow hybrid spawning and rearing habitat. Raising of Twin Falls dam would destroy this habitat.

3. This same area also has quail and waterfowl habitat that would be destroyed by this project.

Please consider my feelings against this project. Thank you.

Sincerely,

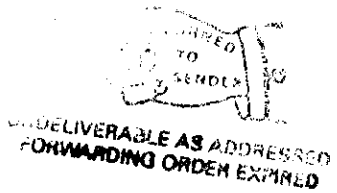
Phyllis Kukal

Phyllis Kukal
600 South Fillmore #19
Jerome, ID 83338
324-7463

APR 19 1993

02-7375

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
hoshone Street East • Twin Falls, Idaho • 83301



RECEIVED
JUN 03 1991
Department of Water Resources
Southern Region Office

APR 19 1993

MEMORANDUM

TO: Loren Holmes
FROM: Gary Spackman Gary
DATE: March 27, 1991

RE: Application for Permit to Appropriate Water No. 02-7375 in the Name of Idaho Power Company; Twin Falls Project

In a recent telephone discussion with you, I understood that you would contact the applicant and the protestants for water right application no. 02-7375. I understand that a FERC license has been issued, and that the protest may have been resolved.

Idaho Power is anxious to have a water right permit issued now that the FERC licensing process is complete.

RECEIVED
MAR 29 1991
Department of Water Resources
Southern Region Office

APR 19 1993

02-07375

IDAHO POWER CO.
P.O. BOX 70
BOISE, ID 83707

Source: SNAKE RIVER Tributary: COLUMBIA RIVER

Diversion Pt: LOT 3 () Sec 4 T 10S R 18E

Use: POWER (5000.000 CFS)
Total Diversion: (5000.000 CFS)

Date Filed: 4/ 5/ 1982

In: T10S R18E S04 Lot 3 ()

APR - 9 1993

The permit(s) will be subject to all prior water rights. Protests must be filled with the Director, Dept. of Water Resources, Southern Region, 222 Shoshone Street East, Twin Falls, Idaho 83301 on or before APRIL 22, 1991.

R. KEITH HIGGINSON, Director

Published 4/ 4/1991 & 4/11/1991

APR 19 1993

T A T E O F I D A H
EPARTMENT OF WATER RESOURC
Southern Region
222 Shoshone Street East
Twin Falls, ID 83301
(208)734-3578

MARCH 19, 1991

TIMES NEWS
P.O. BOX 548
TWIN FALLS, ID 83303-548

Gentlemen:

Enclosed you will find a legal notice which we wish to have published on the dates indicated (once a week for two consecutive weekly issues) in your newspaper. If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Your cooperation is appreciated.

Please send the affidavit of publication and publication billing to this office before APRIL 22, 1991.

Yours truly,

Mary Baldwin
Secretary/Office Coordinator

Enclosure

APR 1 9 1993

T A T E O F I D A H
;PARTMENT OF WATER RESOURC
Southern Region
222 Shoshone Street East
Twin Falls, ID 83301
(208)734-3578

MARCH 19, 1991

POST REGISTER
P.O. BOX 1800
IDAHO FALLS, ID 83402

Gentlemen:

Enclosed you will find a legal notice which we wish to have published on the dates indicated (once a week for two consecutive weekly issues) in your newspaper. If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Your cooperation is appreciated.

Please send the affidavit of publication and publication billing to this office before APRIL 22, 1991.

Yours truly,

Mary Baldwin
Secretary/Office Coordinator

Enclosure

APR 19 1993

T A T E O F I D A H
:PARTMENT OF WATER RESOURC
Southern Region
222 Shoshone Street East
Twin Falls, ID 83301
(208)734-3578

MARCH 19, 1991

IDAHO STATESMAN, LEGAL ADS
BOX 40
BOISE, ID 83707

Gentlemen:

Enclosed you will find a legal notice which we wish to have published on the dates indicated (once a week for two consecutive weekly issues) in your newspaper. If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Your cooperation is appreciated.

Please send the affidavit of publication and publication billing to this office before APRIL 22, 1991.

Yours truly,

Mary Baldwin
Secretary/Office Coordinator

Enclosure

T A T E O F I D A H
.PARTMENT OF WATER RESOURC
Southern Region
222 Shoshone Street East
Twin Falls, ID 83301
(208)734-3578

MARCH 19, 1991

LEWISTON MORNING TRIBUNE
505 C STREET
LEWISTON, ID 83501

Gentlemen:

Enclosed you will find a legal notice which we wish to have published on the dates indicated (once a week for two consecutive weekly issues) in your newspaper. If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Your cooperation is appreciated.

Please send the affidavit of publication and publication billing to this office before APRIL 22, 1991.

Yours truly,

Mary Baldwin
Secretary/Office Coordinator

Enclosure

APR 19 1993

19-Mar-1991

IDAHO POWER COMPANY
PO BOX 70
BOISE ID 83707

RE: Application for Permit No. 02-7375

Gentlemen:

This office has been advised that the Federal Energy Regulatory Commission (FERC) has issued a license for the upgrade of the Twin Falls power plant associated with this water right application.

Since the application was initially received and processed, Section 42-203A of the IDAHO CODE has been amended to require a statewide publication of notice for applications in excess of 10 cubic feet per second.

To meet this requirement, I am proposing to publish notice of the application on 4/4 & 4/11/91 with the final date for receiving protests to be set at 4/22/91. Once publication has been completed, we will proceed with a pre-hearing conference prior to any hearing on protests against the application.

Please let me know if you have any questions regarding this matter.

Very truly yours,

Loren O. Holmes, P.E.
Southern Region Manager

LH:MB

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BOISE, ID 83720

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for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 31. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 32. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

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not relieve the Licensee of responsibility for the clearing and disposal of all slash and debris from project lands.

Article 22. The Licensee shall do everything reasonably within its power, and shall require its employees, contractors, and employees of contractors to do everything reasonably within their power, both independently and upon the request of officers of the agency concerned, to prevent, to make advance preparations for suppression of, and to suppress fires on the lands to be occupied or used under the license. The Licensee shall be liable for and shall pay the costs incurred by the United States in suppressing fires caused from the construction, operation, or maintenance of the project works or of the works appurtenant or accessory thereto under the license.

Article 23. The Licensee shall interpose no objection to, and shall in no way prevent, the use by the agency of the United States having jurisdiction over the lands of the United States affected, or by persons or corporations occupying lands of the United States under permit, of water for fire suppression from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license, or the use by said parties of water for sanitary and domestic purposes from any stream, conduit, or body of water, natural or artificial, used by the Licensee in the operation of the project works covered by the license.

Article 24. The Licensee shall be liable for injury to, or destruction of, any buildings, bridges, roads, trails, lands, or other property of the United States, occasioned by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license. Arrangements to meet such liability, either by compensation for such injury or destruction, or by reconstruction or repair of damaged property, or otherwise, shall be made with the appropriate department or agency of the United States.

Article 25. The Licensee shall allow any agency of the United States, without charge, to construct or permit to be constructed on, through, and across those project lands which are lands of the United States such conduits, chutes, ditches, railroads, roads, trails, telephone and power lines, and other routes or means of transportation and communication as are not inconsistent with the enjoyment of said lands by the Licensee for the purposes of the license. This license shall not be construed as conferring upon the Licensee any right of use, occupancy, or enjoyment of the lands of the United States other than for the construction, operation, and maintenance of the project as stated in the license.

Article 26. In the construction and maintenance of the project, the location and standards of roads and trails on lands of the United States and other uses of lands of the United States, including the location and condition of quarries, borrow pits, and spoil disposal areas, shall be subject to the approval of the department or agency of the United States having supervision over the lands involved.

Article 27. The Licensee shall make provision, or shall bear the reasonable cost, as determined by the agency of the United States affected, of making provision for avoiding inductive interference between any project transmission line or other project facility constructed, operated, or maintained under the license, and any radio installation, telephone line, or other communication facility installed or constructed before or after construction of such project transmission line or other project facility and owned, operated, or used by such agency of the United States in administering the lands under its jurisdiction.

Article 28. The Licensee shall make use of the Commission's guidelines and other recognized guidelines for treatment of transmission line rights-of-way, and shall clear such portions of transmission line rights-of-way across lands of the United States as are designated by the officer of the United States in charge of the lands; shall keep the areas so designated clear of new growth, all refuse, and inflammable material to the satisfaction of such officer; shall trim all branches of trees in contact with or liable to contact the transmission lines; shall cut and remove all dead or leaning trees which might fall in contact with the transmission lines; and shall take such other precautions against fire as may be required by such officer. No fires for the burning of waste material shall be set except with the prior written consent of the officer of the United States in charge of the lands as to time and place.

Article 29. The Licensee shall cooperate with the United States in the disposal by the United States, under the Act of July 31, 1947, 61 Stat. 681, as amended (30 U.S.C. sec. 601, et seq.), of mineral and vegetative materials from lands of the United States occupied by the project or any part thereof: Provided, That such disposal has been authorized by the Commission and that it does not unreasonably interfere with the occupancy of such lands by the Licensee for the purposes of the license: Provided further, That in the event of disagreement, any question of unreasonable interference shall be determined by the Commission after notice ad opportunity for hearing.

Article 30. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit

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obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access,

to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statues and regulations.

Article 21. Timber on lands of the United State cut, used, or destroyed in the construction and maintenance of the project works, or in the clearing of said lands, shall be paid for, and the resulting slash and debris disposed of, in accordance with the requirements of the agency of the United States having jurisdiction over said lands. Payment for merchantable timber shall be at current stumpage rates, and payment for young growth timber below merchantable size shall be at current damage appraisal values. However, the agency of the United States having jurisdiction may sell or dispose of the merchantable timber to others than the Licensee: Provided, That timber so sold or disposed of shall be cut and removed from the area prior to, or without undue interference with, clearing operations of the Licensee and in coordination with the Licensee's project construction schedules. Such sale or disposal to others shall

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and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character and locations of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Commission may prescribe for the purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal Agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relasionship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or

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mission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any features or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project

area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the state and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character,

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Exhibits

The following parts of exhibit A and the following exhibit F drawings conform to the Commission's rules and regulations and are approved and made a part of the license:

Exhibit A: page A-10, section 3, titled "Turbine and Generator Units"; page A-11, section 4, titled "Electrical Transmission," and section 5, titled "Accessory Equipment"; page A-13, table A-1 titled "Significant data for existing facilities at the Twin Falls Hydroelectric Project"; and page A-14, table A-2 titled "Significant data for new facilities at the Twin Falls Hydroelectric Project."

Exhibit F:

Drawing	FERC No. 18-	Title
F- 1	33	General Plan
F- 2	34	Existing Dam Sections
F- 3	35	New Project Profile
F- 4	36	New Powerhouse Plan and Sections
F- 5	37	Existing Dam Sections
F- 6	38	Existing Intake and Powerhouse

List of preparers: Timothy Looney, Civil Engineer
Martin Thorpe, Electrical Engineer

Form L-2
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR UNCONSTRUCTED MAJOR PROJECT AFFECTING LANDS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Com-

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combustion turbine capacity to a hydro project to allow it to operate under critical water conditions at the level of a coal plant.

Because IPC is an electric utility, whose rate of return on investment is regulated, we use the net benefits method to evaluate the economics of the proposed project expansion.

We estimate the levelized cost of power from the project, as proposed in the license application, would be about 57 mills/kWh, giving a net annual benefit of 40 mills/kwh.

In our EIS, we recommend IPC take eight measures to mitigate the effects of the proposed expansion. We've estimated the costs of each measure. Here are the measures and the costs:

1. Test the sediments to be disturbed during construction and properly dispose the sediments. We estimate that sediment testing would cost about $5,000, and the cost of sediment disposal is accounted for in the project cost estimate.

2. Develop and implement a habitat rehabilitation and enhancement program in the reach above Twin Falls. We estimate that it would cost about $138,000 to implement this program for 5 years.

3. Improve the aesthetic quality of Twin Falls by enhancing low summer flows. With the flow mitigation we propose, average annual generation would be decreased 2 GWh. The lost generation has a levelized annual value of about $80,000.

4. Develop and implement a plan to continuously monitor dissolved oxygen and water temperature in the bypass powerhouse to make sure state water quality standards are met. We estimate the cost of the monitoring equipment would be $3,500 and the levelized operation and maintenance cost of the equipment would be $6,900.

5. Develop and implement a plan to: 1) reduce the visual impacts of the transmission tower adjacent to the falls by painting the tower; and 2) make improvements to the overlooks. We estimate painting the transmission tower and making the improvements to the overlooks would have a negligible cost.

6. Reduce color and textural contrasts of the proposed powerhouse. We estimate this plan would have a negligible cost.

7. Develop and implement a plan to monitor and protect

nesting golden eagles during construction. We estimate this plan would have a negligible cost.

8. Develop and implement a plan to schedule and control traffic to improve and minimize any conflict with recreational users during the construction period. This would be a normal construction period planning activity and we estimate this plan would have a negligible cost.

We looked at the effect the proposed mitigation has on the economics of the project expansion. We estimate the mitigation would not significantly impact economics of the expansion. The project expansion has a net annual benefit of about 38 mills/kwh.

Because the expansion would be economically beneficial, we recommend the Commission grant IPC a license allowing them to build the powerhouse.

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development of coal-fueled power plants (the Council's planned marginal resource).

To decide if IPC's proposal is consistent with the plan in the long term, we developed life-cycle costs of power from the Council's planned generic coal plant. We assume the region, when treated collectively, would need new coal-fueled, steam-generating plants about 1998. We base this data on the Council's projection of regional power resource needs under the medium-high load forecast in its 1989 supplement.

Because the life-cycle, levelized cost of IPC's proposed project is less than the levelized life-cycle cost of the least-cost or marginal long-term alternative in the plan, IPC's proposal is consistent with the Council's plan and is economically beneficial within the long-term objectives of the plan.

In a motion to intervene, filed on September 25, 1985, the IDWR asked the Commission to subordinate IPC's use of water for the project to "future depletionary uses"--irrigation, domestic, and industrial uses, for example--called for in the Idaho Water Plan.

We reviewed IPC's proposal to see if it is consistent with the Idaho Water Plan.

As we say in our EIS, the Commission prescribes conditions for providing the appropriate level of energy generation and protection of the environment and irrigation, and won't issue a license if the prescribed conditions would make a project financially infeasible.

Doing what IDWR asks would give IDWR, rather than the Commission, ultimate control of the project. IDWR could even nullify key rights IPC would have under a license. Therefore, we recommend rejecting IDWR's request.

In the future, if IDWR determines project operation takes water from the specified uses in the water plan, it can petition the Commission to use its reserve authority, after notice and oportunity for hearing to require IPC to reduce the water it uses for generation.

Because a license would allow IDWR to ask for changes in IPC's use of water, we think the Twin Falls Project is consistent with the Idaho Water Plan.

In 1988, the Idaho legislature ordered the Idaho Water Resources Board (IWRB) (1) to formulate a comprehensive state water plan and until the plan is adopted, (2) to prohibit

hydropower development on several waterways, including the part of the Snake River where the project is located.

The legislature says the prohibition on development doesn't apply to requests for relicensing or for increasing the capacity of existing projects. Because IPC has applied for a new license and an increase in capacity, the project is exempted from the Idaho Water Plan.

Federal and state agencies filed 26 comprehensive plans, discussing various resources in Idaho. Of these, we identified 7 plans that are relevant to this project. The project doesn't conflict with any of these plans or with any existing or planned water resource development in the Snake River Basin.

Our planning status report for the Snake River Basin and our hydroelectric site data base show no existing or proposed projects that would conflict with the proposed Twin Falls Project.

IPC's expansion proposal would properly develop the hydropower potential of Twin Falls.

Project Economics

In our EIS, we recommend licensing IPC's proposal, but with our recommended mitigation. We find operating the project with our environmental measures would produce net economic benefits of 38 mills per kilowatthour (mills/kWh).

To examine the economic benefits of developing the Twin Falls Project, we compared the cost of the expansion to the cost of alternative power in the region. If the levelized cost of expanding the project is less than the levelized cost of alternative energy to any utility in the region that can be served by the project, the project expansion is economically beneficial.

We estimate the 50-year levelized cost of alternative power in the region in 1994 would be about 97 mills/kWh.

We calculate the alternative power cost by levelizing both the displaced fuel consumption in existing coal-fueled, steam-electric plants until 1998 and the total unit cost of power from the coal plants we expect will be needed within the region by that time. As we said, we base our selection of 1998 on the Council's projected regional need for additional generating resources in the Pacific Northwest.

The value of 97 mills/kWh value includes an average capacity-value-reduction component equal to the cost of adding

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4. A tailrace returning all flows from the powerhouse to the Snake River

5. A short primary transmission line, extending from the new project generator through voltage transformation to a connection with the existing primary transmission line

6. A 110-foot-long, 18-foot-wide, concrete-and-steel access bridge between the existing and proposed powerhouses

7. Related project facilities

IPC's proposed expansion would increase the installed capacity from 9 MW to 51 MW and the project generation from 60 GWh to 189 GWh.

Dam Safety

We consider the Twin Falls Project to be safe and adequate for continued use and operation.

We classify the project as having a low-hazard potential. (The hazard potential of a dam is the potential for loss of human life or property damage that would result from failure of the dam.) Failure of the dam wouldn't have a noticeable economic effect or cause a hazard to life for the following reasons:

- The dam stores about 800 acre-feet of water
- The steep canyon, downstream of the project, limits recreational access
- There's little downstream development

On September 25, 1989, a member of our Portland Regional Office staff, inspecting the Twin Falls Project, concluded that IPC is properly maintaining the project and the project structures are in satisfactory condition.

Because the hydraulic height of the dam is less than 32.8 feet and because the project stores less than 2,000 acre-feet of water, we do not require IPC to hire a consultant to make a safety inspection. IPC's operating personnel inspects the project daily and makes a formal inspection each year.

Because the supporting design report IPC filed with the license application is preliminary, we recommend special article 304, which requires IPC to send us (1) a final supporting design report and (2) final plans and specifications before they start construction.

The proposed project facilities, if constructed according to good engineering practice, would be safe and adequate.

Water Resource Planning and Comprehensive Development

If IPC builds the proposed powerhouse, the project would have two powerhouses with a total installed capacity of 51 MW. As we said, the existing powerhouse has a generator with an installed capacity of 9 MW and the proposed powerhouse would have a generator with 42 MW.

The existing unit has a maximum hydraulic capacity of 960 cubic feet per second (cfs) at a rated head of 142 feet. The proposed unit would have a maximum hydraulic capacity of 4,000 cfs at a rated head of 139 feet. The project would generate with flows ranging from 380 to 4,960 cfs.

IPC proposes to divert 380 cfs to 4,960 cfs from the Snake River, river flows less than 380 cfs would flow over Twin Falls. At river flows between 380 cfs and 4,960 cfs, flow over the falls would be zero; above 4,960 cfs, the flow IPC wouldn't use to generate power also would go over the falls. With the minimum flow proposed by IPC, the expanded project would generate about 129 GWh annually.

In our Snake River environmental impact statement (EIS), we recommend IPC provide a flow of 300 cfs over Twin Falls from 8 a.m. until dusk every day in April through August and on weekends and holidays during the rest of the year. With our minimum flow the project expansion would generate about 127 GWh annually.

As we say in the EIS, upstream storage and diversion for irrigation affects the streamflow of the Snake River at Twin Falls. The mean monthly flow at the Twin Falls site is 2,580 cfs. This average is based on 51 years of flow data collected by the Geological Survey and adjusted to 1980 levels of depletion for irrigation by the Idaho Department of Water Resources (IDWR). We find the hydraulic capacity of the Twin Falls Project is reasonable for using the available flows in the Snake River.

As required by section 10(a)(2) of the Federal Power Act, we reviewed IPC's proposal to see if it is consistent with the Northwest Power Planning Council's (Council) Northwest Conservation and Electric Power Plan of 1986 and its 1989 supplement.

The Council's plan envisions meeting the growing regional energy requirements in the most economical manner with environmentally acceptable resources. The Council considers any resource less expensive than coal-fueled, steam-electric generation an acceptable resource for development before the

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order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(F) This order is issued under authority delegated to the Director and constitutes final agency action. Request for rehearing by the Commission may be filed within 30 days of the date of this order, pursuant to 18 C.F.R. § 385.713.

Fred E. Springer
Director, Office of
Hydropower Licensing

SAFETY AND DESIGN ASSESSMENT
TWIN FALLS HYDROELECTRIC PROJECT NO. 18
IDAHO
November 27, 1990

Project Design and Operation

The Twin Falls Project, owned and operated by the Idaho Power Company (IPC), is on the Snake River, near the town of Twin Falls, in Jerome and Twin Falls Counties, Idaho.

The existing project consists of the following:

1. A concrete-arch dam, equipped with 3.4-foot-high flashboards, across the north falls
2. A nonoverflow concrete gravity dam across the south falls
3. A 136-foot-long, 10-foot-diameter, steel-lined tunnel penstock
4. A semi outdoor powerhouse, containing one vertical-shaft Francis turbine generating unit with a total installed capacity of 9.0 megawatts (MW), at the base of the south falls
5. A tailrace, returning powerhouse flows to the Snake River
6. A primary transmission line, about 1 mile long, extending from the project generator through voltage transformation to the 138-kilovolt Shoshone Falls-American Falls line
7. Other related facilities

Historically, the project produces 60 gigawatthours (GWh) of electrical energy annually.

IPC proposes to increase power production at the Twin Falls project by building the following:

1. A gated intake structure at the existing low-level sluice in the nonoverflow portion of the dam
2. An 18-foot-diameter, steel-lined tunnel, consisting of a vertical shaft, 120 feet deep, and a horizontal tunnel, 93 feet long
3. A 63-foot-wide by 100-foot-long semi outdoor powerhouse, at the downstream toe of the nonoverflow part of the dam, which has one vertical-shaft Kaplan turbine generating unit with a total installed capacity of 42.0 (MW)

not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) nonproject overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than 1 million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report, briefly describing for each conveyance made under this paragraph (c) during the prior calendar year the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) nonproject overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved exhibit R or an approved report on recreational resources of an exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is 5 acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director of the Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identify of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and with the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or an approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R an or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance shall include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to insure that the construction, operation, and maintenance of structures or facilities on the conveyed lands occurs in a manner that protects the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article shall be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(E) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this

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to require changes to the plan. Upon Commission approval the licensee shall implement the plan.

Article 413. The licensee, before starting any future land-clearing, land-disturbing, or spoil-producing activities associated with the project, shall consult with the Idaho State Historic Preservation Officer (SHPO) and shall conduct a cultural resources survey of the affected areas. Further, the licensee shall file a report containing the survey results; for Commission approval a cultural resources management plan to avoid or mitigate impacts to any significant archeological or historic sites identified during the survey; and, the written comments of the SHPO on the report and the plan. If the licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing project works or other facilities at the project, the licensee shall stop all land-clearing, land-disturbing, or spoil-producing activities in the vicinity of the sites, shall consult with the SHPO, and shall file for Commission approval a cultural resources management plan to avoid or mitigate impacts to significant resources, together with the written comments of the SHPO on the plan. Upon Commission approval the licensee shall implement the plan. The survey and the plan shall be based on the recommendations of the SHPO, shall be conducted and prepared by a qualified cultural resources specialist, and shall adhere to the Secretary of the Interior's Guidelines for Archeology and Historic Preservation.

The report and plan shall contain the following: (1) a description of each discovered site, indicating whether it is listed or eligible to be listed on the National Register of Historic Places; (2) a description of the potential effect on each discovered site; (3) proposed measures for avoiding or mitigating the effects; (4) documentation of the nature and extent of consultation with the SHPO; and (5) a schedule for mitigating effects and conducting additional studies. The Commission may require changes to the plan.

The licensee shall not implement a cultural resources management plan or begin any land-clearing, land-disturbing, or spoil-producing activities until informed by the Commission that the requirements of this article have been fulfilled.

Article 414. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility

to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for the protection and enhancement of the project's scenic, recreational, or other environmental values or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and water for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where the facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee also shall ensure to the satisfaction of the Commission's authorized representative that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, may establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, that may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do

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The plan shall include the following: (1) a schedule for monitoring the golden eagle nest, including the period over which the nest would be monitored and how often monitoring would occur; and (2) measures to protect the nesting golden eagles if the nest is used, including prohibiting blasting and other specific construction activities. Agency comments shall be included in the filing.

The licensee shall not start any land-clearing, land-disturbing, or spoil-producing activities until the Commission approves the plan.

Article 408. The licensee, after consultation with the Idaho Department of Transportation and Twin Falls County, and 90 days before starting any project related land-clearing, land-disturbing, or spoil-producing activities and before bringing any equipment to the site shall file for Commission approval, a plan to ensure and monitor vehicular safety on roads leading to the project site, and a construction schedule to minimize conflicts with recreational access and activities on weekends. Upon Commission approval the licensee shall implement the plan. The filing shall include documentation of the required consultation along with and any comments and recommendations. The licensee shall not commence land-clearing, land-disturbing, or spoil-producing activities nor bring any equipment to the site until the Commission approves the plan. The Commission reserves the right to require changes to the plan.

Article 409. The licensee's recreation report, filed on April 4, 1989, consisting of 14 pages of text and tables and one drawing, that provides for the improvement of: (1) restroom facilities, (2) access to scenic viewpoints, (3) parking facilities, and (4) a boat launch area, is approved and made part of the license. Within 90 days of completing the recreational improvements, the licensee shall file with the Commission, as-built drawings showing the size, type, and location of the completed facilities. The licensee shall be responsible for constructing, operating, and maintaining the proposed recreational facilities.

Article 410. The licensee shall maintain flows that average 300 cubic feet per second (cfs) over Twin Falls from 8 a.m. to 30 minutes after sunset each day, 7 days a week, April 1 through August 31, and 8 a.m. to 30 minutes after sunset every Saturday and Sunday and on all holidays, September 1 through March 31 (peak viewing times). At no time during these peak viewing times shall the flow over Twin Falls fall below 270 cfs or inflow, whichever is less. The average flow of 300 cfs, required during peak viewing times, may be temporarily modified if required by operating emergencies beyond the control of the licensee or for short periods upon mutual agreement between the licensee, the

Bureau of Land Management, the Idaho Department of Parks and Recreation, and the Idaho State Historic Preservation Officer.

Article 411. The licensee shall prepare an aesthetic resources protection plan in consultation with the Bureau of Land Management, the Idaho Department of Parks and Recreation, and the Idaho State Historical Preservation Officer. The licensee shall file the plan for Commission approval at least 90 days prior to any land-clearing, land-disturbing, and spoil-producing activities. The licensee shall allow a reasonable timeframe, in no case less than 30 days, for agencies to comment and make recommendations on the plan. The filing shall include documentation of agency consultation and any agency comments and recommendations on the plan. The licensee shall not commence any land-clearing, land-disturbing, spoil-producing activities until the Commission approves the plan. The Commission reserves the right to require changes to the plan. Upon Commission approval the licensee shall implement the plan.

The plan shall include final siting and design drawings and specifications and other necessary supporting analyses, including photographs, that document the following plan components and objectives: (1) painting or other treatment to reduce the adverse visual impact of the transmission tower adjacent to the falls; (2) the exposed surfaces of the new powerhouse shall be rock-faced to match the cliff location and the adjacent rock facade of the historic powerhouse; (3) existing chainlink fencing at the overlooks shall be replaced with a stone and wood rail system that would be compatible with the site's natural and historic character while providing for public safety and unimpeded views of the falls for adults and children; and (4) providing a means for measuring and reporting flows required in Article 410.

Article 412. The licensee, at least 90 days before staring any project-related land-clearing, land-disturbing, or spoil-producing activities or modifications to existing structures, shall consult with the Idaho State Historic Preservation Officer (SHPO) concerning the measures necessary to maintain the historical integrity of the existing project facilities that render the property eligible for the National Register of Historic Places. Any project modifications shall be undertaken in a manner satisfactory to the SHPO and in accordance with the Secretary of Interior's Standards and Guidelines for Archeology and Historic Preservation. Prior to starting any project-related land-clearing, land-disturbing, or spoil-producing activities or modifications to existing structures, the licensee shall file for Commission approval, a cultural resources management plan describing the standards and guidelines that will be implemented to maintain the historical integrity of the existing project facilities, and a copy of a letter from the SHPO commenting on the acceptability of the plan. The Commission reserves the right

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consultation and any agency comments or recommendations. Upon Commission approval the licensee shall implement the plan.

The plan shall include continuous (hourly) monitoring of DO and water temperature in the river immediately downstream of the tailrace from June 15 to October 15. Violations of the state water quality standard for DO shall be reported to EPA, IDHW and IDFG within 24 hours. The plan shall include specific response measures in the event standards are not met, including, but not limited to, an air injection system at the powerhouse to maintain 6 mg/l of DO, in the river immediately downstream of the tailrace, or release of water over the falls rather than through the project turbines and a schedule for constructing or implementing these measures. The licensee shall not begin operation of the new powerhouse until the Commission approves the plan. The Commission reserves the right to require changes to the plan. Within 60 days of completion of construction of an air injection system the licensee shall file as built drawings.

Article 405. The licensee, after consultation with the Idaho Department of Fish and Game (IDFG), the U.S. Fish and Wildlife Service (FWS), and the Bureau of Land Management (BLM), shall develop and implement a plan for habitat enhancement, including but not limited to improvements to Vinyard Creek, the intake forebay, Twin Falls reservoir, and the Snake River and adjacent springs upstream to Hansen Bridge and a monitoring program to determine the response of the cutthroat trout, rainbow-cutthroat hybrid population to habitat enhancements. The plan shall be filed for Commission approval at least 90 days prior to commencing commercial operation of the new powerhouse. The licensee shall allow a reasonable timeframe, in no case less than 30 days, for agencies to comment and make recommendations prior to filing the plan. The filing shall include documentation of agency consultation and any agency comments or recommendations. Upon Commission approval the licensee shall implement the plan.

The plan shall include (1) provisions for surveys of all potential spring habitat upstream to the Hansen Bridge and assessments of the potential for rehabilitating or enhancing habitat at each spring location, (2) monitoring of the seasonal distribution and abundance of trout in areas where habitat improvement have been constructed, and (3) provisions for filing annual reports by December 31 of each year on the habitat enhancement program and the response in the fish population. The licensee shall conduct the monitoring program for at least 5 years and file a final comprehensive report on the success of the habitat enhancement program and for approval any recommendations for changing the program. The final report shall include agencies' comments on its findings and recommendations. The Commission reserves the right to require changes to the plan.

The licensee shall not begin commercial operation of the new powerhouse until the Commission approves the plan.

In the event the specific measures of the habitat enhancement program are deemed inadequate to protect and enhance the population at any time during or immediately following the 5-year monitoring program, the licensee in consultation with IDFG, FWS, and BLM shall file for Commission approval a supplemental plan for implementing changes to the program along with comments and recommendations of the IDFG, FWS, and BLM. The Commission reserves the right to require changes to the plan and any subsequent supplemented plan.

Article 406. The licensee, after consultation with the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, and at least 90 days before any project related land clearing, land-disturbing, or spoil-producing activities, shall file for Commission approval, a detailed plan for revegetating areas to be disturbed by construction or spoil-disposal. Upon Commission approval, the licensee shall implement the plan.

The plan shall include at a minimum: (1) the exact location of the staging area and spoil disposal sites; (2) the planned contours and depth of topsoil; (3) a description of how the spoil would be compacted and contoured; (4) a description of the plant species used, their source, and their potential value to wildlife; (5) planting densities; (6) fertilization and irrigation requirements; (7) provisions to control exotic species and damage from small mammals and deer; and (8) a monitoring program. The licensee shall avoid depositing spoil materials at the downstream 10,000-cubic-yard site and at the 500-cubic-yard site, as shown on attachment 10 of the filing dated April 4, 1989.

The licensee shall allow a reasonable timeframe, in no case less than 30 days, for agencies to comment and make recommendations on the plan. The filing shall include documentation of agency consultation and any agency comments and recommendations on the plan. The licensee shall not commence any land-clearing, land-disturbing, or spoil-producing activities until the Commission approves the plan. The Commission reserves the right to require changes to the plan.

Article 407. The licensee, after consultation with the U.S. Fish and Wildlife Service (FWS) and the Idaho Department of Fish and Game (IDFG) and at least 90 days before starting any land-clearing, land-disturbing, or spoil-producing activities, shall file for Commission approval, a plan to monitor the golden eagle nest near the project site and to prevent project construction activities from disturbing nesting golden eagles. Upon Commission approval, the licensee shall implement the plan.

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Safety and Inspections and one copy to the Director of the Commission's Portland Regional Office.

Article 304. At least 60 days before starting construction, the licensee shall submit (1) final contract drawings and specifications and (2) a supporting design report, sending two copies of the filings to the Director of the Division of Dam Safety and Inspections and one copy to the Director of the Commission's Portland Regional Office.

The filings shall cover such pertinent features of the project as (1) water-retention structures, (2) all necessary transmission facilities, (3) the powerhouse, and (4) water conveyance structures.

The Director of the Division of Dam Safety and Inspections may require changes in the plans and specifications to assure a safe and adequate project.

Article 401. The licensee, after consultation with the Soil Conservation Service (SCS), shall prepare and file along with final plans and specifications required by Article 304, a plan to control erosion, slope stability, and to minimize the quantity of sediment resulting from project construction and operation. The plan shall be implemented and shall include the following: (1) settling ponds to filter water pumped from construction sites; (2) rock bolts to stabilize the rock cliff above the powerhouse; (3) stabilizing spoil fills by compacting the spoil material in stable slope configurations not exceeding the natural angle of repose, leaving no depressions in the spoil material and covering it with top soil; (4) seeding disturbed areas and spoil fills with a seed mixture approved by SCS and applying mulch after the seed has been placed; (5) monitoring revegetation on slopes above the powerhouse road and replanting as necessary to ensure successful revegetation of this slope; (6) using clean gravels in cofferdams; and (7) limiting in-river construction, including placement and removal of cofferdams, to the low flow period of the year.

Documentation of consultation with SCS and the seed mix recommended by SCS shall be included with the plan when it is filed with the Commission. The Commission reserves the right to require changes to the plan to ensure adequate protection of the environmental, scenic, and cultural values of the project area.

Article 402. The licensee, after consultation with the U.S. Environmental Protection Agency, Idaho Department of Health and Welfare, U.S. Fish and Wildlife Service, and Idaho Department of Fish and Game and at least 90 days before starting any project related land-clearing, land-disturbing, or spoil-producing activities within the Snake River shall file for Commission approval, and shall implement a plan to conduct tests for heavy

metals, pesticides, and other toxic substances in any sediments or other unconsolidated deposits in the Snake River that would be removed or otherwise disturbed by dredging, constructing, or operating project facilities and to safely remove and dispose of any sediment and unconsolidated deposits containing heavy metals, pesticides, or other toxic materials. The plan also shall include an implementation schedule for the monitoring and comments of the consulted agencies on the monitoring plan and implementation schedule. The filing shall include documentation of agency consultation and any agency comments and recommendations on the plan.

The licensee shall allow a reasonable time frame, in no case less than 30 days, for agencies to comment and make recommendations prior to filing the plan. The licensee shall not commence any land-clearing, land-disturbing, or spoil-producing activities within the Snake River until the Commission approves the plan. The Commission reserves the right to require changes to the plan.

Article 403. The licensee after consultation with the U.S. Environmental Protection Agency, Idaho Department of Health and Welfare, Idaho Department of Fish and Game, and U.S. Fish and Wildlife Service, and at least 90 days before starting any land-clearing, land-disturbing, or spoil-producing activities, shall file for Commission approval plans for the potential installation of air blowers in the penstocks, turbine, or draft tubes, as may be required by Article 404 to provide reaeration if dissolved oxygen is below 6 mg/l in as measured in the river immediately downstream of the tailrace. The project shall be designed such that installation of an air injection system is not precluded.

The licensee shall allow a reasonable timeframe, in no case less than 30 days, for agencies to comment and make recommendations on the plan. The filing shall include documentation of agency consultation and any agency comments and recommendations on the plan. The licensee shall not commence any land-clearing, land-disturbing, or spoil producing activities until the Commission approves the plan. The Commission reserves the right to require changes to the plan.

Article 404. The licensee, after consultation with the Idaho Department of Fish and Game (IDFG), the Idaho Department of Health and Welfare (IDHW), and the U.S. Environmental Protection Agency (EPA), shall develop and implement a plan to monitor water temperature and dissolved oxygen in the river immediately downstream of the tailrace. The plan shall be filed for Commission approval at least 90 days prior to commencing commercial operation of the new powerhouse. The licensee shall allow a reasonable timeframe, in no case less than 30 days, for agencies to comment and make recommendations prior to filing the plan. The filing shall include documentation of agency

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necessary or appropriate in the operation or maintenance of the project.

(C) The exhibit G described above and those sections of exhibits A and F recommended for approval in the attached S&DA are approved and made part of the license.

(D) This license is subject to the articles set forth in Form L-2 (October 1975), entitled "TERMS AND CONDITIONS OF LICENSE FOR UNCONSTRUCTED MAJOR PROJECT AFFECTING LANDS OF THE UNITED STATES", except article 20, and the following additional articles.

Article 201. The licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

(a) For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 68,000 horsepower.

(b) For the purpose of recompensing the United States for the use, occupancy, and enjoyment of 74.7 acres of its lands, other than for transmission line right-of-way, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time.

(c) For the purpose of recompensing the United States for the use, occupancy, and enjoyment of 18.4 acres of its lands for transmission line right-of-way, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time.

Article 202. Pursuant to Section 10(d) of the Act, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. One half of the project surplus earnings, if any, accumulated under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account at the end of each fiscal year. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year under the license, the amount of that deficiency shall be deducted from the amount of any surplus earnings subsequently accumulated, until absorbed. One-half of the remaining surplus earnings, if any, cumulatively computed, shall

be set aside in the project amortization reserve account. The amounts established in the project amortization reserved account shall be maintained until further order of the Commission.

The annual specified reasonable rate of return shall be the sum of the annual weighted costs of long-term debt, preferred stock, and common equity, as defined below. The annual weighted cost for each component of the reasonable rate of return is the product of its capital ratio and cost rate. The annual capital ratio for each component of the rate of return shall be calculated based on an average of 13 monthly balances of amounts properly includable in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates for long-term debt and preferred stock shall be their respective weighted average costs for the year, and the cost of common equity shall be the interest rate on 10-year government bonds(reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 203. The licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representative of the Commission and in accordance with appropriate federal, state, and local statutes and regulations.

Article 301. The licensee shall begin construction of the project works within 2 years and shall complete construction of the project works within 4 years from the issuance date of the license.

Article 302. The licensee shall file revised exhibits A, F, and G for Commission approval, to describe and show the project as built, within 90 days after finishing construction.

Article 303. The licensee shall review and approve the contractor's cofferdams and deep excavations designs before starting construction, and during the construction shall make sure that the cofferdams and deep excavations are consistent with the previously approved designs.

At least 30 days before starting construction of the cofferdam, the licensee shall submit the approved cofferdam construction drawings and specifications and the letters of approval, sending one copy to the Director of the Division of Dam

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recreation facilities in a satisfactory manner.

Term of the License

Section 15 of the Act specifies that any license issued shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more than 50 years. This provision is consistent with the Commission's policy which establishes 30-year terms for those projects which propose no new construction or capacity, 40-year terms for those projects that propose a moderate amount of new development, and 50-year terms for those projects that propose substantial new development.

The existing facilities of the Twin Falls Project consist of a concrete arch dam, a 136-foot-long penstock, a powerhouse containing a single generating unit with an installed capacity of 9 MW and a one-mile-long transmission line.

Redevelopment of the project would add an intake structure, a 213-foot-long penstock, a second powerhouse containing a 42-MW generating unit, a tailrace, and other appurtenant facilities.

The redevelopment of the project would increase the installed capacity from 9 MW to 51 MW and the project generation from 60 GWh to 189 GWh. We consider these additions substantial new development, therefore a term of 50 years for the new license is warranted.

Summary of Findings

Based on the conclusions in the FEIS and additional staff discussions concerning environmental impacts of the project in this order, it is concluded that issuance of this license is in the public interest.

The design of the project is consistent with the engineering standards governing dam safety. The project will be safe if constructed, operated, and maintained in accordance with the requirements of this order. Analysis of related issues is provided in the S&DA, attached to this order.

The Director, Office of Hydropower Licensing, concludes that the Twin Falls Project would not conflict with any planned or authorized development and would be best adapted to comprehensive development of the waterway for beneficial public uses.

The Director orders:

(A) This license is issued to the Idaho Power Company, for a period of 50-years, effective the first day of the month in which this order is issued, for the redevelopment and continued

operation and maintenance of the Twin Falls Project. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

(B) The project consists of:

(1) All lands, to the extend of the licensee's interest in those lands, enclosed by the project boundary shown by exhibit G:

Exhibit G-	FERC No. 18-	Showing
G	39	Project Map

(2) Project works consisting of: (a) the Twin Falls Dam which has three sections, a concrete arch dam across the north falls with a 474-foot-long overflow crest at elevation 3,508 feet (3,511.4 feet with flashboards), a non-overflow concrete gravity dam across the south falls with a 203-foot-long crest at elevation 3,520 feet, and a concrete dike across the island between the north and south falls in two sections, one 108 feet long with the crest at elevation 3,516 feet and the other 207 feet long with the crest elevation 3,509 feet (3,512 feet with flashboards); (b) the Twin Falls Reservoir, which has a storage capacity of about 1,000 acre-feet at normal pool elevation of 3,511.4 feet; (c) a gated intake structure in the non-overflow gravity section; (d) a 10-foot-diameter, 136-foot-long steel-lined tunnel penstock; (e) a 40-foot-long, 37-foot-wide concrete powerhouse at the base of south falls containing a generating unit with a rated capacity of 9 MW; (f) a 1-mile-long, 138-kV transmission line connecting the project to the licensee's distribution system; (g) a second intake structure at the non-overflow section of the dam; (h) an 18-foot-diameter steel-lined tunnel consisting of a 120-foot-deep vertical shaft and a 93-foot-long horizontal tunnel; (i) a 63-foot-wide, 100-foot-long concrete powerhouse at the toe of the non-overflow section of the dam containing a generating unit with a rated capacity of 42 MW; (j) a tailrace returning all waters to the Snake River; (k) a short primary line connecting this development with the other powerhouse; (l) a 110-foot-long, 18-foot-wide concrete and steel bridge between the powerhouses; and (m) other appurtenances.

The project works generally described above are more specifically shown and described by those portions of exhibits A and F recommended for approval in the attached S&DA.

(3) All the structures, fixtures, equipment, and facilities used to operate or maintain the project and located within the project boundary, all portable property that may be employed in connection with the project and located within or outside the project boundary, and all riparian or other rights that are

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Section 15(a)(2)(D): Need for the Power

The staff considered the short and long-term need for the power the project would generate, and the cost of alternative power if the licensee does not get a new license for the project and has concluded that:

- Power from the Twin Falls project is needed.
- Replacing project power would cost the licensee about $5.6 million annually.

The project is located in the Northwest Power Planning Council (Council) area--in the south-central part of Idaho--near Twin Falls, Idaho. In March 1989, the licensee published a resource management report (RMR) that identifies the existing unit at the project as a nondeferrable resource now serving part of the licensee's power requirements.

The licensee plans to expand the project capacity to 51 MW. The average annual generation from the project will increase to 189,000 megawatthours (MWh). Completion of the expansion is now scheduled for 1995.

The RMR shows a need for power on the licensee's system in 2001 under medium loads and median water conditions and in 1995 under high loads and median water conditions. The licensee projects that deficiencies occurring in some months during low water conditions will require the licensee to curtail service to interruptible customers and to make purchases from other utilities to meet its firm loads.

With low loads and median water conditions, the licensee may have resources in excess of its system needs through 2008. In recognition of this possibility, the licensee is further developing its ability to participate in the regional power market.

The Council's 1989 supplement to it's 1986 Power Plan shows a need for power could exist in the Council area any time from the early to the late 1990's.

The supplement also shows resource deficits would occur on the Investor-owned Utility (IOU) systems in the Council area before deficits occur in the area as a whole. The Council projects IOU deficits by 1992 with medium-high loads and by 1998 with medium-low loads.

In March 1990, the Pacific Northwest Utilities Conference Committee (Committee) issued a revised Northwest Regional Forecast of Power Loads and Resources. The Committee projects a need for more power resources in the Council area as a whole in

1993. The Committee also projects that individual systems in the area could experience deficits as early as the 1990-1991 winter.

Hydro resources, such as the Twin Falls Project expansion, coming on-line in the mid-1990's, could be useful in meeting a small part of that need for power. Such projects could contribute to the need as part of the hydro resources in the Council's proposed resource addition portfolios.

When operational, the projects would be available to displace thermal generation in the Western Systems Coordinating Council (WSCC) region until needed to serve load directly in the Council area or on the licensee system specifically. The WSCC region encompasses the Council area.

The staff studied the financial impact on the licensee's ratepayers, considered as a single group, which would result from the loss of the output of the project. If the Commission denies a new license or issues a nonpower license, it is assumed the licensee would replace the project's dependable capacity and energy by generating more with its present coal-fired base load units.

Historically, the project produces about 60 gigawatthours (GWh) of energy annually and has a dependable capacity of 7.7 MW. But because of the licensee's proposed project changes and the enhancements the staff, the agencies, and the licensee propose, the energy output of the project would differ appreciably over the next license period.

If the licensee must replace the capacity and energy the project now produces, the staff estimates that the levelized annual impact on the licensee's ratepayers would be $5.6 million or about 93.7 mills/kilowatthour.

Section 15(a)(2)(E): Transmission Line Improvements

The licensee does not plan to modify the transmission network that has been and will be used by project.

Section 15(a)(2)(F): Project Modifications

The licensee proposes to increase the installed capacity 42 MW by building a new powerhouse. The project would have a total installed capacity of 51 MW. Project annual generation would increase from 60 to 189 GWh.

Section 15(a)(3): Compliance History

The licensee has satisfactorily complied with the terms and conditions of its existing license. The licensee has made timely filings and submittals and has maintained the project and its

levelized cost of providing 300 cfs from 8 a.m. to dusk every day in April through August and on weekends and holidays during the rest of the year would be about $80,000 annually. The staff believes that this cost is justified during periods of high visitor use of the project area.

The FEIS recommended that the licensee enhance trout habitat in Vinyard Creek adjacent to Twin Falls reservoir. The licensee agrees with this and has allocated funds specifically for this purpose. The FEIS recommended that the licensee should also monitor the effectiveness of the trout habitat enhancement measures for 5 years and provide a basis for modifying these measures if needed. The staff believes that this monitoring would increase the cost of the project by about $27,500 per year for a total of $138,000. The staff believes that the costs of the above measures are justified in order to mitigate for increased removal of wild, native trout due to diversion of water into the project intake.

Staff estimates that the project will start producing power in 1994 and the capital cost of the project to be $44 million. Staff finds operating the project, with staff environmental measures would produce net economic benefits of about 38 mills/kilowatthour.

Based on a review under sections 4(e) and 10(a), issuing a new license for the expanded Twin Falls Project is best adapted to a comprehensive plan for improving and developing the upper Snake River basin.

Recommendations of Federal and State Fish and Wildlife Agencies

Section 10(j) of the Act requires the Commission to include license conditions based on the recommendations of federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife. The FEIS addressed the concerns of the federal and state fish and wildlife agencies and this license provides conditions consistent with the recommendations.

The Department of Interior and the IDFG filed recommendations for fish and wildlife conditions. The recommendations, which were determined consistent with the Act and other applicable laws, are described in detail in the FEIS and are summarized below.

Trout Habitat Enhancement: The FWS and IDFG recommend enhancement of trout habitat to protect the trout population in Twin Falls Reservoir. Specifically, IDFG and FWS recommend enhancement of trout habitat in Vinyard Creek adjacent to Twin Falls Reservoir. The FEIS concurred with these recommendations because habitat enhancement appears to be the most cost-effective measure to protect and potentially enhance the trout population.

Article 406 requires the licensee to develop and implement a trout habitat enhancement plan in consultation with the FWS and IDFG.

Trout Monitoring Program: The FWS recommends a 3-5 year monitoring program to determine the effectiveness of the proposed trout habitat enhancement measures. The FWS also recommends the monitoring plan should include provisions for a backup plan in the event the proposed measures do not work as intended. Article 406 requires the licensee to develop and implement a monitoring program with provisions for modifying the plan in the event measures do not work as intended.

Section 15(a)(2)(A): Complying with the Present License

The staff has reviewed licensee's plans to comply with the conditions of a new license. The licensee's compliance record shows it made a good faith effort to comply with all of its prior license conditions. It is therefore believed that the licensee would be able to meet the requirements of a new license.

Section 15(a)(2)(B): Safe Operation

The staff reviewed licensee's plans to manage, operate, and maintain the project safely and finds them adequate. The licensee proposes no change in project operation adversely affecting project safety. Based on the licensee's public safety records, its plans are adequate.

Licensee's project safety record shows we can expect it to cooperate with the Commission and to fully comply with the terms and conditions of the new license.

Section 15(a)(2)(C): Providing Efficient and Reliable Electric Service

The staff reviewed licensee's operating plans and its ability to provide efficient and reliable electric service. It is concluded that the licensee is operating the project in an efficient and reliable manner.

The staff examined licensee's record of forced outages and find that the outages do not represent a significant number of occurrences.

The licensee normally uses the power it generates with the project in its system. Because the project is located near the center of the licensee's system, it allows the project to contribute to reliability and stability of the area. Also, the licensee is electrically interconnected with all adjoining systems, so any surplus energy can be made available for use in those systems.

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Comprehensive Development

Section 4(e) of the Act states that in deciding whether to issue a license, the Commission, in addition to the power and development purposes of the project, shall give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. These purposes are considered in the staff conclusions section of the FEIS prepared for this project.

Section 10(a)(1) states that the project adopted shall be such that in the judgement of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water power development, for the adequate protection, utilization and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreation and other purposes discussed in section 4(e).

Further, section 10 (a)(2) of the Act requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Federal and state agencies filed 26 plans that address various resources in Idaho. Of these, the staff identified 7 plans that are relevant to this project. 2/

The FEIS concluded that the project, as proposed to be modified, would be inconsistent with portions of two of the plans: (1) the Columbia River Basin Fish and Wildlife Program; and (2) the Idaho Fisheries Management Plan.

The Columbia River Basin Fish and Wildlife Program (Program) was developed by the Northwest Power Planning Council to protect, mitigate, and enhance fish and wildlife resources associated with

2/ (1) Columbia River Basin Fish and Wildlife Program, 1987, Northwest Power Planning Council; (2) Northwest Conservation and Electric Power Plan, 1986, Northwest Power Planning Council; (3) Idaho State Water Plan, 1986, Idaho Water Resources Board; (4) Idaho Fisheries Management Plan, 1986-1990, Idaho Department of Fish and Game; (5) Idaho Water Quality Standards, 1985, Idaho Department of Health and Welfare; (6) Idaho Outdoor Recreation Plan, 1983, Idaho Department of Parks and Recreation; (7) Monument Resources Management Plan, 1984, U.S. Department of Interior, Bureau of Land Management.

the development and operation of hydroelectric projects within the Columbia River Basin and its tributaries. The FEIS determined that the project would be inconsistent with the Program's requirement for fisheries protection, because the project lacks facilities to protect against fish entrainment. The Program, however, while requiring compensation for unavoidable losses, does not require prevention of entrainment. As stated earlier, Article 405 requires the licensee to develop a plan to enhance trout habitat, monitor the effectiveness of the enhancement measures, and develop a supplemental plan if needed. With this trout habitat enhancement plan the project would be consistent with the Program.

The Twin Falls project is also located in a reach of the Snake River designated by the Council as a "protected area". However, the protected area designation does not apply to the proposed actions at the project because the designation does not apply to existing dams.

The Idaho Fisheries Management Plan, developed by the IDFG, provides overall goals and guidance for the management of fishery resources for the state. The project would be inconsistent with the specific goal of the plan pertaining to the backwaters of Twin Falls Dam to Murtaugh Bridge, of protecting wild trout, in particular the population of wild, native cutthroat trout. Specifically, the project would adversely affect the trout through entrainment into the project intake. The degree of inconsistency would be reduced, however, to the extent that proposed trout habitat improvements lead to an expanded wild trout population.

The FEIS concluded that the project would be consistent with the other five relevant comprehensive plans. The Idaho Water Resources Board has approved the licensee's petition to exempt the project from interim protection status under the Idaho State Water Plan. There are no inconsistencies with the provisions of the Idaho Statewide Comprehensive Outdoor Recreation Plan, the Idaho State Water Quality Standards, or the Department of Interior, Bureau of Land Management Monument Resource Plan. The project is exempt under the Northwest Conservation and Electric Power Plan because it is a modification of an existing facility.

Because the licensee would divert more flow to operate the new powerhouse, the FEIS recommended that the licensee should provide a minimum flow over the falls to mitigate impacts to visual quality. Impacts to the waterfalls are considered important because the aesthetic qualities of the falls are extremely sensitive to change. This sensitivity stems from the adverse impacts to visual quality of frequently having low or no flows over the falls in June through September from operation of the existing project, and also from the falls high visibility and popularity with visitors. The staff estimates that the 50-year

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improvements to the scenic viewpoint and parking area, covered picnic tables, and dock improvements at the boat ramp and in the reservoir. Article 409 approves the licensee's recreation report filed on April 4, 1989, and specifies that the licensee file as-built drawings of the completed recreational facilities.

7. Visual Resources

The FEIS concluded that the project significantly impacts the aesthetic quality of Twin Falls by reducing flows over the waterfalls and modifying the natural landscape. The addition of the new facilities would lead to a further reduction in aesthetic quality by further reducing flow over the falls and adding additional power generation and transmission facilities.

The FEIS recommended a minimum flow of 300 cubic feet per second (cfs) over the falls from 8 a.m. to dusk everyday from April through August and on weekends and holidays during the rest of the year (peak viewing times). The FEIS also recommended reducing the aesthetic impacts of the transmission tower located adjacent to the falls, matching the exposed surfaces of the powerhouse with natural rock at that location, and improving the overlook facilities.

Requiring the licensee to maintain a minimum flow of 300 cfs over the falls as recommended in the FEIS would, in a typical operation, cause the release of higher flows to preclude falling below the required 300-cfs minimum flow. Staff believes that a 10% variation (30 cfs) from the 300-cfs minimum flow, in this visual environment, would not be perceptible. In addition, this range of flows (270 to 300 cfs at the low end) would still provide significantly greater flows in the northern plume than the 140 cfs proposed by the licensee, and still obviates the need for a weir to split the falls.

The practice of providing a higher flow than is absolutely required would, over time, result in significant lost generation and subsequent revenue, without a similar perceptible benefit to the aesthetic quality of Twin Falls.

Article 410 requires the licensee to maintain an average flow of 300 cfs over Twin Falls during these peak viewing times for aesthetic quality, and also requires that these flows not fall below an instantaneous minimum of 270 cfs or inflow, whichever is less, during these peak viewing times. Requiring the 300-cfs average flow during the peak viewing times allows the licensee to reconcile minor operating streamflow fluctuations and functional operating limitations without excessive loss in generation.

Article 411 requires the licensee to construct the project facilities as recommended in FEIS and to develop a visual

resources protection plan in consultation with the BLM, Idaho Department of Parks and Recreation (IDPR), and the Idaho State Historical Preservation Officer (SHPO). This plan will document the following plan components and objectives: (1) painting or other treatment to reduce the adverse visual impact of the transmission tower adjacent to the falls; (2) the exposed surfaces of the new powerhouse shall be rock-faced; (3) existing chainlink fencing at the overlooks shall be replaced with a stone and wood rail system; and (4) a means for measuring and reporting flows required in Article 410 shall be provided.

8. Cultural Resources

The FEIS concluded that new construction could affect the existing project facilities, which are eligible for inclusion on the National Register of Historic Places (Register). The FEIS recommended that the licensee, in consultation with the SHPO, design new project facilities that avoid adverse effects to the characteristics of the existing project structures. Article 412 requires the licensee to preserve the existing facility's unique characteristics that render the project eligible for the Register. Article 413 requires the licensee to contact the SHPO if cultural resources are discovered during project construction and develop a cultural resources management plan if needed.

9. Cumulative Impacts and Benefits

The FEIS evaluated the cumulative effects of 4 proposed projects on a 32-mile-long section of the Snake River from Milner Dam to Auger Falls. The four projects include the Twin Falls Project, the Milner Project (FERC No. 2899), the Auger Falls Project (FERC No. 4797), and the Star Falls Project (FERC No. 5797). The FEIS identified target resources for the Snake River--important resources that could be adversely affected in a cumulative fashion by the proposed hydropower projects--including drainage morphology, water quality, resident trout, white sturgeon, wintering waterfowl, raptors, riparian-associated wildlife, riparian vegetation, aesthetic quality, recreation, and local economy.

The FEIS concluded that the proposed modifications at the Twin Falls Project, with the mitigation and enhancement measures recommended by the staff, would result in improved trout habitat in Vinyard Creek which would contribute to cumulative benefits to resident trout and recreational fishing. While the additional development at Twin Falls would contribute to cumulative impacts to visual quality in the Snake River canyon, staff recommended mitigation would enhance sight seeing conditions at Twin Falls, which would contribute to cumulative benefits to recreation.

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constructing, or operating project facilities, and to safely remove and dispose of any sediment and unconsolidated deposits containing heavy metals, pesticides and other toxic materials.

The FEIS concluded that diversion of river flow around Twin Falls would reduce reaeration and thus the level of dissolved oxygen (DO) in the Snake River. Depending on the river's biological oxygen demand (BOD) loading, a reduced amount of reaeration could reduce the waste assimilating capacity of the river. To avoid a reduction in the river's waste assimilating capacity, the FEIS recommended that the licensee make provisions for installing air blowers in the penstocks, turbine, or draft tubes to provide reaeration of the diverted water in the event DO falls below 90 percent saturation.

Upon reevaluation of the recommended saturation level the staff determined that present BOD levels in the study reach were not sufficiently high to necessitate 90% saturation in the river below the project. Analysis indicates that existing BOD levels would not significantly deplete DO in the river because the rate of biochemical oxidation is slower that the reaeration rate of the river. Consequently, either with or without the project, DO levels would be expected to be reduced by less than 1 mg/l from existing 8-9 mg/l summer levels. Saturation levels below 90% would be adequate to process existing levels of BOD. Barring major increases in BOD, the waste assimilating capacity of the river, with or without the project, would be protected. The present state standard of 6 mg/l DO (about 75% saturation in summer) for waters of the reach would be adequate. The state standard protects the fish of the reach from direct stress from low DO.

Article 403 requires the licensee to maintain DO at 6 mg/l, as measured in the river immediately downstream of the tailrace, in the diverted water by making provisions for supplemental aeration, as discussed above, if needed.

The FEIS recommended that monitoring of DO and water temperature be done to ensure that the project provides sufficient aeration. Article 404 requires the licensee, after consultation with the IDFG, Idaho Department of Health and Welfare (IDHW), and the U.S. Environmental Protection Agency (EPA), to develop and implement a monitoring program to monitor the need for, and effectiveness of, supplemental aeration.

The licensee applied for water quality certification pursuant to Section 401(a)(1) of the Clean Water Act, 33 U.S.C. 1341(a)(1), from the IDHW with a letter dated April 25, 1983. Water quality certification was granted by IDHW on November 7, 1983.

3. Fisheries

The FEIS concluded that the project would result in an increase in the number of wild, native cutthroat and rainbow-cutthroat hybrids removed from Twin Falls reservoir due to diversion of water through the project intakes. The FEIS recommended that habitat restoration and enhancement in tributary springs would constitute the most cost-effective mitigation. Article 405 requires the licensee to develop and implement, in consultation with IDFG, U.S. Fish and Wildlife Service (FWS), and BLM, a habitat enhancement plan and trout monitoring program.

4. Vegetation

The FEIS concluded that spoil disposal during project construction would result in temporary and permanent loss of up to 9.2 acres of vegetation at the project site. The FEIS recommended that spoil disposal be limited to certain specific disposal sites and the licensee develop and implement a detailed revegetation plan, in consultation with the FWS and IDFG. Article 406 requires the licensee to develop and file for Commission approval a detailed plan for revegetating areas to be disturbed by construction or spoil disposal.

5. Raptors

The FEIS noted the existence of a golden eagle nest near the project site that, if active, would experience limited, short-term impacts as a result of blasting during project construction. The FEIS recommended the licensee monitor the nest prior to beginning construction, and if found to be active, the licensee should implement protective measures, including prohibiting blasting, to protect the nest. Article 407 requires the licensee to monitor the golden eagle nest, and implement protective measures if the nest is found to be active.

6. Land Use and Recreation

The FEIS concluded that the project would have minor, negative impacts on recreational visitors and local traffic due to increased congestion and truck traffic during construction. To minimize traffic congestion during construction, the FEIS recommended that the licensee develop and implement a plan to assure vehicular safety during construction and to schedule construction activities to minimize conflicts with peak recreation use. Article 408 requires the licensee to develop, in consultation with Twin Falls County, a vehicular safety plan and a schedule of construction activities to minimize conflicts with the public during weekends.

The FEIS concurred with the licensee's proposed recreational improvements, including restroom facility replacement,

54 FERC ¶ 62,034

RECEIVED
JAN 28 1991
Department of Water Resources

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Idaho Power Company — Project No. 18-000-Idaho

ORDER ISSUING NEW LICENSE
(Major)
(Issued January 18, 1991)

Idaho Power Company (licensee) has filed an application for a new license under Part I of the Federal Power Act (Act) to continue to operate and maintain the Twin Falls Project, and install additional capacity. The project is located on the Snake River in Jerome and Twin Falls Counties, Idaho, partially on lands of the United States administered by the Bureau of Land Management (BLM).

The original license expired on June 10, 1984, and thereafter the project has been operated under an annual license.

The existing facilities consist of the Twin Falls Dam and reservoir, an intake structure, a 136-foot-long penstock, a powerhouse with an installed capacity of 9 megawatts (MW), and a 1-mile-long transmission line. The proposed additions are a second intake structure, a 213-foot-long penstock, a powerhouse with a 42-MW generating unit, an interconnection with the existing transmission line, and an access road and bridge. A more detailed description of the project is contained in ordering paragraph (B).

Notice of the application has been published. No protests or objections to issuance of the license were filed.

The Idaho Department of Water Resources (IDWR) filed a motion to intervene requesting that any license issued for this project should subordinate the licensee's water right to upstream depletionary uses. The IDWR's motion to intervene is discussed in the attached Safety and Design Assessment (S&DA).

The Idaho Department of Fish and Game (IDFG) filed a motion to intervene to ensure that any license issued for this project be conditioned to "preserve, protect, perpetuate, and maintain the fish and wildlife resources of the State of Idaho".

This project was examined and included in the draft and Final Environmental Impact Statement (FEIS) prepared on four proposed projects in the Snake River Basin. 1/

1/ Final Environmental Impact Statement, Federal Energy Regulatory Commission, Office of Hydropower Licensing, July 1990, Milner (FERC No. 2899), Twin Falls (FERC No. 18), Auger Falls (FERC No. 4797), and Star Falls (FERC No. 5797). This document is in the Commission's public file and is available for inspection at the Commission's Office of Public Information.

IDFG's motion to intervene, as well as all comments received from interested agencies and individuals have been fully considered in the FEIS and in determining whether to issue this license, as discussed below.

Environmental Considerations

The impacts of the Twin Falls Project on important environmental resources, and the mitigation measures necessary to protect these resources, are discussed below.

1. Geology and Soils

The FEIS concluded that construction and operation of the new facilities at the project would cause minor increases in erosion and sedimentation in the Snake River. The licensee has proposed measures to control erosion and sedimentation and maintain slope stability including: (1) settling ponds to filter water pumped from construction sites; (2) rock bolts to stabilize the rock cliff above the powerhouse; (3) stabilizing spoil fills by compacting the spoil material, using stable slope configurations, leaving no depressions, and covering the spoil fills with top soil; and (4) seeding disturbed areas and applying mulch after the seed has been placed. As part of a final plan to be prepared by the licensee, the FEIS recommended additional measures to minimize impacts on soil and geologic resources. These additional measures include: (1) not exceeding the natural angle of repose on slopes of spoil material; (2) using clean gravels in cofferdams; (3) monitoring the revegetation process on the slopes above the powerhouse road; and (4) limiting in-river construction to the low-flow period of the year.

Article 401 requires the licensee to prepare and file a plan (to include the measures proposed by the licensee and those recommended in the FEIS) to control erosion, sedimentation, and slope stability during construction and operation of the project.

2. Water Quality

The FEIS concluded that chemical changes in water quality of the Snake River could result from construction related disturbance of sediments containing heavy metals, pesticides, and other toxic materials. Article 402 requires the licensee to develop a plan to conduct tests for toxic substances in any sediments or other unconsolidated deposits in the Snake River that would be removed or otherwise disturbed by dredging,

APR 19 1993

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

January 27, 1989

Mr L Glen Saxton, Chief
Water Allocation Bureau
State of Idaho
Department of Water Resources
1301 North Orchard
Statehouse
Boise, ID 83720

RECEIVED
JAN 27 1989
Department of Water Resources

Re: Application for Permit 02-7375
Twin Falls Hydroelectric Project

Dear Mr Saxton:

I have received your letter of December 29, 1988, requesting the status of Idaho Power's Twin Falls Hydroelectric Project and specifically with regard to the Company's Application for a Water Permit for use in the uprate in capacity of that facility.

We have been for some time, and currently are, pursuing relicensing of that Project. The Twin Falls Project has been considered from an environmental standpoint by the FERC, along with three other proposed projects that are located in the same reach of the Snake River. A necessary but time consuming segment of the FERC licensing process has been the review of the potential environmental impacts that might occur due to relicensing of the Project. These will be considered along with the possible mitigation options that the Company may be required to implement.

In January of 1989, the FERC issued *Scoping Document Supplement 2 For Snake River Idaho Hydroelectric Projects*. This document is an outline for a supplemental environmental investigation that, when completed, would be combined with the previous Draft Environmental Impact Statement. After the procedure for public comment has been completed, we would anticipate these two documents being combined to form a Final Environmental Impact Statement (FEIS). We cannot be sure of the timeframes for these procedures in that we do not have any control of the time and there are multiple parties involved. However, it is at this point, our anticipation that the FEIS may be issued by the first part of 1990. Should the Company choose to accept the resulting terms and conditions of a license for the project that the FEIS would result in, it is possible that we could receive a license for the project from the FERC by mid-1990.

Upon the issuance of the license, a construction schedule would be established which would be filed with the FERC and would put the Company into a

APR 19 1993

position to put to beneficial use the water which is the subject of our Application No 02-7375.

I hope this explanation is sufficient for your needs. I am enclosing for your information a copy of the scoping document that we have just received and if you would like any further information, please don't hesitate to call me. Thank you.

Sincerely,

James R Thompson
Attorney

JRT:jar
Enclosure

APR 19

December 29, 1988

James R. Thompson
Idaho Power Company
P.O. Box 70
Boise, ID 83707

RE: APPLICATION FOR PERMIT 02-7375 - TWIN FALLS PLANT

Dear Mr. Thompson:

I have periodically checked with you to determine the status of the proposed uprate of the above referenced project. My last conversation with you was by telephone on June 6, 1988 in which you advised you would provide a written update on the status of the project. I did not receive the update.

Please advise me of the status of the project. I also request that you submit within 30 days appropriate evidence of a nature to show that the company is diligently pursuing the upgrade of the project. As you know, pending applications which are not being diligently pursued by the applicant are speculative in nature and will be rejected by the department pursuant to Section 42-203A, Idaho Code, and the Water Appropriation rules and regulations.

Feel free to contact me if you have questions.

Sincerely,

L. GLEN SAXTON, Chief
Water Allocation Bureau

c: W. Region



IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

February 24, 1988

RECEIVED
FEB 25 1988
Department of Water Resources

L Glenn Saxton
Chief, Operations Bureau
State of Idaho
Department of Water Resources
Statehouse
Boise, Idaho 83720

Re: Application for Permit No 02-7375
Idaho Power Company's
Twin Falls Hydroelectric Project

Dear Mr Saxton:

In regard to Permit No 02-7375, you have requested an update on the status of Idaho Power Company's application for FERC license for the Company's Twin Falls Hydroelectric Project.

For clarification, the Company had previously requested FERC to allow it to withdraw its application for the additional capacity. However, the Company made a subsequent determination that it was in its best interest to proceed with the uprate application and the evaluation of that application by the FERC is continuing. Current nameplate capacity of the Twin Falls plant is 9 megawatts, the proposed uprate would bring it to 51 megawatts.

Most recently in that evaluation process, the FERC staff issued a Draft Environmental Impact Statement (DEIS) dated November 1987. The DEIS analyzes the suggested cumulative environmental impacts of the ~~regarding the~~ Twin Falls Hydroelectric Project as well as three other hydroelectric projects in that same vicinity of the river. Idaho Power, as well as other hydroelectric project developers considered by the DEIS are currently preparing comments in response to the DEIS. There are to be submitted on or before April 1, 1988. Subsequent to its receipt of those comments, a final Environmental Impact Statement will be issued by the FERC staff. I am not aware of any time constraint upon the FERC for issuance of this final report. Upon the issuance of that report, Idaho Power will evaluate the impact of the report on the feasibility of the proposed project.

Therefore, it is our request that the Company's application for Permit No 02-7375 remain in the active status pending completion of the licensing process. Thank you for your cooperation in this matter and if you should need any clarification or further information, please don't hesitate to contact me.

Sincerely,

James R Thompson
Attorney

APR 19 1993

JRT:srk

IDAHO POWER COMPANY
P. O. BOX 70 ★ BOISE, IDAHO 83707

FIRST-CL

L Glenn Saxton
Chief Operations Bureau
State of Idaho
Department of Water Resources
Statehouse
Boise, Idaho 83720

ASD-110

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

June 15, 1987

NJS

L Glen Saxton
Chief Operations Bureau
Department of Water Resources
State of Idaho
Statehouse
Boise, Idaho 83720

RECEIVED
JUN 17 1987
Department of Water Resources

RE: Application for Permit No 02-7375
Idaho Power Company -
Twin Falls Hydroelectric Project

Dear Mr Saxton:

This letter is to update you on the current status of Idaho Power Company's application for new license for our Twin Falls Hydroelectric Project with the FERC. That application process is still pending.

Recent enactment of the Electric Consumers Protection Act of 1986 has spawned new requests for information from the FERC to be used in their analysis of our application. Since this proceeding is still pending before the FERC, the application of Idaho Power for Permit No 02-7375 in your department should remain active. We do anticipate favorable action upon our application after the administrative process is completed. In any event, you will be notified of the FERC's action regarding our application.

In the meantime, should you need any further information or clarification, please don't hesitate to contact me at 383-2672.

Sincerely,

JRT

James R Thompson
Attorney

JRT:srk

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APR 19 1993

April 22, 1987

Jim Thompson
Idaho Power Company
Box 70
Boise, ID 83707

Dear Mr. Thompson:

Re: Permit No. 02-7375, 65-12210 and 65-12211

On April 1, 1987, I contacted you by telephone relative to an update on Nicolas Ysursa's letter dated August 27, 1986 (copy enclosed).

Please advise me of the current status of the matters pending before FERC on the respective projects.

Sincerely,

L. GLEN SAXTON
Chief, Operations Bureau

LGS:rf

Enclosure

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APR 19 1993

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 BOISE, IDAHO 83707

August 27, 1986

RECEIVED
AUG 29 1986
Department of Water Resources

L Glenn Saxton, Chief
Operations Bureau
State of Idaho
Department of Water Resources
Statehouse
Boise, Idaho 83720

Re: Application for Permit Nos ~~01~~ 02-7375
(Idaho Power Company's Twin Falls Project)
65-12210 and 65-12211 (Idaho Power
Company's North Fork of the Payette
River Project)

Dear Mr Saxton:

Pursuant to your telephone call, following is an update of the status of the relicensing of the Twin Falls Project and license for the North Fork Payette River Project. Since my last letter to you on February 25, 1986, and our telephone conversation of April 29, 1986, Idaho Power Company (Company) has received correspondence from the Federal Energy Regulatory Commission (FERC) concerning these two projects.

On the Twin Falls Project, FERC requested the Company to provide a feasibility analysis of installing additional generating capacity (copy enclosed). In response, the Company requested FERC to allow the Company to withdraw its amendment of the new license application, to reinstate the original application for new license of June 1983 and to proceed with the processing of the new license application. Thus, the relicensing process on the Twin Falls Project before FERC is ongoing, and the Application for Permit No 02-7355 should remain active.

As you are aware, in April of 1986 the Company submitted an application to surrender the license for the North Fork Payette River Project. In response to that application, FERC requested the Company to provide additional information and analysis on the need for the power from the project (copy attached). The Company requested until November 14, 1986, to submit the information. FERC granted the request. Therefore, the federal license for the North Fork Payette River Project is active and Permit Nos 65-12210 and 65-12211 should remain active.

Thank you for your cooperation in this matter. If you need additional information or have further questions, please feel free to contact me at any time at 383-2673.

Sincerely,

Nicolas R Ysursa

Nicolas R Ysursa
Attorney

NRY:slp
Enclosures

APR 19 1993

Fee 360.

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

AUG 2 1 1986

Project No. 2930-010
North Fork Payette River
Idaho Power Company

Mr. Logan E. Lanham
Senior Vice President
Idaho Power Company
P.O. Box 70
Boise, ID 83707

Dear Mr. Lanham:

Your August 1, 1986, request for a 65-day extension of the deadline for filing additional information requested in our letter of July 11, 1986, for this project is granted. Your response will be due November 15, 1986.

Sincerely,

Richard T. Hunt

Richard T. Hunt
Director, Office of
Hydropower Licensing

APR 1 9 1993

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

JUL 11 1986

Project No. 2930-010
Idaho Power Company

R.J. O'Connor
President and Chief Executive Officer
Idaho Power Company
Box 70
Boise, Idaho 83707

Dear Mr. O'Connor:

We have reviewed your application for surrender of the license for the North Fork Payette River, Project No. 2930 and find that it includes insufficient information to support the conclusion that it would be inappropriate to proceed with or commence construction of the project in accordance with the license requriements.

The Idaho Power Company's (IPC) 1985 Resource Plan for the period 1985 through 2004 shows a need for additional resources, in 1997 and 1998. The additional resources are required to meet energy and peak capacity requirements under probable load and median water conditions. The need for additional resources is advanced to 1994 under high loads and median water conditions. The generation expansion plan, proposed by the Company for development of avoided costs under probable loads and median water conditions, would show energy deficits as early as 1990 under probable loads and critical water conditions. The generation expansion plans also include the Swan Falls rebuild (FERC Project No. 503) and the Wiley Project (FERC Project No. 2899) as the first additions to the exisitng resources and both of these proposed additions have since been eliminated as proposed generating additions. Further, the Milner Project (FERC Project No. 2899), scheduled in the expansion plan as an addition with the Wiley project provides no energy in the summer months during which energy deficits occur on the IPC system.

Accordingly, the North Fork Payette project output could be used on the IPC system to replace power expected from the Wiley and Swan Falls projects and to provide summer energy that would not be provided by the Milner project. This would not be before 1998, under probable load and median water conditions, but under high load and median water conditions the power would be needed in 1994.

In addition, firm capacity available from the North Fork Payette project could be used to meet energy deficits as early as 1990 under probable loads and critical water conditions.

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The North Fork Payette project under median water conditions not only provides generation in the summer months but also provides a significant amount of generation over the rest of the year. The summer generation could be used to off load fossil-fueled thermal generation used to meet summer energy requirements on the IPC system and to displace fossil-fueled summer generation in the Pacific Southwest. Energy generation in the winter months could be used to off load fossil-fueled generation in the Northwest Region and adjacent areas which experience higher needs in the winter months. The project power could also delay installation of thermal resources shown in the IPC generation expansion plan. Use of the North Fork Payette power generation to off-load and delay installation of fossil-fueled plants would conserve non-renewable fossil fuels and reduce noxious emissions that results from the combustion of fossil fuels. Energy available in both summer and winter months could also be used to delay releases of water from the limited storage resources in the T.E. Roach complex used to follow load on the IPC system.

The Northwest Power Planning Council (NPPC) predicts, in the 1986 Northwest Conservation and Electric Power Plan, that the Northwest Region's current energy surplus will be disipated sometime in the 1990's. If demand for energy increases at a rate equal to or greater than the NPPC's medium-low forecast, (a 69 percent probability according to the NPPC) then the regional electric system will go into deficit sometime between 1990-1996. The Pacific Northwest Utilities Conference Committee and the Bonneville Power Administration predict that additional resources will be needed by 1993 and 1994, respectively, if the regional load grows in accordance with their 1986 mid-range projections.

The construction period required to bring the project on line would mean the total project resources would not be available until 1990 or 1991 and that the project could be available to address resource needs in the Northwest Region shortly after completion.

In summary the North Fork Payette project could be useful in meeting the need for power forecasted by the NPPC, the Pacific Southwest and the Idaho Power Company.

Additional cogeneration and small power producer generating resources in addition to the North Fork Payette project could delay the installation of coal resources required on the Idaho Power System in the year 2000 under probable load and median water conditions and by 1998 under high load and median water conditions, with the North Fork Payette project in service.

APR 1 9 1993

A proposed project is potentially feasible so long as its projected levelized cost is less than the long-term levelized incremental energy cost of any utility in the region that can be served by the project. The NPPC has developed an energy plan to meet the load requirements of the northwest region. Based on that plan, the staff has developed a projected regional incremental energy cost to evaluate the feasibility of the project.

The staff's projected regional incremental energy cost for the northwest is based upon the generic coal-fueled steam-electric plant forecasted by the NPPC in its proposed resource portfolios to come on line about the year 2002. The staff, recognizing that the NPPC has established this plant as a yardstick for measuring the cost-effectiveness of new resources, has therefore, assumed that the project would not be entitled to any credit for capacity until 2002, even though the northwest region is likely to go into deficit sometime between 1990-1996. The staff does recognize, however, that the energy generated by the project before 2002 could be used to displace fuel consumption in existing northwest coal-fueled plants or sold out of the region until it can be used to serve load directly within the region. The staff's projected incremental energy cost includes an escalating fuel cost component for that purpose.

The timing of IPC's projected need for additional resources closely parallels the region's needs as projected by the Council, and therefore the economic feasibility study done by staff is applicable to development of the project by IPC for its own use as well as to development of the project to meet regional needs.

The following table shows the relationship between the staff's projected regional levelized incremental energy cost, the projected costs of energy from the proposed project for 1991 and 1995 project completion dates, and the projected levelized benefits. The projected benefit for the project completed in 1995 is presented in both 1995 and 1991 dollars. All studies are based on an interest rate of 11 percent and a project average annual energy production of 1,160 GWh based on an assumed continuous miniminum flow release of 125 cfs.

APR 1 3

	Projected On Line 1991	Projected On Line 1995
	mills per kilowatt hour	
Projected levelized project cost in first-year dollars	63.5	78.4
Projected regional levelized incremental energy cost in first-year dollars	87.0	114.8
Projected Levelized Benefit in First-Year Dollars	23.5	36.4
Projected Levelized Benefit in 1991 Dollars	23.5	23.9

Staff's studies show that the proposed project is economically feasible to construct now to serve the needs of IPC and or the region for additional resources beyond the year 2002. Staff's studies also show that there would be no significant economical advantage in delaying the project construction.

Please furnish within 60 days whatever information or studies you have to support your conclusion that development of the project is inappropriate at this time.

Sincerely,

Richard T. Hunt

Richard Hunt
Director, Office of
Hydropower Licensing

APR 19 1993

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

MAY 22 1986

Project No. 18-001
Twins Falls
Idaho Power Company

Mr. Paul L. Jaurequi
Idaho Power Company
P.O. Box 70
Boise, Idaho 83707

Dear Mr. Jaurequi:

The Commission's staff needs additional information before it can complete its evaluation of your license application for this project. Under section 4.32(f) of the Commission's regulations, you have 90 days from the date of this letter to provide a feasibility analysis of installing additional generating capacity, taking into account, to the extent reasonable, all benefits including any contribution to the conservation of non-renewable energy resources. If the study shows additional capacity to be feasible, then submit simultaneously a schedule, not to exceed 18 months, for filing a revision to the pending license application to install that capacity.

The Commission's staff will resume its evaluation of your application when the requested information is submitted. If an original and 14 copies are not timely filed with the Secretary of the Commission, your application may be dismissed. You are advised to contact James Hunter on (202) 376-9814 if you have any questions concerning what information must be provided.

Sincerely,

Don Gabor

for Kenneth M. Pusateri
Acting Director, Office
of Hydropower Licensing

cc: Mr. Lee Sherline
1010 Massachusettes Ave, N.W.
Suite 101
Washington, D.C. 20001

RECEIVED

APR 19 1993

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

February 25, 1986

RECEIVED
FEB 26 1986
Department of Water Resources

L Glenn Saxton, Chief
Operations Bureau
State of Idaho
Department of Water Resources
Statehouse
Boise, Idaho 83720

Re: Application for Permit Nos 02-7375 (Idaho Power Company's Twin Falls Project), 65-12210 and 65-12211 (Idaho Power Company's North Fork of the Payette River Project)

Dear Mr Saxton:

This refers to your letter of February 20, 1986, concerning Application for Permit No 02-7375, and your letter of February 21, 1986, concerning Application for Permit Nos 65-12210 and 65-12211.

It is correct that Idaho Power Company on February 19, 1985, filed an amendment to its application for new license for the Twin Falls Hydroelectric Project No 18-000 deleting the proposed additional generating capacity from the application for new license. Permit No 02-7375 is for those additional waters associated with the proposed additional generating capacity. As of this time, Idaho Power Company has not received its new license for the Twin Falls Hydroelectric Project nor has it received approval of its amendment of the new license application to delete the proposed additional generating capacity. Since this proceeding is still pending before the Federal Energy Regulatory Commission, the Application for Permit No 02-7375 should remain active. If and when Idaho Power Company receives the requisite approvals, I will notify you directly.

The North Fork of the Payette River Project is presently being reevaluated to determine whether the Company would proceed with construction of the project in light of existing energy surpluses. That reevaluation is not complete, but a determination will be made soon. After that determination and if needed, upon appropriate approvals of the Federal Energy Regulatory Commission, I will be better able to advise you of the status of the project and water permits. Until that time, Permit Nos 65-12210 and 65-12211 should remain active.

APR 1 9 1993

Thank you for your cooperation on this matter, and if you need additional information or have further questions, please feel free to contact me at any time at 383-2673.

Sincerely,

Nicolas R Ysursa

Nicolas R Ysursa
Attorney

NRY:slp

APR 19 1993

IDAHO POWER COMPANY
P. O. BOX 70 ★ BOISE, IDAHO 83707

L Glenn Saxton, Chief
Operations Bureau
State of Idaho
Department of Water Resources
Statehouse
Boise, ID 83720

INTER-DEPARTMENT MEMO — 1

DATE 2/24/86

FROM ACY

TO Glen

SUBJECT Note that TPCO has amended license request to FERC to drop the additional generation. Do we still have application 02-7375?

yes — attached

SIGNATURE

Environmental Assessment

Twin Falls Hydroelectric Project, FERC No. 18--Idaho

I. APPLICATION

The Idaho Power Company (Applicant) of Boise, Idaho, filed an application for a new 50-year license for its existing Twin Falls Hydroelectric Project on June 30, 1983. The application included adding new generation capacity to the existing project. **The application was amended on February 19, 1985, to delete the new capacity proposal and apply for a relicense of the existing project.**

The original 50-year license was issued on June 11, 1934, and expired on June 10, 1984. The project is operating under an annual license until the Commission acts on the relicense application.

II. PURPOSE AND NEED FOR THE PROPOSED ACTION

A. Project Purpose

The Applicant proposes to continue generating electricity at the Twin Falls plant for sale to consumers throughout the western grid.

B. Need for Power

The Twin Falls project is part of the Idaho Power Company's (Company) existing electric generation resource base and is used in meeting the Company's electric system load requirements. The in-place hydroelectric resource is an inexpensive source of power that provides economic benefits through deferral of power needs requiring thermal resource generation.

III. PROPOSED PROJECT AND ALTERNATIVES

A. Existing Project

The Applicant proposes to continue generating electrical power by utilizing the flows of the Snake River at Twin Falls, Idaho. The project is located on the Snake River in Jerome and Twin Falls Counties (Figure 1). The existing project consists of a 3-section dam across the north and south falls, an 85-acre reservoir, an intake, a power penstock, a powerhouse with an installed capacity of 9 megawatts (MW), and a 1-mile-long transmission line.

B. Alternatives to Proposed Project

1. Denial of New Power License and Issuance of Nonpower License

Section 15(b) of the Federal Power Act, 16 U.S.C. §808(b), authorizes the Commission to issue a license for nonpower use when the Commission "finds that in conformity with a comprehensive plan for improving or developing a waterway or waterways for beneficial public uses all or part of any licensed project should no longer be used or adapted for use for power purposes." A license that is granted by the Commission for nonpower use is temporary.

APR 19 1985

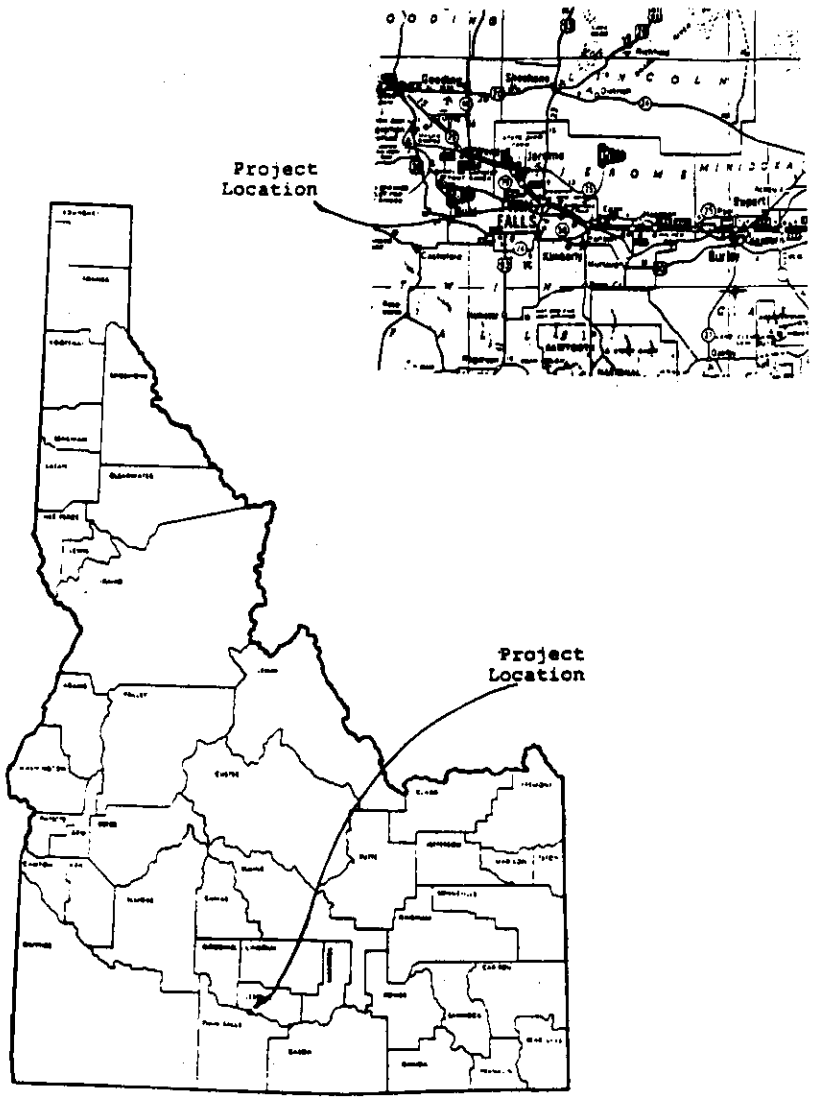


Figure 1. Twin Falls Hydroelectric Project location (Source: Staff).

te of Idaho
DEPARTMENT OF WATER RESOURCES
STATE OFFICE, 450 W. State Street, Boise, Idaho

JOHN V. EVANS
Governor

A. KENNETH DUNN
Director

Mailing address:
Statehouse
Boise, Idaho 83720
(208) 334-4440

February 20, 1986

Nicolas R. Ysursa
Box 70
Boise, ID 83707

Re: Application for Permit No. 02-7375 (Idaho Power Company)

Dear Mr. Ysursa:

Department records show that on April 5, 1982 the Idaho Power Company filed the above-referenced application in anticipation of increasing the generating capacity of the Twin Falls Hydroelectric Project on the Snake River in Twin Falls County. Information available from the Federal Energy Regulatory Commission shows that on February 19, 1985 Idaho Power Company amended its application for license, deleting the proposed additional generating capacity from the application for license.

Please advise this office of your intent with respect to the pending water right application. If you do not intend to pursue development of the additional generating capacity at that facility, the Department would appreciate your completion and return of the enclosed relinquishment form which has been partially completed.

If you have questions, please feel free to contact me.

Sincerely,

L. Glen Saxton

L. GLEN SAXTON
Chief, Operations Bureau

ls

Enclosure

cc: Southern Region

RECEIVED

APR 19 1993

02-2056

APR 19 1993

P-18-001

UNITED STATES OF AMERICA

FEDERAL ENERGY REGULATORY COMMISSION

Notice of Application Filed with the Commission
(April 26, 1985)

Take notice that the following hydroelectric application has been filed with the Federal Energy Regulatory Commission and is available for public inspection:

a. Type of Application: Revised Relicense Application

b. Project No.: 18-001

c. Date Filed: February 19, 1985

d. Applicant: Idaho Power Company

e. Name of Project: Twin Falls Hydroelectric

f. Location: On the Snake River in Jerome and Twin Falls Counties, Idaho, partially on lands of the United States administered by the Bureau of Land Management.

g. Filed Pursuant to: Federal Power Act [16 U.S.C. §§791(a) - 825(r)]

h. Contact Person: Lee Sherline, Leighton & Sherline, Suite 803, 1701 K Street, NW, Washington, DC 20006

i. Comment Date: JUN 10 1985

j. Expiration of Initial License: June 10, 1984

k. Description of Project: The project proposed for relicensing would consist of the facilities currently licensed as Project No. 18, including: (1) the Twin Falls dam, which has three sections, a concrete arch dam across the north falls with a 474-foot-long overflow crest at elevation 3508 feet, 3511.4 feet with flashboards, a non-overflow concrete gravity dam across the south falls with a 203-foot-long crest at elevation 3520 feet, and a concrete dike across the island between the north and south falls in two sections, one 108 feet long with the crest at elevation 3516 feet and the other 207 feet long with the crest at elevation 3509 feet, 3512 feet with flashboards; (2) the Twin Falls reservoir, which has a storage capacity of about 1000 acre-feet at normal pool elevation 3511.4 feet; (3) a gated intake structure in the non-overflow gravity section; (4) a 10-foot-diameter, 136-foot-long inclined penstock; (5) a 40-foot-long, 37-foot-wide concrete powerhouse containing a generating unit with a rated capacity of 9 MW and an average annual energy output of 65.8 GWh; and (6) a 1-mile-long, 138 kV transmission line connecting to the Applicant's distribution system. The existing project will be subject to Federal takeover upon expiration of the initial license under Sections 14 and 15 of the Federal Power Act. As of July 1, 1983, the Applicant's estimated net investment in the project is $1,074,017 and estimated severance damages are $126,079,341.

l. This notice also consists of the following standard paragraphs: A3, A9, B, and C.

A3. License or Conduit Exemption -- Any qualified license, conduit exemption, or small hydroelectric exemption applicant desiring to file a competing application must submit to the Commission, on or before the specified comment date for the particular application, either a competing license, conduit exemption, or small hydroelectric exemption application, or a notice of intent to file such an application. Submission of a timely notice of intent allows an interested person to file the competing license, conduit exemption, or small hydroelectric exemption application no later than 120 days after the specified comment date for the particular application. Applications for preliminary permit will not be accepted in response to this notice.

This provision is subject to the following exception: if an application described in this notice was filed by the preliminary permittee during the term of the permit, a small hydroelectric exemption application may be filed by the permittee only (license and conduit exemption applications are not affected by this restriction).

A9. Notice of intent -- A notice of intent must specify the exact name, business address, and telephone number of the prospective applicant, include an unequivocal statement of intent to submit, if such an application may be filed, either (1) a preliminary permit application or (2) a license, small hydroelectric exemption, or conduit exemption application, and be served on the applicant(s) named in this public notice.

APR 19 1993

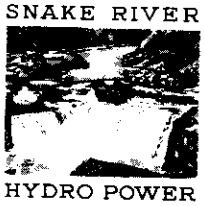
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C. Filing and Service of Responsive Documents - Any filings must bear in all capital letters the title "COMMENTS", "NOTICE OF INTENT TO FILE COMPETING APPLICATION", "COMPETING APPLICATION", "PROTEST", or "MOTION TO INTERVENE", as applicable, and the Project Number of the particilar application to which the filing is in response. Any of the above named documents must be filed by providing the original and those copies required by the Commission's regulations to: Kenneth F. Plumb, Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N.E., Washington, D.C. 20426. An additional copy must be sent to: Fred E. Springer, Director, Division of Project Management Branch, Office of Hydropower Licensing, Federal Energy Regulatory Commission, Room 208 RB at the above address. A copy of any notice of intent, competing application or motion to intervene must also be served upon each representative of the Applicant specified in the particular application.

Kenneth F. Plumb
Secretary

APR 19

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

May 13, 1985

+60 days - July 12, 1985

RECEIVED
MAY 14 1985
Department of Water Resources

State of Idaho
Department of Water Resources
Statehouse
Boise, ID 83720

RE: Project No 18-001
Twin Falls Hydroelectric Project
Application of Idaho Power Company

Dear Sir:

Pursuant to the Federal Energy Regulatory Commission's letter of April 25, 1985 to you, copies of the subject application are being sent to you for your information and any comments and recommendations you may have involving your interests. **Please submit your comments to the Secretary, Federal Energy Regulatory Commission, Washington, D.C. 20426, with a copy directly to the Applicant, within 60 days of the date of this letter.** If you have not submitted comments, or requested that the Commission grant an extension of time within that period, the Commission will assume that you have none.

Sincerely,

Nicolas R Ysursa

Nicolas R Ysursa
Attorney

NRY:srk
Enclosure

LEIGHTON AND SHERLINE
SUITE 101
1010 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C. 20001-5402
202-898-1122

RECEIVED
MAY 9 1985
Department of Water Resources

May 6, 1985

State of Idaho
Department of Water Resources
State House
Boise, Idaho 83720

Re: Project No. 18-001 (Twin Falls)

We recently discovered that the FERC, in issuing its Notice re the above-identified proceeding and addressing its April 25 letter accepting Idaho Power Company's Application for filing, used an old address of the undersigned.

It would be greatly appreciated if you will correct our address in your service list in this proceeding to the address appearing in this letterhead.

The Commission has been advised of this error and it is assumed that its records have now been corrected.

Yours very truly,

LEIGHTON AND SHERLINE

Lee S. Sherline

by Lee S. Sherline

RECEIVED
APR 19 1993

LEIGHTON AND SHERLINE
SUITE 101
1010 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C. 20001-5402

PM
6 MAY
1993

SUPPORT
NATIONAL HISTORIC
PRESERVATION WEEK

APR 19 1993

State of Idaho
Department of Water Resources
State House
Boise, Idaho 83720

P-18-001

UNITED STATES OF AMERICA

FEDERAL ENERGY REGULATORY COMMISSION

Notice of Application Filed with the Commission
(April 26, 1985)

Take notice that the following hydroelectric application has been filed with the Federal Energy Regulatory Commission and is available for public inspection:

RECEIVED
MAY 3 1985
Department of Water Resources

Dist → 02-2056 (T.F. power site)
02-3035 (Shoshone Falls)
02-4375 (Lower Salmon)

RECEIVED
APR 19 1993

a. Type of Application: Revised Relicense Application

b. Project No.: 18-001

c. Date Filed: February 19, 1985

d. Applicant: Idaho Power Company

e. Name of Project: [redacted]

f. Location: On the Snake River in Jerome and Twin Falls Counties, Idaho, partially on lands of the United States administered by the Bureau of Land Management.

g. Filed Pursuant to: Federal Power Act [16 U.S.C. §§791(a) - 825(r)]

h. Contact Person: Lee Sherline, Leighton & Sherline, Suite 803, 1701 K Street, NW, Washington, DC 20006

i. Comment Date: ~~JUN 10 1985~~ July 12, 1985 per letter from IPCo dated May 13, 1985

j. Expiration of Initial License: June 10, 1984

k. Description of Project: The project proposed for relicensing would consist of the facilities currently licensed as Project No. 18, including: (1) the Twin Falls dam, which has three sections, a concrete arch dam across the north falls with a 474-foot-long overflow crest at elevation 3508 feet, 3511.4 feet with flashboards, a non-overflow concrete gravity dam across the south falls with a 203-foot-long crest at elevation 3520 feet, and a concrete dike across the island between the north and south falls in two sections, one 108 feet long with the crest at elevation 3516 feet and the other 207 feet long with the crest at elevation 3509 feet, 3512 feet with flashboards; (2) the Twin Falls reservoir, which has a storage capacity of about 1000 acre-feet at normal pool elevation 3511.4 feet; (3) a gated intake structure in the non-overflow gravity section; (4) a 10-foot-diameter, 136-foot-long inclined penstock; (5) a 40-foot-long, 37-foot-wide concrete powerhouse containing a generating unit with a rated capacity of 9 MW and an average annual energy output of 65.8 GWh; and (6) a 1-mile-long, 138 kV transmission line connecting to the Applicant's distribution system. The existing project will be subject to Federal takeover upon expiration of the initial license under Sections 14 and 15 of the Federal Power Act. As of July 1, 1983, the Applicant's estimated net investment in the project is $1,074,017 and estimated severance damages are $126,079,341.

l. This notice also consists of the following standard paragraphs: A3, A9, B, and C.

A3. License or Conduit Exemption -- Any qualified license, conduit exemption, or small hydroelectric exemption applicant desiring to file a competing application must submit to the Commission, on or before the specified comment date for the particular application, either a competing license, conduit exemption, or small hydroelectric exemption application, or a notice of intent to file such an application. Submission of a timely notice of intent allows an interested person to file the competing license, conduit exemption, or small hydroelectric exemption application no later than 120 days after the specified comment date for the particular application. Applications for preliminary permit will not be accepted in response to this notice.

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A9. Notice of intent -- A notice of intent must specify the exact name, business address, and telephone number of the prospective applicant, include an unequivocal statement of intent to submit, if such an application may be filed, either (1) a preliminary permit application or (2) a license, small hydroelectric exemption, or conduit exemption application, and be served on the applicant(s) named in this public notice.

APR 6 1993

B. Comments, Protests, or Motions to Intervene - Anyone may submit comments, a protest, or a motion to intervene in accordance with the requirements of the Rules of Practice and Procedure, 18 C.F.R. §§385.210, .211, .214. In determining the appropriate action to take, the Commission will consider all protests or other comments filed, but only those who file a motion to intervene in accordance with the Commission's Rules may become a party to the proceeding. Any comments, protests, or motions to intervene must be received on or before the specified comment date for the particular application.

C. Filing and Service of Responsive Documents - Any filings must bear in all capital letters the title "COMMENTS", "NOTICE OF INTENT TO FILE COMPETING APPLICATION", "COMPETING APPLICATION", "PROTEST", or "MOTION TO INTERVENE", as applicable, and the Project Number of the particilar application to which the filing is in response. Any of the above named documents must be filed by providing the original and those copies required by the Commission's regulations to: Kenneth F. Plumb, Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N.E., Washington, D.C. 20426. An additional copy must be sent to: Fred E. Springer, Director, Division of Project Management Branch, Office of Hydropower Licensing, Federal Energy Regulatory Commission, Room 208 RB at the above address. A copy of any notice of intent, competing application or motion to intervene must also be served upon each representative of the Applicant specified in the particular application.

Kenneth F. Plumb
Secretary



IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

March 7, 1985

RECEIVED
MAR 8 1985
Department of Water Resources

State of Idaho
Department of Water Resources
Statehouse
Boise, Idaho 83720

RE: Project No 18-001
Twin Falls Hydroelectric Project
Application of Idaho Power Company

Gentlemen:

Idaho Power Company (Company) has filed for a copyright of its Application for New License for the Twin Falls FERC Project No 18-001. Our records indicate that the Company transmitted to you 1 copy of the Application.

Enclosed is 1 label which the Company requests be affixed to the front cover of the Application in your possession.

Your assistance in this effort would be greatly appreciated.

Sincerely,

Nicolas R Ysursa
Attorney

NRY:srk
Enclosures

APR 19 1993

IDAHO DEPARTMENT OF WATER RESOURCES
BUREAU OF ENERGY RESOURCES
STATEHOUSE
BOISE, IDAHO 83720

APR 19 1993

THIS REPORT LISTS THE CURRENT FEDERAL ENERGY REGULATORY COMMISSION LICENSING STATUS OF IDAHO HYDROPOWER PROJECTS AS KNOWN BY THE IDAHO DEPARTMENT OF WATER RESOURCES. IDWR WILL NOT BE RESPONSIBLE FOR ERRORS AND OMISSIONS. SUBSCRIBERS TO THIS REPORT ARE ENCOURAGED TO CONTACT IDWR AT (208) 334-2583 TO REPORT ERRORS, OMISSIONS, OR UPDATES IN PROJECT STATUS.

FERC STATUS REPORT
3/ 5/85

FERC #	PROJECT NAME	STREAM	COUNTY	MW	DEVELOPER WATER RIGHT # FERC STATUS	CONTACT	ADDRESS	CITY	ST	ZIP
	CANYON SPRINGS	ARTESIAN WELL	TWIN FALLS	.130	J.D. MCCOLLUM WATER RIGHT #:47-7813 (APP) (4/12/84) CONTRACT SIGNED (9/20/84) PLANT OPERATING (8/ 2/84) NO FERC JURISDICTN (10/18/84) QF STATUS GRANTED	CH2M HILL	P.O. BOX 8748	BOISE	ID	83707
	LYNN STEVENSON	UNNAMED TRIB TO SNAKE	GOODING	.140	LYNN E. STEVENSON WATER RIGHT #: (1/12/84) CONTRACT SIGNED (3/23/84) PLANT OPERATING	JAMES TUCKER	P.O. BOX 1906	TWIN FALLS	ID	83303
	DIAMOND D RANCH	LOON CREEK	CUSTER	.100	DIAMOND D RANCH PRTNRSHIP WATER RIGHT #: (3/22/84) DECLARATN OF INTENT	JOHN DEMOREST	2836 N. BEECHWOOD DR	LOS ANGELES	CA	90068
	WATKINS	BILLINGSLEY CREEK	GOODING	.010	PAUL E. WATKINS WATER RIGHT #:36-7142 (LIC): 36-8098. 36-8099 (PERS) (12/28/83) NO FERC JURISDICTN	PAUL F. WATKINS	RT. 1 BOX 412	HAGERMAN	ID	83332
0018	TWIN FALLS	SNAKE RIVER	TWIN FALLS/JEROME	42.0	IDAHO POWER WATER RIGHT #:02-7375 (APP). 02-2056 (LIC). 02-2036 (SHOSHONE FALLS POWER) (6/ 7/84) TEMP RELICENSE ISS (2/31/84) INTERVENTION GRNTD	PAUL L. JUAREGUI	P.O. BOX 70	BOISE	ID	83707
0020	SODA PROJECT	BEAR RIVER	CARIBOU		UTAH POWER & LIGHT WATER RIGHT #:13-2314 (PER) (3/ 5/84) LICENSE AMENDED	UTAH POWER & LIGHT	P.O. BOX 899	SALT LAKE CITY	UT	84110
0472	ONEIDA HYDROELECTRIC PROJ	BEAR RIVER	FRANKLIN		UTAH POWER & LIGHT WATER RIGHT #: (/ /) LICENSE ISSUED (9/ 6/84) LICENSE AMENDED (11/ 8/84) APPEAL GRANTED	UTAH POWER & LIGHT	P.O. BOX 899	SALT LAKE CITY	UT	84110
0503	SWAN FALLS	SNAKE RIVER	ADA/OWYHEE	25.0	IDAHO POWER WATER RIGHT #:02-2032. 02-4000. 02-4001.(LICS): 02-0100 (DEC): 02-7379 (AP P) (12/22/82) LICENSE ISSUED (9/ 7/84) CONST TIME EXTENDED (9/12/84) INTERVENTION GRNTD	IDAHO POWER	P.O. BOX 70	BOISE	ID	83707
0703	PARIS		BEAR LAKE	.715	UTAH POWER & LIGHT WATER RIGHT #:NONE 9-28-84 (2/23/83) LICENSE ISSUED	UTAH POWER & LIGHT	P.O. BOX 899	SALT LAKE CITY	UT	84110

02-2056
07-1312-V

P-18-000

UNITED STATES OF AMERICA

FEDERAL ENERGY REGULATORY COMMISSION

Notice of Application Filed with the Commission

(September 7, 1983)

Take notice that the following hydroelectric application has been filed with the Federal Energy Regulatory Commission and is available for public inspection:

a. Type of Application: Relicense Involving New Capacity

b. Project No: 18-000

c. Date Filed: June 30, 1983

d. Applicant: Idaho Power Company

e. Name of Project: Twin Falls Hydroelectric

f. Location: On the Snake River in Jerome and Twin Falls Counties, Idaho, partially on lands of the United States administered by the Bureau of Land Management.

g. Filed Pursuant to: Federal Power Act [16 U.S.C. §§791(a) - 825(r)]

h. Contact Person: Lee Sherline, Leighton & Sherline, Suite 803, 1701 K Street, N.W., Washington, D.C. 20006

i. Comment Date: NOV 10 1983

j. Expiration of Initial License: June 10, 1984

k. Description of Project: The project proposed for relicensing would consist of: (A) the facilities currently licensed as Project No. 18, including: (1) the Twin Falls dam, which has three sections, a concrete arch dam across the north falls with a 474-foot-long overflow crest at elevation 3508 feet, 3511.4 feet with flashboards, a non-overflow concrete gravity dam across the south falls with a 203-foot-long crest at elevation 3520 feet, and a concrete dike across the island between the north and south falls in two sections, one 108 feet long with the crest at elevation 3516 feet and the other 207 feet long with the crest at elevation 3509 feet, 3512 feet with flashboards; (2) the Twin Falls reservoir, which has a storage capacity of about 1000 acre-feet at normal pool elevation 3511.4 feet; (3) a gated intake structure in the non-overflow gravity section; (4) a 10-foot-diameter, 136-foot-long inclined penstock; (5) a 40-foot-long, 37-foot-wide concrete powerhouse containing a generating unit with a rated capacity of 9 MW; and (6) a 1-mile-long, 138 kV transmission line connecting to the Applicant's distribution system; and (B) proposed facilities including ; (1) a gated intake structure at the existing low-level sluice in the non-overflow gravity dam; (2) an 18-foot-diameter water conductor consisting of a 120-foot-deep vertical shaft and a 93-foot-long horizontal tunnel; (3) a 63-foot-wide, 100-foot-long concrete powerhouse at the downstream toe of the non-overflow portion of the dam containing a generating unit with a rated capacity of 42 MW; and (4) a 138-kV transmission line connecting to the line from the existing powerhouse in a switchyard adjacent to that powerhouse; (5) a new tailrace channel; (6) a 1875-foot-long access road to the powerhouse area; and (7) a 110-foot-long, 18-foot-wide concrete and steel access bridge between the powerhouses. The Applicant does not propose additional recreation facilities. The estimated cost of the new development is $35,838,000.

The existing project will be subject to Federal takeover upon expiration of the initial license under Sections 14 and 15 of the Federal Power Act. As of July 1, 1983, the Applicant's estimated net investment in the project is $1,074,017 and estimated severance damages are $126,079,341.

1. This notice also consists of the following standard paragraphs: A3, A9, B and C

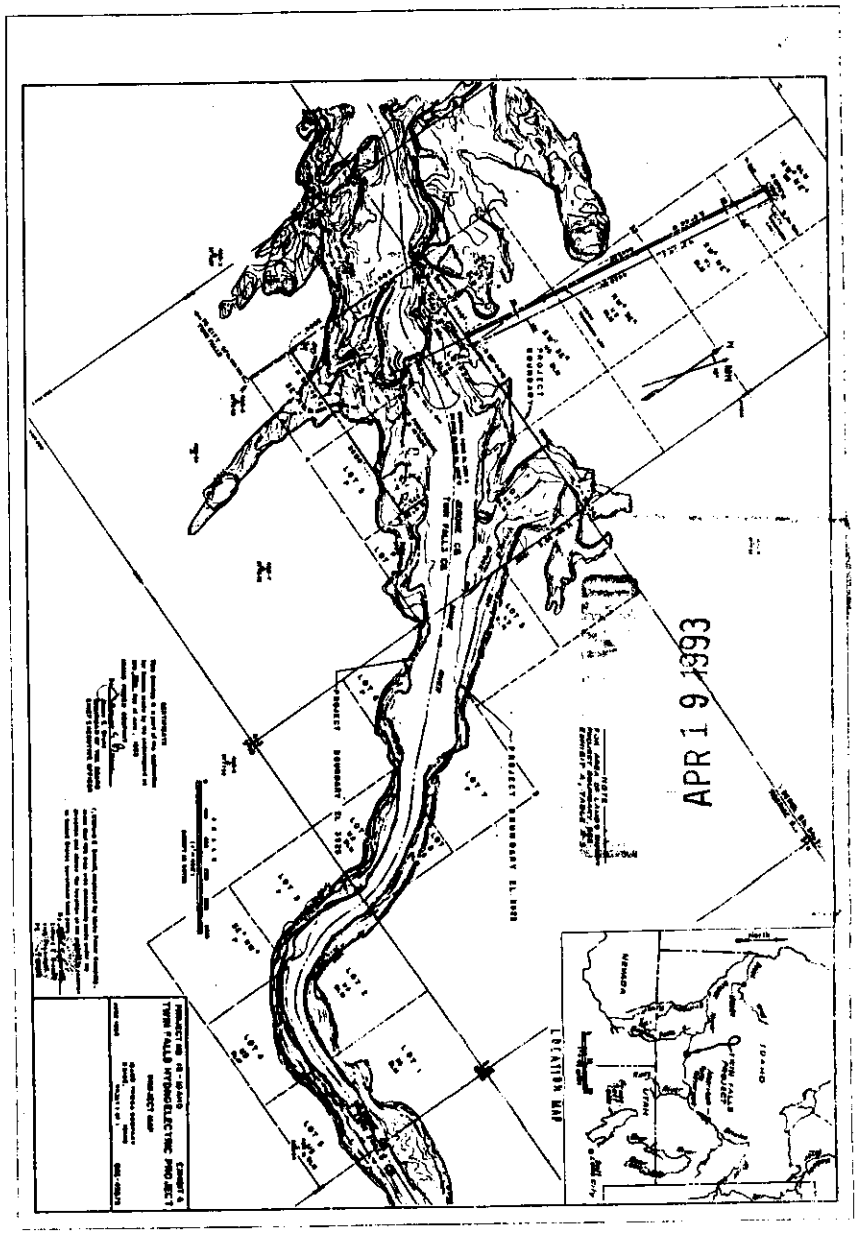
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APR 19 1993

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Kenneth F. Plumb
Secretary



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APR 19 199

January 13, 1983

Allan R. Ansell
Environmental Studies Coordination
Idaho Power Company
Box 70
Boise, ID 83707

Dear Mr. Ansell:

RE: Twin Falls Project

Your letter of December 3, 1982, requests comments concerning the proposed uprating of the Twin Falls hydropower project. The Department of Water Resources has regulatory jurisdiction for water rights and dam safety.

This letter is intended only to address issues and requirements for these two regulatory responsibilities.

Department records list license right 17070/02-2056 for Twin Falls powerplant authorizing a diversion of 1050 cfs under an April 2, 1929, priority. Application 02-7375 is pending proposing an additional 5,000 cfs for power generation at the project. This application was filed on April 9, 1982, and has been protested by the Idaho Department of Fish and Game, the Magic Valley Fly Fisherman and several private individuals. The protests express concern that the local public interest will be affected by the enlarged project particularly if the height of the existing dam is raised. The required hearing has not been scheduled to consider the protests.

Use of water at the existing dam was subordinated to subsequent development upstream from Milner Dam by the FERC license issued in 1934. Gains to the river between Milner and the project were not subordinated. The issue of subordination of existing and additional water use at the Twin Falls project to subsequent upstream development must be addressed and resolved prior to issuance of a FERC license and before a water appropriation permit is issued for the additional water use.

APR 9 1983

The addition of the new intake structure and conduit will require review under state dam safety statutes. Plans and specifications for the change must be submitted and approved prior to construction.

I appreciate the efforts you and Idaho Power Company have made to provide information on the proposed enlargement.

Sincerely,

NORMAN C. YOUNG
Administrator
Resources Administration Division

NCY:alw

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

RECEIVED
DEC 6 1982
Department of Water Resources

December 3, 1982

Kenneth Dunn, Director
Idaho Department of Water Resources
Statehouse
Boise, ID 83720

RE: Twin Falls Hydroelectric Project
Consultation Packet

Dear Mr Dunn:

Pursuant to my letter of November 30, please find enclosed a Consultation Packet for the subject project.

The purpose of the packet is to inform appropriate governmental agencies of the project and to provide them an opportunity to comment in areas where they have expertise or jurisdiction. Appropriate comments will be incorporated into the final Application for License filed with the Federal Energy Regulatory Commission.

An intergovernmental scoping meeting has been scheduled for December 17, 1982 at 10:00 a.m. in Idaho Power Company's main office located at 1220 West Idaho Street, Boise. The purpose of the meeting is to provide a forum to explain and discuss the proposed project.

If you, or one of your representatives, plan to attend the meeting, please notify me by calling (208) 383-2729. If you are unable to attend, written comments will be accepted until January 17, 1983.

I am looking forward to your comments and working closely with you on this project.

Sincerely,

Allan R. Ansell

Allan R Ansell
Environmental
Studies Coordinator

APPROVED
APR 19 1993

ARA:lf

Enclosure

SNAKE RIVER



HYDRO POWER

5000 cfs appr.
filed - 5/12

RECEIVED
DEC 1 1982
Department of Water Resources

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

November 29, 1982

Mr Kenneth Dunn, Director
Idaho Department of Water Resources
Statehouse
Boise, ID 83720

water rights at 1050 cfs subordinated to present and future irrigation use, except IPC can use water stored at American Falls and any water entering the river below Milner Dam

Dear Mr Dunn:

In 1934 the Idaho Power Company was issued a license by issued a license by the Federal Power Commission (FPC) to build and operate a dam and powerhouse at the Twin Falls of the Snake River. The license was issued for a term of fifty years, and will expire in 1984. It is therefore necessary to prepare an application for a new license to be submitted to the Federal Energy Regulatory Commission (FERC, formerly the FPC).

The Exhibit E of the Application for License is an environmental report which must be prepared in consultation with local, state and federal agencies with expertise in environmental matters.

The purpose of this letter is to inform you of an interagency scoping meeting to be held December 17, 1982 at 10:00 a.m. in the Idaho Power Company's main office located at 1220 Idaho Street, Boise, Idaho.

An information packet which explains the proposed project will be mailed to you in the near future for your review.

We request that you indicate whether or not you plan to attend the meeting by contacting me at (208) 383-2728. We further request that you identify an office or individual within your agency to whom further correspondence shall be directed and through whom additional coordination shall be accomplished.

Thank you for your consideration in this matter. Information and comments you provide are an integral part of the FERC environmental exhibit and feasibility study process.

Sincerely,

Allan R Ansell

RECEIVED
APR 19 1993

Allan R Ansell
Environmental
Studies Coordinator

RECEIVED
NOV 5 1982

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3578

November 3, 1982

C. E. Bissell
Idaho Power Co.
P. O. Box 70
Boise, Idaho 83707

Re: Application for Permit No. 02-7375

Dear Mr. Bissell:

This office is currently holding the above referenced application to appropriate water for power generation pending a hearing on protests filed against the application.

The Department has determined that The Federal Energy Regulatory Commission (FERC) and/or The Idaho Public Utilities Commission (PUC) has jurisdiction in permitting the project for which a water right is sought.

For this reason, no hearing before the Department of Water Resources will be scheduled until notification is received by this office that action on the proposed project has been taken by FERC and/or PUC.

If you have any questions, please feel free to contact this office.

Very truly yours,

Loren O. Holmes
Southern Region Supervisor

LOH:marya

cc: Dick Bonamarte
Magic Valley Fly Fisherman
Dept F & G - Jermoe
Tim Cochnauer
Phyllis Kukal

APR 19 1993

SNAKE RIVER
HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

June 16, 1982

RECEIVED
JUN 17 1982
Department of Water Resources
Southern District Office

Magic Valley Fly Fisherman
c/o Dick Bonamarte
Conservation Chairman
Box 1037
Twin Falls, Idaho 83301

Re: Application for Water Permit No 02-7375
Snake River Twin Falls Project

Dear Mr Bonamarte:

This refers to your letter of May 27, 1982 in which you enclosed a copy of your letter of protest to the Idaho Department of Water Resources regarding the above referenced water application. In your letter you requested information regarding what Idaho Power Company exactly proposed to do by the application filed, and a response as to whether it was the Company's intent to raise the height of the existing Twin Falls Dam.

The application is for a planned addition to the Twin Falls Power Plant to include a new 50 foot high dam. This new development will require an additional 5,000 cfs of water.

In the event you have additional questions, please contact me.

Sincerely,

Nicolas R. Ysursa

Nicolas R Ysursa
Attorney

NRY:ke

cc: Loren Holmes ✓
Bob Bell

9 1993

Co..servation & Education

MAGIC
VALLEY
FLY FISHERMEN

May 27, 1982

RECEIVED
MAY 28 1982
Department of Water Resources
Southern District Office

IDAHO POWER COMPANY
P.O. BOX 70
BOISE, IDAHO 83707

Gentlemen:

Enclosed please find a copy of our letter of protest to Idaho Department Of Water Resources regarding your application for Permit #02-7375, Snake River, Twin Falls Dam Project. The reason for our protest is clearly outlined in our letter.

The Magic Valley Fly Fishers are hereby requesting information from you with regard to exactly what you are proposing by the application you have filed. Is it your intent to raise the height of the existing Twin Falls Dam? The answer to that question and what you propose to do is very important to this organization.

We look forward to your answers so we may determine whether or not to withdraw our protest in this matter.

Thank you in advance for your cooperation in this matter; and we await your prompt response to this inquiry.

Very truly yours,

Dick Bonamarte

Dick Bonamarte
Conservation Chairman

Enclosure

cc: Bob Bell, Idaho Fish & Game
Loren Holmes, Dept. of Water Resources

APR 19 1993

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3578

May 19, 1982

William E. Webb
Regional Supervisor
Idaho Department of Fish & Game
Region 4
Box 428
Jerome, Idaho 83338

Re: Application for Permit No. 02-7375

Dear Mr. Webb:

Your protest against the approval of the above-referenced application has been received and a copy has been sent to the applicant. The Department suggests you contact the applicant directly in an effort to determine what is proposed by the application and to attempt to resolve the protest.

If you do not advise us within twenty (20) days that the protest has been resolved, the matter will be scheduled for conference and/or hearing. At such a conference and/or hearing, the following are the principle items the Department can consider in either approving or denying an application for permit (Section 42-203, Idaho Code):

1. Will the proposed use reduce the quantity of water under existing water rights?

2. Is the proposed water supply insufficient for the purpose intended?

3. Is the application made in good faith or for delay or speculative purposes?

4. Has the applicant sufficient financial resources with which to complete the project?

5. Will the proposed use conflict with the local public interest?

If this office can be of further assistance, please contact us.

Very truly yours,

APR 19 19[illegible]

LOREN O. HOLMES
Southern Region Supervisor

LOH:marya

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3578

May 19, 1982

Tim Cochnauer
2320 Government Way
Coeur d'Alene, Idaho 83814

Re: Application for Permit No. 02-7375

Dear Mr. Cochnauer:

Your protest against the approval of the above-referenced application has been received and a copy has been sent to the applicant. The Department suggests you contact the applicant directly in an effort to determine what is proposed by the application and to attempt to resolve the protest.

If you do not advise us within twenty (20) days that the protest has been resolved, the matter will be scheduled for conference and/or hearing. At such a conference and/or hearing, the following are the principle items the Department can consider in either approving or denying an application for permit (Section 42-203, Idaho Code):

1. Will the proposed use reduce the quantity of water under existing water rights?

2. Is the proposed water supply insufficient for the purpose intended?

3. Is the application made in good faith or for delay or speculative purposes?

4. Has the applicant sufficient financial resources with which to complete the project?

5. Will the proposed use conflict with the local public interest?

If this office can be of further assistance, please contact us.

Very truly yours,

APR 19 1993

LOREN O. HOLMES
Southern Region Supervisor

LOH:marya

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3578

May 19, 1982

Dick Bonamarte
Magic Valley Fly Fishermen
P. O. Box 1037
Twin Falls, Idaho 83301

Re: Application for Permit No. 02-7375

Dear Mr. Bonamarte:

Your protest against the approval of the above-referenced application has been received and a copy has been sent to the applicant. The Department suggests you contact the applicant directly in an effort to determine what is proposed by the application and to attempt to resolve the protest.

If you do not advise us within twenty (20) days that the protest has been resolved, the matter will be scheduled for conference and/or hearing. At such a conference and/or hearing, the following are the principle items the Department can consider in either approving or denying an application for permit (Section 42-203, Idaho Code):

1. Will the proposed use reduce the quantity of water under existing water rights?

2. Is the proposed water supply insufficient for the purpose intended?

3. Is the application made in good faith or for delay or speculative purposes?

4. Has the applicant sufficient financial resources with which to complete the project?

5. Will the proposed use conflict with the local public interest?

If this office can be of further assistance, please contact us.

Very truly yours,

LOREN O. HOLMES
Southern Region Supervisor

APR 19 1993

LOH:marya

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3578

May 19, 1982

Mr. C. E. Bissell
Idaho Power Co.
P. O. Box 70
Boise, Idaho 83707

Re: Application for Permit No. 02-7375

Dear Mr. Bissell:

Enclosed are copies of protests filed against the issuance of a permit pursuant to your above referenced application. The Department suggests you contact the protestants directly in an effort to determine the nature of the protest and to attempt to resolve the protests.

If you do not advise us within twenty (20) days that the protest has been resolved, the matter will be scheduled for conference and/or hearing. At such a conference and/or hearing, the following are the principle items the Department can consider in either approving or denying an application for permit (Section 42-203, IDAHO CODE):

1) Will the proposed use reduce the quantity of water under existing water rights?

2) Is the proposed water supply insufficient for the purposes intended?

3) Is the application made in good faith or for delay or speculative purposes?

4) Has the applicant sufficient financial resources with which to complete the project?

5) Will the proposed use conflict with the local public interest?

If this office can be of further assistance, please contact us.

Very truly yours,

LOREN O. HOLMES
Southern Region Supervisor

LOH:marya

Encl:

RECEIVED
APR 19 1993

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1041 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3578

May 19, 1982

Phyllis Kukal
600 South Fillmore #19
Jerome, Idaho 83338

Re: Application for Permit No. 02-7375

Dear Mrs. Kukal:

Your protest against the approval of the above-referenced application has been received and a copy has been sent to the applicant. The Department suggests you contact the applicant directly in an effort to determine what is proposed by the application and to attempt to resolve the protest.

If you do not advise us within twenty (20) days that the protest has been resolved, the matter will be scheduled for conference and/or hearing. At such a conference and/or hearing, the following are the principle items the Department can consider in either approving or denying an application for permit (Section 42-203, Idaho Code):

1. Will the proposed use reduce the quantity of water under existing water rights?

2. Is the proposed water supply insufficient for the purpose intended?

3. Is the application made in good faith or for delay or speculative purposes?

4. Has the applicant sufficient financial resources with which to complete the project?

5. Will the proposed use conflict with the local public interest?

If this office can be of further assistance, please contact us.

Very truly yours,

APR 19 1993

LOREN O. HOLMES
Southern Region Supervisor

LOH:marya

Conservation & Education

MAGIC VALLEY FLY FISHERMEN

May 10,1982

RECEIVED
MAY 10 1982
Department of Water Resources
Southern Idaho Office

Idaho Department of Water Resources
1041 Blue Lakes Boulevard N.
Twin Falls,Idaho 83301

Gentlemen:

The Magic Valley Fly Fishers hereby go on record protesting Idaho Power Company's application #02-7375,Snake River,Twin Falls Dam project. As we understand it,Idaho Power Company is considering raising the height of the existing dam approximately 31 feet.

If this plan is adopted,the backup of water would inundate several important trout spawning and rearing areas located on both sides of the Snake River. One such area is Vineyard Creek, which enters the Snake River on the north shore of the Snake River about one-half mile above the existing Twin Falls Dam. This stream currently provides excellent cutthroat,rainbow and rainbow-cutthroat hybrid spawning and rearing habitat all of which would be inundated if the height of the Twin Falls Dam were raised as proposed. Some of the rainbow-cutthroat hybrids utilizing Vineyard Creek are known to reach weights exceeding six pounds and large numbers of trout exceed two pounds. In 1980 the Legislature approved an instream maintenance flow for Vineyard Creek to preserve the spring in its natural state.

We would hope Idaho Power Company would consider other alternatives to raising the height of the dam in order to protect Vineyard Creek and other trout spawning and rearing habitat which will be seriously affected by their proposed project.

Very truly yours,

Dick Bonamarte

Dick Bonamarte
Conservation Chairman

cc: Bob Bell
Idaho Fish & Game

APR 19 1993

IDAHO DEPARTMENT OF FISH AND GAME
REGION 4
868 East Main • Box 428
Jerome • Idaho • 83338

RECEIVED
MAY 10 1982
Department of Water Resources
Southern District Office

May 7, 1982

Loren Holmes
Regional Supervisor
Department of Water Resources
1041 Blue Lakes Boulevard North
Twin Falls, ID 83301

Re: Application #02-7375 - Twin Falls Dam
Snake River - Idaho Power Co.

Dear Loren:

The Department of Fish and Game protests the granting of application #02-7375 for diversion of 5,000 cfs of Snake River water for power generation at the Twin Falls Dam (Point of diversion Lot 3 of Section 4, Township 10S, Range 18E, B.M., Twin Falls County).

It is our understanding the feasibility of raising the height of the existing Twin Falls dam approximately thirty-one feet is being considered. If this plan were adopted the existing Twin Falls pool would be extended upstream to a point approximately three-quarters of a mile below the Hansen Bridge. This would inundate additional free-flowing sections of the Snake River and some portions of some extremely important trout spawning tributaries.

Vinyard Creek which enters the Snake River on the north shore of the Snake River approximately one-half mile above the existing Twin Falls Dam would be very severely impacted. The stream currently provides excellent cutthroat, rainbow and rainbow-cutthroat hybrid spawning and rearing habitat all of which would be inundated if the height of the Twin Falls Dam were raised as proposed. Some of the rainbow cutthroat hybrids utilizing Vinyard Creek are known to reach weights exceeding six pounds and large numbers of the trout exceed two pounds. In 1980 the legislature approved an instream resource maintenance flow for Vinyard Creek to help preserve the spring in its natural state.

In addition to Vinyard Creek several other important trout spawning and rearing areas located on both sides of the Snake River would be inundated if the dam height were raised.

APR 19 1993

Serious loss of valuable quail habitat and waterfowl nesting habitat would also result from the project.

The Department of Fish and Game would withdraw its protest if the decision is made not to raise the height of the existing Twin Falls Dam.

Sincerely,

William E. Webb
Regional Supervisor

cc: Bureau of Program Coordination

9 1993

2320 Government Way
Coeur d'Alene, Idaho 83814
May 5, 1982

RECEIVED
MAY 7 1982
Department of Water Resources
Southern District Office

Idaho Department of Water Resources
1041 Blue Lakes North
Twin Falls, Idaho 83301

Dear Sirs;

I would like to go on record of protesting the Idaho Power application for water right in the Snake River at Twin Falls, Application No. 02-7375. I believe that flow records for that river site will show that the applied for water amount is not available on a sustained basis, and secondly that the inundation of the river canyon behind the proposed dam will cause irreparable damage to one of the most unique features of the Snake River Canyon in southern Idaho. Vinyard Creek and Lake are two of the remaining few of the Thousand Springs complex that are in an unaltered state. This area has been designated as a Natural Resource Area by the University of Idaho and has received considerable attention by the Idaho Department of Fish and Game for its aesthetic uniqueness and fauna inhabitants. In fact, this body of water is the most southern extent of the range of the Snake River cutthroat trout. This fish desires special consideration due to its limited existence in the state.

Thank you for your consideration.

Tim Cochnauer

Tim Cochnauer

APR 19 1993

NOTICE OF APPLICATION FOR WATER RIGHT

Notice is hereby given that the following application(s) have been submitted for permit to appropriate the public waters of the State of Idaho:

02=2325

IDAHO POWER COMPANY

P.O. BOX 70, BOISE, ID 83707

Source: SNAKE RIVER tributary to COLUMBIA RIVER

Date Filed: 04/05/1982

Amount: 5000.00 CFS

Diversion Point: LOT 03 Sec 04 T 10S R 18E, TWIN FALLS Co.

Use: POWER (5000.00 CFS) from 01/01 to 12/31

Place of Use: LOT 03 Sec 04 T 10S R 18E

Diversion Means: CONCRETE DAM, STEEL PENSTOCK, POWERHOUSE

If issued, the permit(s) will be subject to all prior water rights. Protests against the granting of any permit must be filed with the Director of the Idaho Department of Water Resources, 1301 Blue Lakes Blvd. North, Twin Falls, Idaho 83301 and received on or before MAY 10, 1982.

APR 19 1993

A. KENNETH DUNN

Director

Published 4/22 & 4/29/82.

02-7375
IDAHO POWER COMPANY
P.O. BOX 70, BOISE, ID 83707
Source: SNAKE RIVER tributary to COLUMBIA RIVER
Date Filed: 04/05/1982
Amount: 5000.00 CFS
Diversion Point: LOT 03 Sec 04 T 10S R 18E, TWIN FALLS Co.
Use: POWER (5000.00 CFS) from 01/01 to 12/31
Place of Use: LOT 03 Sec 04 T 10S R 18E
Diversion Means: CONCRETE DAM, STEEL PENSTOCK, POWERHOUSE

If issued, the permit(s) will be subject to all prior water rights. Protests against the granting of any permit must be filed with the Director of the Idaho Department of Water Resources, 1041 Blue Lakes Blvd. North, Twin Falls, Idaho 83301 and received on or before MAY 10, 1982.

A. KENNETH DUNN
Director

PUBLISH: Thursday, April 22, and 29, 1982.

May 3, 1982

RECEIVED

Department of Water Resources
1041 Blue Lakes Blvd. No.
Twin Falls, ID 83301

Re: Idaho Power Company Application #02-7375
Snake River, Twin Falls Dam

Gentlemen:

I wish to protest the above application for the following reasons:

1. Raising the height of the existing dam, or building a higher one, would inundate Vinyard Creek. I have enjoyed this area for the past several years and feel it is one of the few areas close to the Twin Falls area that has not been overtaken by people. I know many people that feel the same as I do and I have urged them to protest this application also.

2. Vinyard Creek supports an excellent cutthroat, rainbow and cutthroat-rainbow hybrid spawning and rearing habitat. Raising of Twin Falls dam would destroy this habitat.

3. This same area also has quail and waterfowl habitat that would be destroyed by this project.

Please consider my feelings against this project. Thank you.

Sincerely,

Phyllis Kukal

Phyllis Kukal
600 South Fillmore #19
Jerome, ID 83338
324-7463

APR 19



IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

April 27, 1982

RECEIVED
APR 28 1982
Department of Water Resources
Southern District Office

Mr Allen D Merritt
Senior Water Resource Analyst
State of Idaho
Department of Water Resources
Southern Division
1041 Bluelakes Boulevard North
Twin Falls, Idaho 83301

RE: Application for Permit No 02-7375

Dear Mr Merritt:

As requested by your letter of April 12, 1982, and as indicated in my letter of April 27, 1982, enclosed is the following:

1. A plan for the facility; and

2. An itemized estimate of the cost of constructing the facility.

If further information is needed, please advise. Thank you.

Sincerely,

Nicolas R. Ysursa

Nicolas R Ysursa
Attorney

NRY:ke
Enclosures

APR 29 1982

Form 205/206
7/81

Ident. No._____

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
AFFIDAVIT FOR WATER RIGHTS TO BE USED
FOR POWER PURPOSES

RECEIVED
APR 28 1982
Department of Water Resources
Southern District Office

A. Establishment of Residency: (Complete either 1, or 2).

1. Individual Applicant or Individual Members of a Partnership:

I,_____ of _____,
(name) (city)

county of_____, State of Idaho, being duly sworn, do hereby certify that I am a bona fide resident of the State of Idaho.

2. Corporation:

I, Paul L Jauregui of Boise,
(name) (city)

County of Ada, State of Idaho, being duly sworn, depose and say: That I am the designated registered agent of the Idaho Power Company
_____: that as such I am in charge of the registered
(name of corporation)

office of the said corporation as required by Section 30-1-12, Idaho Code, at Boise Idaho, wherein are kept the corporate records required
(city)

by Section 30-1-52, Idaho Code: and that Idaho Power Company
(name of corporation)

is a corporation qualified to do business in the State of Idaho under the laws of the State of Idaho.

B. Ownership of Facilities: (To be completed for hydropower projects only)

The hydropower facility to be developed pursuant to the attached Application for Permit:

[X] Will not utilize existing man-made irrigation facilities such as a dam or a canal.

[ ] Will utilize existing man-made irrigation facilities such as a dam or a canal, and permission of the owner is documented in an affidavit attached hereto.

[ ] Will utilize existing man-made irrigation facilities such as a dam or a canal and the owner of the facilities is the signee of this affidavit.

Idaho Power Company
By Paul L Jauregui
Applicant Secretary

State of Idaho)
County of Ada) ss.

On this 26th day of April, 19 82, personally appeared before me the signer(s) of the above instrument, who duly acknowledged to me that he (she) (they) executed the same.

Sally L Leyland
Notary Public residing at
Boise, Idaho

seal

My commission expires:

12-31-82

Withdrawn

APR 19 1993

RECEIVED
APR 28 1982
Department of Water Resources
Southern District Office

TWIN FALLS REDEVELOPMENT
ESTIMATE OF THE COST OF CONSTRUCTION

IN MID-1981 DOLLARS

Land and Land Rights	50,000
Powerhouse - Structures & Improvements	2,601,000
Reservoirs, Dams & Waterways	2,747,000
Turbines & Generators	8,991,000
Accessory Electrical Equipment	1,113,000
Misc. Power Plant Equipment	800,000
Roads	1,500,000
Substation - Structures & Improvements	88,000
Substation - Equipment	725,000
Lost Generation	1,995,000
Estimated Project Construction Cost	20,610,000
Contingencies at 15%	3,092,000
Total Estimated Construction Cost	23,702,000
Engineering & Administrative at 12%	2,844,000
Total Project Costs w/o AFUDC	26,546,000
AFUDC @ 7½% for 1 year	995,000
Total Project Cost w/AFUDC	27,541,000

MICROFILMED
APR 19 1993

BALANCE SHEET
As of July 31, 1981

(Subject to Approval of Independent Auditors)

RECEIVED
APR 28 1982
Department of Water Resources
Southern District Office

ASSETS

Electric Utility Plant (Note 1):	
Electric plant in-service (at original cost)	$1,249,887,385
Less accumulated provision for depreciation (Note 2)	217,938,897
Electric plant in-service (net)	1,031,948,488
Electric plant held for future use	1,624,687
Construction work in progress	169,969,646
Electric utility plant less accumulated provision for depreciation	1,203,542,821
Other Property and Investments:	
Nonutility property	2,946,204
Investment in subsidiary (Note 3)	2,509,046
Sinking funds	186,692
Other	1,359,947
Total other property and investments	7,001,889
Current Assets:	
Cash	3,695,226
Accounts receivable (less allowance for uncollectible accounts - $803,417)	22,275,583
Income tax refund receivable	195,000
Materials and supplies (at average cost)	10,129,524
Fuel stock (at average cost)	8,568,326
Prepayments	1,966,577
Total current assets	46,830,236
Deferred Debits:	
Unamortized debt expense (Note 13)	3,210,049
Advance coal royalties	6,952,931
Cancellation charges (Note 12)	11,361,131
American Falls Water Rights (Note 11)	22,095,000
Other	9,980,644
Total deferred debits	53,599,755
Total	$1,310,974,701

The accompanying Notes to Financial Statements are an integral part of this statement.

APR 19 1993

BALANCE SHEET
- As of July 31, 1981
(Subject to Approval of Independent Auditors)

RECEIVED
APR 28 1982
Department of Water Resources
Southern District Office

LIABILITIES

	Shares Authorized	Shares Outstanding	
Proprietary Capital:			
Common stock	25,000,000	13,732,128	$ 68,660,640
4% preferred stock	215,000	215,000	21,500,000
Serial preferred stock	150,000		
7.68% Series		150,000	15,000,000
Serial preferred stock	3,000,000		
9.50% Series		250,000	25,000,000
12.25% Series		82,500	33,000,000
Premium on capital stock			194,651,081
Capital stock expense			(1,957,823)
Retained earnings (Note 6)			124,668,995
Undistributed subsidiary earnings			45,953
Total proprietary capital			480,568,846
Long-Term Debt:			
Long-term debt			494,142,821
Project financing - Boardman (Note 10)			61,816,727
American Falls bond guarantee (Note 11)			22,095,000
Unamortized premium on long-term debt			1,781,102
Unamortized discount on long-term debt - Debit			293,125
Total long-term debt			579,542,525
Current Liabilities:			
Notes payable (Notes 4 & 5)			48,500,000
Accounts payable			12,803,764
Notes payable to associated companies			2,482,735
Taxes accrued			8,281,015
Interest accrued			11,357,840
Dividends declared			10,374,954
Other			6,104,552
Total current liabilities			99,904,860
Deferred Credits:			
Customer advances for construction			6,229,228
Accumulated deferred investment tax credits (Note 7)			38,411,926
Accumulated deferred income taxes (Note 8):			
Accelerated amortization property			1,385,200
Other property			70,716,431
Other			19,495,000
Other			12,774,357
Total deferred credits			149,012,142
Operating Reserves			1,946,328
Total			$1,310,974,701

The accompanying Notes to Financial Statements are an integral part of this statement.

APR 19 1993

Idaho Power Company
CLASSIFICATION OF ELECTRIC UTILITY PLANT AND ACCUMULATED PROVISION FOR DEPRECIATION AND AMORTIZATION
As of July 31, 1981
(Subject to Approval of Independent Auditors)

RECEIVED
APR 22 1982
Department of Water

Classification of Electric Plant

Electric Utility Plant

		Amount
1. Electric plant in-service:		
(a) Intangible plant	$ 2,137,859	
(b) Steam plant	333,020,407	
(c) Hydro-production plant	362,446,780	
(d) Other production plant	6,580,326	
(e) Transmission plant	210,022,560	
(f) Distribution plant	306,799,849	
(g) General plant	28,879,604	$1,249,887,385
2. Electric plant held for future use		1,624,687
3. Construction work in progress		169,969,646
Total electric utility plant		$1,421,481,718

Classification of Accumulated Provision for Depreciation and Amortization Applicable to Electric Plant

Accumulated provision for depreciation of electric plant	$ 217,417,858
Accumulated provision for amortization of electric plant	521,039
Total accumulated provision for depreciation and amortization	$ 217,938,897

The accompanying Notes to Financial Statements are an integral part of this statement.

APR - 9 1993

Idaho Power Company
NOTES TO FINANCIAL STATEMENTS
As of July 31, 1981
(Subject to Approval of Independent Auditors)

1. Electric Plant

The cost of additions to electric plant in service represents the original cost of contracted services, direct labor and material, allowance for funds used during construction and indirect charges for engineering, supervision and similar overhead items. Maintenance and repairs of property and replacements and renewals of items determined to be less than units of property are charged to operations. For property replaced or renewed, except for extraordinary retirements, the original cost plus removal cost less salvage, is charged to accumulated provision for depreciation, cost of related replacements and renewals is added to electric plant.

2. Depreciation

Electric plant is depreciated on the straight-line method except for production facilities constructed prior to January 1, 1968 of the T E Roach Hells Canyon Development (consisting of the Brownlee, Oxbow and Hells Canyon hydroelectric power plants) for which depreciation is based on the five percent present-worth method.

3. Investment in Subsidiary

The Company uses the equity method of accounting for its investment in Idaho Energy Resources Co., a wholly-owned subsidiary. This subsidiary is a joint venturer in Bridger Coal Company, which operates the mine supplying coal for the Jim Bridger steam generation plant. Coal purchased by the Company from the joint venture amounted to $27,448,811 for the twelve months ended July 31, 1981. As of July 31, 1981, the total assets, total liabilities and total net worth of Idaho Energy Resources Co. were $4,868,634, $2,359,588, and $2,509,046, respectively. Idaho Energy Resources Co. declared a dividend of $8,000,000 to the Company on November 26, 1980 and $5,800,000 on July 30, 1981, thereby reducing the Company's investment in subsidiary as well as payables to subsidiary.

4. Notes Payable

At July 31, 1981 the total lines of credit maintained with various banks amounted to $119,800,000. Commercial paper may be issued in an amount not to exceed 25% of operating revenues for the latest twelve-month period and must be supported by bank lines of credit of an equal amount. Under borrowing arrangements with seven of the banks, the Company is currently required to pay a fee of 1/2 of 1% on the available lines of credit which total $95,000,000.

5. Unsecured Bank Loans Outstanding at July 31, 1981:

Commercial Paper:

17.60 note dated June 29, 1981 due Aug 3, 1981	$ 1,200,000
18.10 note dated June 30, 1981 due Aug 3, 1981	450,000
17.85 note dated June 30, 1981 due Aug 14, 1981	1,000,000
18.35 note dated July 1, 1981 due Aug 14, 1981	1,100,000
19.10 note dated July 24, 1981 due Aug 26, 1981	5,000,000
19.10 note dated July 24, 1981 due Sept 8, 1981	10,000,000
18.60 note dated July 24, 1981 due Sept 1, 1981	4,350,000
18.10 note dated July 27, 1981 due Sept 3, 1981	9,250,000
18.10 note dated July 27, 1981 due Sept 10, 1981	1,000,000
18.10 note dated July 28, 1981 due Sept 10, 1981	2,550,000
18.10 note dated July 28, 1981 due Aug 27, 1981	2,650,000

APR 19 1993

5. Unsecured Bank Loans Outstanding at July 31, 1981 (Cont'd):

Commercial Paper:

18.35 note dated July 30, 1981 due Sept 14, 1981	$ 2,600,000
18.10 note dated July 31, 1981 due Aug 3, 1981	3,000,000
18.10 note dated July 31, 1981 due Aug 31, 1981	2,950,000
18.10 note dated July 31, 1981 due Sept 10, 1981	1,400,000
Total	$48,500,000

6. Retained Earnings

The agreement relating to the Company's outstanding debentures provides that the Company will not declare or pay any dividend or make any other distribution on its common stock (other than in common stock), or acquire any shares of its common stock, if the aggregate amount and cost thereof after 1957 shall exceed the aggregate net income (as defined) attributable to the common stock after 1957 plus $7,500,000 and plus the amount of proceeds from sales of common stock after 1957. No portion of the retained earnings at July 31, 1981 was restricted under this provision. Undistributed subsidiary earnings represented $45,953 of the July 31, 1981 retained earnings balance. Pursuant to Section 10(d) of the Federal Power Act, which requires the creation of a reserve account after twenty years of operation of a licensed project for earnings in excess of a specified rate, the Company has computed a Federal amortization reserve on certain of its licensed hydroelectric projects. Such a reserve constitutes an appropriation of retained earnings which, at July 31, 1981 amounted to $1,543,966.

7. Investment Tax Credit

For income tax reductions arising from the investment tax credit an equivalent amount has been charged to operating expenses and the resulting credit deferred to be amortized to income over the estimated service lives of the related properties.

8. Income Taxes

The Company, for income tax purposes, uses liberalized depreciation methods for assets acquired prior to 1971 and the "class" life system for assets acquired in 1971 and thereafter. Deferred income taxes (commonly referred to as normalized accounting) are provided on coal-fired generation facilities for the difference between income tax depreciation and financial accounting depreciation as well as for certain other capitalized costs (taxes and operator training) related to coal-fired plant construction. On other facilities, deferred income taxes are provided for the difference between actual income tax depreciation and straight-line depreciation using "guideline" lives. Deferred income taxes are also provided for the tax reduction or increase applicable to various items that are capitalized or deferred on the books and expensed or considered income for tax purposes. This accounting is consistent with indicated rate-making policy of the state regulatory authority having principal jurisdiction.

9. Allowance For Funds Used During Construction ("AFDC")

The allowance, a non-cash item, represents the estimated composite interest costs of debt, shown as a reduction of interest charges, and a return on equity funds, shown as an addition to other income, used to finance construction. Based on the uniform formula adopted by the Federal Energy Regulatory

APR 19 1993

9. Allowance For Funds Used During Construction ("AFDC") (Cont'd)
Commission, the Company's AFDC rate (net of applicable income taxes) is 8.50% for the year of 1981. The Company's AFDC rate related to the Boardman plant project financing was computed at the actual cost thereon (see Note 10).

10. Project Financing
Since February 22, 1979, the Company has financed a major portion of its 10 percent interest in the Boardman coal-fired plant through the sale of commercial paper issued by a financing intermediary which is backed by a bank credit agreement. At July 31, 1981, the amount of commercial paper outstanding pursuant to the Agreement totalled $61,633,000. The Company is authorized to guarantee up to $80,000,000 of commercial paper issued in connection with the project. Under the agreement, the Company is required to satisfy the actual obligation incurred by the financing intermediary within three years commencing January 1, 1984. The Company included its portion of the costs of construction applicable to the Boardman plant in construction work in progress. The principal amount of commercial paper outstanding together with capitalized interest and related fees thereon, is included in long-term debt. For the twelve months ended July 31, 1981 interest and related fees were $9,780,827.

11. American Falls Bond Guarantee
In 1976 the Company signed a contract which expires in the year 2025 with the American Falls Reservoir District wherein it agreed to make falling water payments to the District for the use of water released from the American Falls Replacement Dam. Such payments are to defray in part the costs of construction associated with the American Falls Replacement Dam Program. In addition, the Company agreed to guarantee bonds of the District for the project at the time of issuance. On December 18, 1980, $22,095,000 of bonds were issued, and the Company, pursuant to the agreement, executed a guarantee. Under the contract, the Company is required to make falling water payments of approximately $2.4 million annually which are sufficient to cover the total debt service applicable to the bonds.

12. Cancellation Charges
Approval to construct the proposed Pioneer coal-fired generating plant on the site selected by the Company was denied by the Idaho Public Utilities Commission in 1976. Total cancellation charges of $11,361,131 ($5,567,000 net of applicable income taxes) have been incurred in connection with this project consisting of preliminary investigation charges, primarily engineering and environmental studies, and cancellation charges on equipment. If it is determined that the work performed to date has to be abandoned, the Company intends to request rate relief sufficient to recover, over a ten-year amortization period, the actual costs incurred. However, should the request be denied, the charges, net of applicable income taxes, will be written off against income of the period during which such denial occurs. The Company's management has assessed the potential impact on the financial statements of an adverse determination of the recoverability of these charges through rate relief, and has concluded that the effect of any adjustments which would be required would not be material to the financial position of the Company.

13. Other Accounting Policies
Revenues are recognized on the basis of cycle billings and are recorded when customers are billed. Debt discount, expense and premium are being amortized over the terms of the respective debt issues.

JUL 1993

Idaho Power Company
STATEMENT OF INCOME
For The Twelve Months Ended July 31, 1981
(Subject to Approval of Independent Auditors)

Operating revenues	$295,739,466
Operating expenses:	
Purchased power	26,297,981
Fuel	32,006,841
Other operation	52,946,610
Maintenance expense	26,253,059
Depreciation expense (Note 2)	27,893,223
Amortization of limited-term electric plant	122,688
Taxes other than income taxes	12,606,199
Income taxes - Federal (Note 8)	2,074,100
Income taxes - Other (Note 8)	1,622,600
Provision for deferred income taxes (Note 8)	15,571,400
Provision for deferred income taxes - Credit (Note 8)	(3,474,200)
Investment tax credit adjustments (Note 7)	8,824,100
Total operating expenses	202,744,601
Operating Income	92,994,865
Other Income and Deductions:	
Equity in earnings of subsidiary (Note 3)	3,558,183
Allowance for other funds used during construction (Note 9)	2,921,176
Other income and deductions - Net	(337,064)
Net other income and deductions	6,142,295
Income Before Interest Charges	99,137,160
Interest Charges:	
Interest on first mortgage bonds	32,555,000
Interest on other long-term debt (Note 10)	13,351,353
Interest on short-term debt	10,585,518
Amortization of debt premium discount and expense - Net (Note 13)	86,030
Amortization of gain on reacquired debt - Credit	(66,984)
Other interest expense	736,494
Total interest charges	57,247,411
Allowance for borrowed funds used during construction - Credit (Notes 9 and 10)	(7,070,007)
Net interest charges	50,177,404
Net Income	$ 48,959,756

APR 19 1993

The accompanying Notes to Financial Statements are an integral part of this statement.

Idaho Power Company
STATEMENT OF RETAINED EARNINGS
AND
UNDISTRIBUTED SUBSIDIARY EARNINGS
For The Twelve Months Ended July 31, 1981

(Subject to Approval of Independent Auditors)

Retained Earnings

Retained earnings (at beginning of period)	$104,839,399
Balance transferred from income	45,401,574
Dividends received (Subsidiary - Note 3)	13,800,000
Total	164,040,973
Dividends:	
4% preferred stock	860,000
7.68% series serial preferred stock	1,152,000
9.50% series serial preferred stock	2,375,000
12.25% series serial preferred stock	112,292
Common stock	34,872,686
Total	39,371,978
Retained earnings (at end of period) (Note 6)	$124,668,995

Undistributed Subsidiary Earnings (Note 3)

Balance (at beginning of period)	$ 10,287,770
Equity in earnings for the period	3,558,183
Dividends paid (Debit - Note 3)	(13,800,000)
Balance (at end of period)	$ 45,953

APR 19 1993

The accompanying Notes to Financial Statements are an integral part of this statement.

STATE OF IDAHO

De ment of Water Resources

No 22130

Boise, Idaho, april 9, 1982

RECEIVED FROM ida gravel co of Boise $7725.00

seven thousand seven hundred twenty five and no/100 DOLLARS

FOR		
appl / perm	$ 7725	00
	$	
	$	
92-6	$	
TOTAL - - -	$ 7725	00

APR 19 1982

mary e. hill

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

April 27, 1982

RECEIVED
APR 28 1982
Department of Water Resources
Southern District Office

Mr Allen D Merritt
Senior Water Resource Analyst
State of Idaho
Department of Water Resources
Southern Division
1041 Bluelakes Boulevard North
Twin Falls, Idaho 83301

RE: Application for Permit No 02-7375

Dear Mr Merritt:

As requested by your letter of April 12, 1982, enclosed is the following:

1. A statement of the financial resources of the Applicant and the means by which funds are to be provided for construction of the project; and

2. An Affidavit for water rights to be used for power purposes.

A plan for the facility and an itemized estimate of the cost of constructing the facility is currently being prepared and will be submitted as soon as the information becomes available, which is anticipated to be prior to May 14, 1982. Thank you.

Sincerely,

Nicolas R. Ysursa

Nicolas R Ysursa
Attorney

NRY:ke
Enclosures

MED
19 1993

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES
Southern Region

1041 Blue Lakes Blvd N.
Twin Falls, Idaho 83301
(208) 734-3578

APRIL 13, 1982

Times News
P. O. Box 548
Twin Falls, Idaho 83301

Gentlemen:

Enclosed you will find a legal notice which we wish to have published on the dates indicated (once a week for two consecutive weekly issues) in your newspaper. We have allowed ample time for you to submit a galley proof to this office for review before the first publication date. If you cannot publish the notice on the proposed dates, please contact us immediately.

An affidavit of publication must be submitted to the Department along with the publication bill. Your cooperation is appreciated.

Please send the affidavit of publication and publication billing to this office before MAY 10, 1982.

Yours truly,

Mary A. Hill
Secretary

Encl.

MICROFILMED

APR 19 1993

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
Southern Region

JOHN V. EVANS
Governor
A. KENNETH DUNN
Director

1041 Blue Lakes Blvd. N.
Twin Falls, Idaho 83301
(208) 734-3578

April 12, 1982

Idaho Power Company
Attn: Nicolas R. Ysursa
P.O. Box 70
Boise, Idaho
83707

RE: Application for Permit No. 02-7375

Dear Mr. Ysursa:

This office is currently processing your Application for Permit No. 02-7375 filed on April 5, 1982.

Since the application seeks to establish a water right for power generating purposes, and it appears that a commercially marketable amount of power may be produced, the following information must be submitted for inclusion with your application in accordance with Section 42-202 of the IDAHO CODE:

A plan for the facility. This must include a scale drawing showing the proposed layout of the plant on the property, and must give approximate locations, dimensions, and elevations of all major components of the facility.

An itemized estimate of the cost of constructing the facility.

A statement of the financial resources of the applicant and the means by which funds are to be provided for construction of the project. This information will be reviewed in confidence and returned to you.

Please find enclosed an affidavit which must also be included with your application. Please complete the affidavit, sign it before a notary, and return it to this office.

Advertising and regional office review of your application should be completed by May 14, 1982. If the above requested information is received by that date, no additional delay in processing in this office will be incurred before we forward your application to the IDWR State Office for final review.

If you have questions regarding these requirements, please contact our office.

Sincerely,

Allen D. Merritt
Senior Water Resource Analyst

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APR 19 1993

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
SOUTHERN REGION

John V. Evans
Governor

C. Stephen Allred
Director

1341 Blue Lakes Blvd. North
Twin Falls, Idaho 83301
(208) 734-3678

April 12, 1982

Mr. Bob Bell, Regional Fisheries Biologist
Idaho Fish & Game Department
Region #4
P. O. Box 428
Jerome, Idaho 83338

Re: Application for Permit No. 02-7375 - 47-7812

Dear Mr. Bell:

Please find enclosed a copy of the above referenced application for permit for your information and files.

Sincerely,

Mary A. Hill
Secretary

for

Loren O. Holmes
Southern Region Supervisor

Encl:

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APR 19 1993

SNAKE RIVER



HYDRO POWER

IDAHO POWER COMPANY

BOX 70 • BOISE, IDAHO 83707

RECEIVED

April 2, 1982

APR 6 1982

Department of Water Resources

RECEIVED

APR 9 1982

Department of Water Resources
Southern District Office

Mr A Kenneth Dunn
Director, State of Idaho
Department of Water Resources
420 West State
Boise, Idaho 83702

RE: Application to Appropriate Water -
Twin Falls Hydroelectric Project

Dear Mr Dunn:

Enclosed for filing is an Application for Permit to Appropriate Water relating to the planned uprating of the Twin Falls Hydroelectric Project to provide for additional generating capacity.

Also enclosed is a draft in the amount of $7,725.00 representing the filing fee for the additional 5,000 cfs.

If there are any questions on this matter, feel free to contact me at any time at 383-2673 or P O Box 70, Boise, Idaho 83707.

Sincerely,

Nicolas R Ysursa

Nicolas R Ysursa
Attorney

NRY:ke
Enclosure

APR 19 1993

INDICATES TOTAL

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	USE	USE PERIOD FROM	USE PERIOD TO	MAX AMOUNT MAX RATE	DIVERSION POINT	PLACE OF USE AND ACREAGE	BASIS FOR RIGHT
02-7375	IDAHO POWER COMPANY P.O. BOX 70 BOISE ID 83707	04-05-1982	POWER	01-01	12-31	5000.00 CFS	LT03 S04 LT03 T10S R18E S04 T10S R18E		APPLICATION
	SOURCE: SNAKE RIVER		TRIBUTARY: COLUMBIA RIVER						
	REMARKS: FEET OF HEAD = 147 HORSEPOWER = 80,000								
02-7376	EMPIRE POWER CO. P.O. BOX K TWIN FALLS ID 83301	04-15-1982	POWER	01-01	12-31	6000.00 CFS	SWNE S01 LT13 (NESW) T09S R14E LT10 (NESW) SWNE S01 S01 T09S R14E T09S R14E NWSE S01 T09S R14E		APPLICATION
	SOURCE: SNAKE RIVER		TRIBUTARY: COLUMBIA RIVER						
	REMARKS: FEET OF HEAD = 15 MEGAWATTS = 4.5								
02-7377	CRYSTAL SPRINGS RANCH BOX 109 BUHL ID 83316	04-19-1982	INDUSTRIAL	01-01	12-31	9.00 CFS	LT06 S12 LT06 T09S R15E S19 T09S R15E LT07 S12 T09S R15E	LT07	APPLICATION
	SOURCE: SNAKE RIVER		TRIBUTARY: COLUMBIA						
	OTHER USES: SAND/GRAVEL PUMPING								
02-7378	ELLSWORTH, JOHN L. OREANA ST. RT. MURPHY ID 83650	04-20-1982	STOCKWATER	03-15	11-15	6.40 CFS	SWSW S26 T03S R01E		APPLICATION
	SOURCE: SNAKE RIVER		TRIBUTARY: COLUMBIA RIVER						
13-4200	VARLEY FARMS INC. P.O. BOX 526 GRACE ID 83241	08-01-1948	STOCKWATER	01-01	12-31	.03 CFS	SESE S16 SESE T10S R40E S16 T10S R40E		STATRY CLM
	SOURCE: GROUNDWATER		TRIBUTARY:						
	OTHER USES: S/50 RANGE,2 HORSES;D/2 HOMES								
			DOMESTIC	01-01	12-31	.08 CFS		SAME AS OTHER USE	
					*	---*AFA			
					*	.11*CFS			
21-7289	NEVILLE, DARRELL C. RT. 1 BOX 26 REXBURG ID 83440	02-01-1982	STOCKWATER	04-01	11-01	.06 CFS	SENW S06 SENW T09N R42E S06 T09N R42E		APPLICATION
	SOURCE: GROUNDWATER		TRIBUTARY:						
	OTHER USES: S/450 RANGE.								



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INTRODUCTION

The Twin Falls Power Plant is located in south central Idaho on the Snake River about six miles northeast of the community of Twin Falls. The plant was constructed by the Idaho Power Company in the mid-thirties pursuant to a 50-year license issued by the Federal Power Commission (FPC) in 1934.

Prior to issuance of the FPC license, the company was requested to determine, as far as practicable, the economic limiting height of a dam at the site and determine the feasibility of constructing the dam so that it could be raised when conditions warranted. Geologic assessments made in 1929 indicated that it was practical to build a dam to elevation 3550, approximately 30 feet higher than the existing reservoir.

The 1934 license directed the company to build an initial development consisting in part, of dams across the Snake River with a reservoir elevation of 3507 feet above sea level. The license also authorized an ultimate development to an elevation of 3550 feet at such time as the FPC may direct. However, the second stage of development was never directed to be completed.

Project maps were prepared from aerial photos flown in 1981. Based on this mapping, it was determined that the historic elevations for the existing facilities and reservoir levels were overstated by about eight feet.

APR 19 1993

In 1981, in analyzing what could best be adapted to a comprehensive scheme of development the company chose to evaluate the original authorization to enlarge the dam and powerhouse. Preliminary investigations confirmed that the geology of the site was of sufficient quality to accommodate raising the dam.

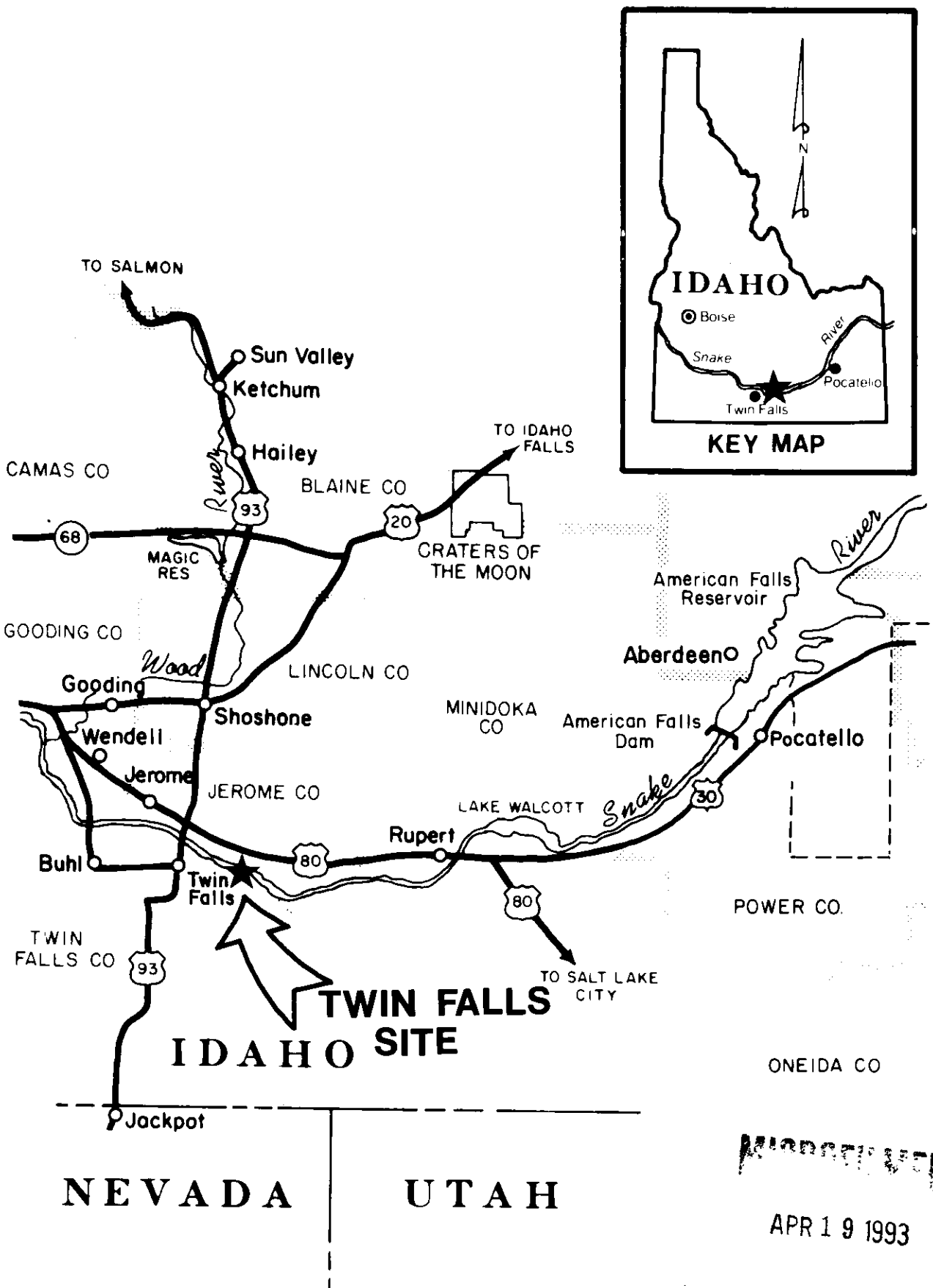
Several preliminary options were identified to determine the most economically feasible project. These options indicated a potential for adding 10,000 to 44,000kw of additional capacity to the existing project. The assessment also determined that in order to maximize the capacity, a new dam would need to be built immediately downstream of the old dam.

To allow sufficient time to conduct additional engineering and environmental studies, Idaho Power requested permission until June, 1983 to make a filing for a new federal license. The Federal Energy Regulatory Commission (formerly the FPC) granted the company's request in February of 1982.

Subsequent engineering studies determined that there would be little economic value to increasing the dam height. It is presently believed that the fullest practical use of the Twin Falls site would be to increase the generating capacity while maintaining the existing reservoir level. Therefore, the proposed project would <u>not</u> increase the existing pool elevation.

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AUG 9 1993

GENERAL LOCATION MAP



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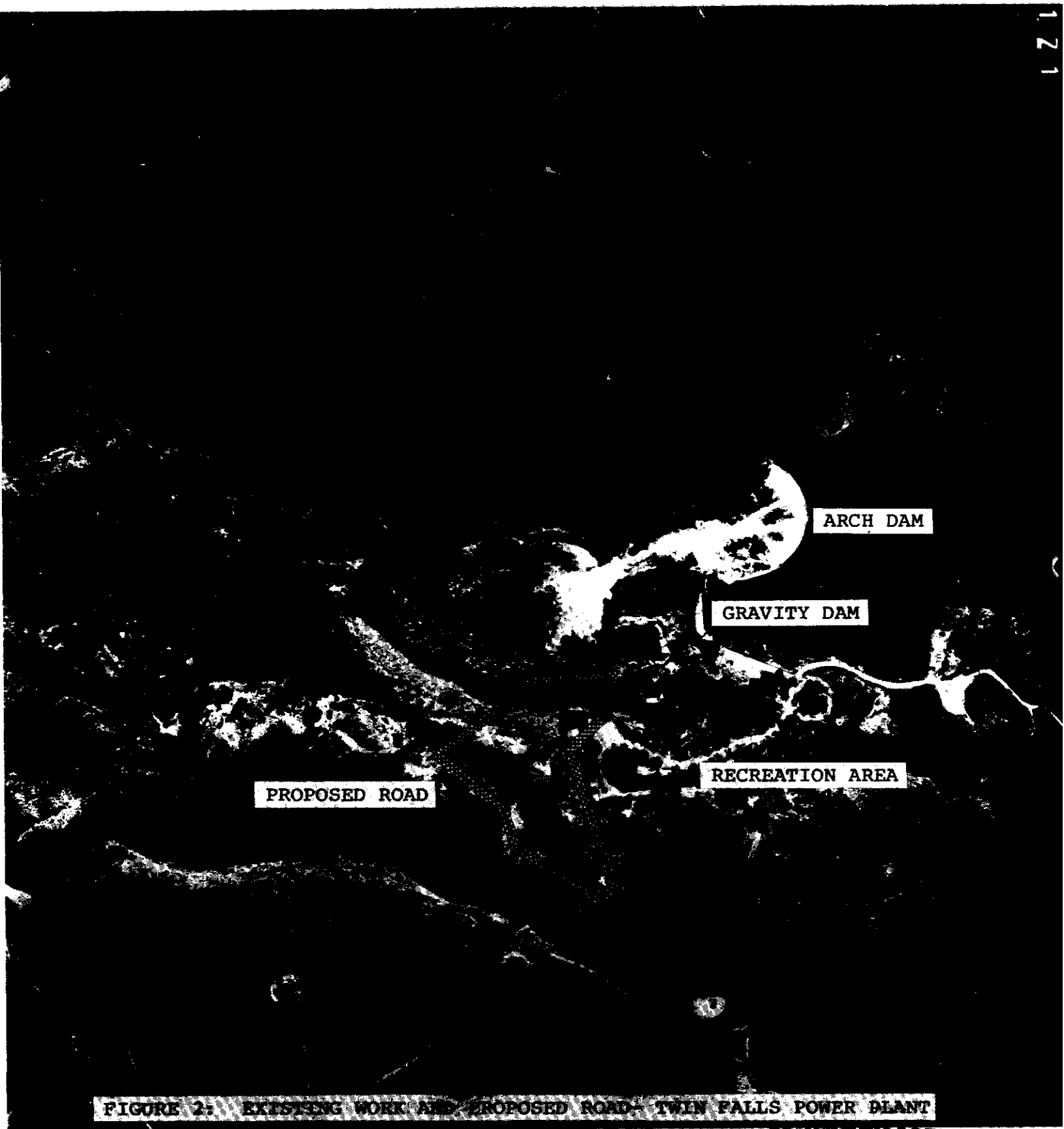


FIGURE 2: EXISTING WORK AND PROPOSED ROAD, TWIN FALLS POWER PLANT

FILED
APR 19 1993

THE EXISTING PROJECT

The existing project consists of several major elements, including:

- Two dams - One dam is located across the south falls. It is a concrete gravity structure which does not include overflow features. It also includes, as an integral part, the intake structures to the existing powerhouse.
  The second dam is a concrete arch dam located across the north falls.
- A concrete dike located on an island between the north and south falls.
- A water conduit consisting of a ten-foot diameter steel-lined tunnel.
- A powerhouse consisting of semi-outdoor powerhouse containing a single unit with a nameplate rating of 8.537 megawatts.
- A switchyard containing transformers, transmission line take-off structures and other appurtanent electrical equipment.
- A recreation facility consisting of a ten-acre park, with picnic tables, covered electric cooking facilities, restrooms, a dock and a boat ramp.

APR 19 1993

THE PROPOSED ACTION

EXPANSION OF THE TWIN FALLS HYDROELECTRIC PROJECT

In addition to the existing generating facilities, the proposed action would include new facilities located on the north side of the south falls pool.

New elements of the project include:

- A new intake structure - The new intake structure would be incorporated into the existing dam across the south falls.
- A water conduit - The water conduit would have a diameter of approximately 18 feet and a length of approximately 142 feet. It would also include a rock tunnel approximately 86 feet long.
- A new powerhouse - The new powerhouse would be a semi-outdoor type located at the base of the south falls, on its north side. The power house would contain a single unit rated at about 40 megawatts and other associated electrical equipment.
- An access road - A new access road would be required from the existing operators village to the powerhouse. The road would be approximately 1900 feet long.
- Remote operating facilities - These facilities would be designed to operate both the existing and the proposed powerhouses.
- A new switchyard - The new switchyard would contain transformers and transmission line take-off structures for both the new and old generating units.

APR 19 1993

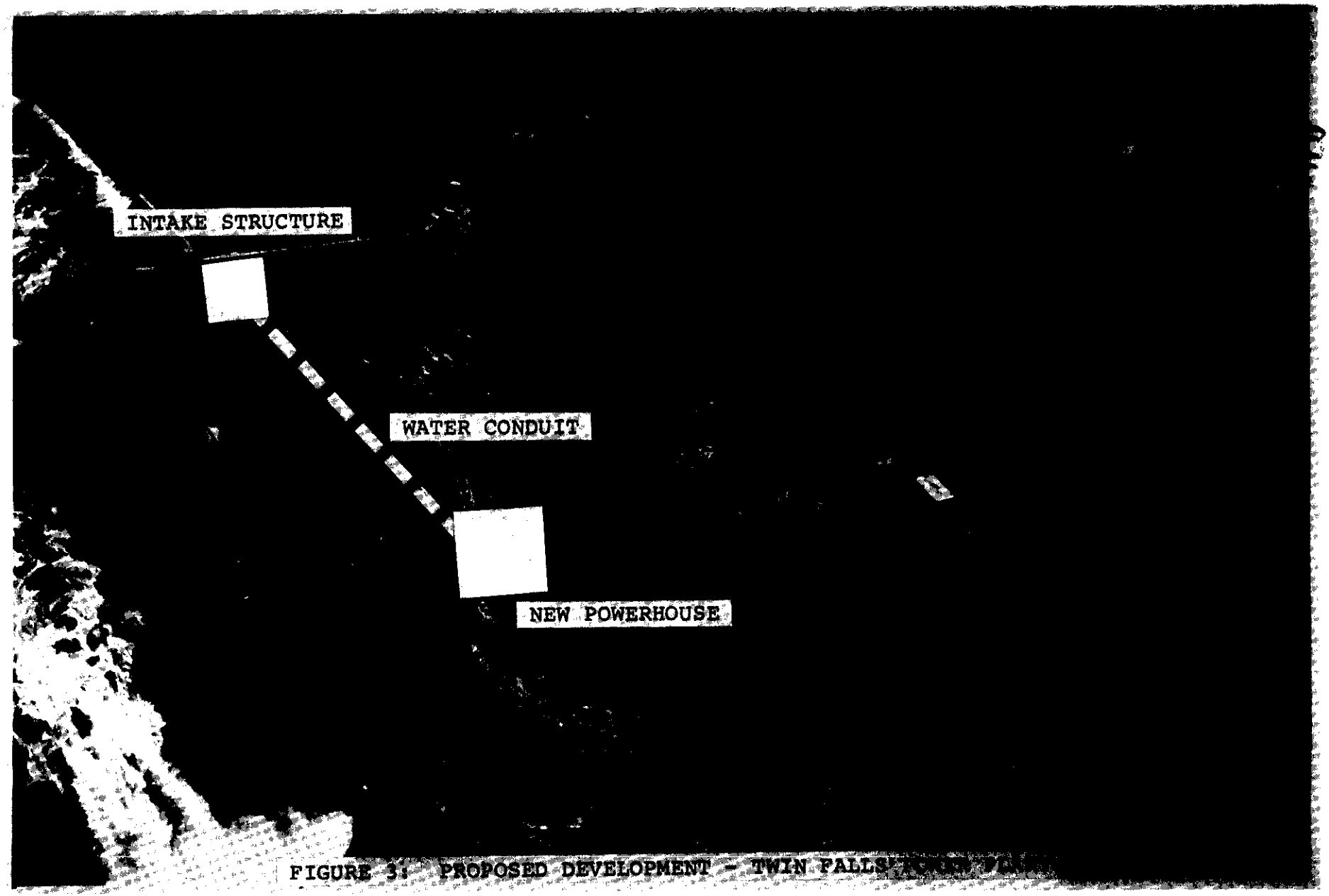


FIGURE 3: PROPOSED DEVELOPMENT - TWIN FALLS

APR 19 1993

ENVIRONMENTAL OVERVIEW

The climate of the project area is semiarid, characterized by hot summers and moderately cold winters. Average annual preciptiation is about 10 inches. Air quality is generally good. The primary air pollution problem is dust generated by agricultural operations and traffic.

Twin Falls dam is located on a nearly level portion of the Snake River Plain, at the location of the Twin Falls of the Snake River. Historically, the entire flow of the river plunged over the falls, a drop of about 135 feet. Since construction of the Twin Falls project a portion of the riverflow is directed through the powerhouse.

The Twin Falls project is one of many dams and reservoirs which have been built on the Snake River. Functions of these projects include irrigation, power production, flood control, and recreation. The reservoirs also contribute substantially to wildlife populations. Riverflows are affected by annual precipitation, upstream reservoir storage, groundwater inflow and irrigation diversion.

At Twin Falls Dam, the Snake River drains an area of more than 17,000 square miles. Flows in the river are regulated by upstream reservoirs having a combined usable capacity of about 4.7 million acre-feet. During the irrigation season, from June through October, a major portion of the riverflow is diverted at Milner Dam about 20 miles upstream of the project.

APR 19 1993

Twin Falls reservoir, the pool formed by Twin Falls dam is a shallow reservoir with a maximum depth of aproximately 30 feet. It has a high flushing rate and limited storage capacity. Maximum storage within the reservoir is approximately 1000 acre feet and the reservoir has a surface area of approximately 96 acres.

The reservoir does not appear to stratify to any great degree during the summer months. Dissolved oxygen content of the reservoir measured during the summer of 1982 remained relatively constant, and high, throughout the reservoir. Excess water pass over the concrete arch dam situated on the crest of the north falls.

The dam and reservoir are located in a portion of the entrenched Snake River Canyon. Canyon walls adjacent to the reservoir reach a height of about 240 feet. Below the falls, the canyon rim is approximately 380 feet above the river. Surrounding land to the south is dedicated almost exclusively to intensive irrigation agriculture. Some home sites are situated nearby.

The reservoir and associated park are popular recreation sites. Most of the users live in and around the nearby community of Twin Falls. The developed recreation site is a pleasant, dayuse facility. Boating, swimming, fishing, picnicing and sightseeing are the primary recreation activities associated with the park.

No historic or archaeological resources are known to occur within the project boundary.

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Due to surrounding land uses, the area provides habitat for limited wildlife populations. The reservoir and its tributaries support a variety of fish including large scale suckers, chiselmouth, brown bullhead, rainbow trout, cutthroat trout, hybrid cutthroat trout, redside shiners and squawfish.

For your review, the following pages contain the proposed Table of Contents of the Exhibit E. It represents an outline of the anticipated report.

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TABLE OF CONTENTS

EXHIBIT E

I. General Description of the Local Environment - The Setting

1.1 Physiography and Topography

1.2 Climate and Air Quality

II. Report on Water use and Quality; Consumptive Use of Project Waters and the Impact of the Project on Water Quality

2.1 Existing Instream Flow Uses

2.2 Seasonal Variation of Existing Water Quality

2.3 Existing Waters and Proposed Project Reservoir

2.4 Anticipated Impacts of the Proposed Construction and Operation of Project Facilities

2.5 Measures Recommended by Federal and State Agencies and the Applicant to Protect or Improve Water Quality During Project Construction and Operation

2.5.1 Public Safety Considerations

2.6 Groundwater in the Vicinity of the Proposed Project

2.7 Appendix (copy of the Water Quality Certificate)

III. Report on Fish, Botanical and Wildlife Resources

3.1 Existing Fish, Vegetation and Wildlife Communities of the Proposed Project Area and its Vicinity

3.1.1 Fish and Aquatic Biology
3.1.2 Vegetation
3.1.3 Wildlife

3.2 Anticipated Impacts on Fish, Botanical and Wildlife Resources of the Proposed Facilities

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3.2 Anticipated Impacts on Fish, Botanical and Wildlife Resources of the Proposed Facilities

3.2.1 Fish and Aquatic Biology
3.2.2 Vegetation
3.2.3 Wildlife

3.3 Measures Recommended by Applicant for the Mitigation of Impacts on Fish, Botanical and Wildlife Resources

3.3.1 Fish and Aquatic Biology
3.3.2 Vegetation
3.3.3 Wildlife

3.4 Materials and Information Regarding Mitigation Measures

3.5 Measures Recommended by Agencies for the Mitigation of Impacts on Fish, Botanical and Wildlife Resources

IV. Report on Historic and Archaeological Resources

4.1 Discovery Measures

4.2 Results of Surveys, Inventories and Subsurface Test Work and Identification of Historic and/or Archaeological Sites in the Proposed Project Area

4.3 Impacts of Proposed Project Construction or Operation on Sites or Properties

4.4 Management Plan for the Avoidance of, or Mitigation of, Impacts on Historic or Archaeological Sites and Resources

4.5 Materials and Information Regarding the Mitigation Measures

4.5.1 Schedule for Implementing the Mitigation Proposals

4.5.2 Estimated Cost of Measures

4.5.3 Statement of the Sources and Extent of Financing

4.5.4 Copies of Testing Reports

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V. Report on Socio-Economic Impacts

5.1 Description of Impact Area

5.2 Employment, Population and Personal Income Trends in the Impact Area

5.3 Impact of Substantial In-migration of People on the Impact Area's Government Facilities and Services

5.4 Onsite Manpower Requirement and Payroll During and After Project Construction

5.5 Numbers of Project Construction Personnel

5.5.1 Currently Reside Within the Impact Area

5.5.2 Commute Daily to the Construction Site

5.5.3 Would Relocate on a Temporary Basis

5.6 Existing Supply of Available Housing in the Impact Area

5.7 Numbers and Types of Residences and Business Establishment Displaced by the Proposed Project

5.8 Fiscal Impact Analysis Evaluating the Incremental Local Government Expenditures and Relation to the Incremental Local Government Revenues Resulting from the Construction of the Proposed Project

VI. Report on Geological and Soil Resources

6.1 Geological Features and Location of Existing and Potential Hazards and Problems

6.2 Soils and Mineral Resources

6.3 Anticipated Erosion Due to Construction and Operation of the Proposed Project and Proposed Measures of Facilities for the Mitigation of Impacts on Soils

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VII. Report on Recreational Resources

7.1 Areas within or in the Vicinity of the Proposed Project Boundary that are Included in, or Have Been Designated for Study for Inclusion in:

7.1.1 The National Wild and Scenic Rivers Systems

7.1.2 The National Trails System

7.1.3 A Wilderness Area Designated Under the Wilderness Act.

7.2 Existing Recreational Facilities Within the Project Vicinity and Public Recreational Facilities to be Provided by the Applicant

7.2.1 Existing Facilities

7.2.2 Proposed Facilities

7.3 Shoreline Buffer Zone

7.4 Existing and Future Recreational Use of the Project

7.4.1 Existing Recreational Use Patterns

7.4.2 Future Recreational Use

7.5 Development and Cost Estimates of the Recreational Facilities

7.5.1 Development

7.5.2 Cost Estimates

7.6 Measures Recommended by Agencies to - Enhance Recreational Opportunities at the Proposed Project

7.7 Drawings Describing the Project Area's Recreational Facilities

7.7.1 Existing Facilities and Those Proposed for Initial Development

7.7.2 Facilities Planned for Future Development

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APR 19 1993

7.7.3 Location of all Project Lands Reserved for Recreational Uses Other Than Those Previously Addressed

7.7.4 Project Boundary of All Areas Designated for Recreational Development Referenced to the Appropriate Exhibit G Drawings

VIII. Report on Aesthetic Resources

8.1 Character of Lands and Waters Directly and Indirectly Affected by the Proposed Project Facilities

8.2 Anticipated Impacts on Aesthetic Resources From Construction Activities

8.3 Mitigation Measures Proposed by the Applicant to Preserve and Enhance the Aesthetic Resources During Construction and Operation of the Proposed Project Facilities

8.4 Maps, Drawings and Photographs Providing an Understanding of the Information Required

IX. Report on Land Use

9.1 Existing Land Use in the Proposed Project Area

9.2 Proposed Land Uses that Would Occur as a Result of Development and Operation of the Project

9.3 Maps and Drawings

X. Alternative Locations, Designs and Energy Sources

10.1 Alternative Sites

10.2 Alternative Facility Designs, Processes and Operations

10.3 Alternative Electrical Energy Sources

10.4 Overall Consequences if the License Application is Denied

XI. Literature

11.1 Agency Contacts

11.2 Bibliography

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IDAHO POWER COMPANY

PROJECT NO 18-000

SUPPLEMENT

FEBRUARY 1985

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INTRODUCTION

The following is a supplement to the application for new license for the Twin Falls Project No 18-000 (application) filed by Idaho Power Company (existing licensee and applicant) on June 30, 1983. The application was accepted for filing on August 23, 1983 with notice issued September 7, 1983. In response to Commission inquiry of October 9, 1984, applicant informed the Commission it would supplement its pending application to request a new license for the existing project and facilities, with a license provision that the applicant may add the additional 42 megawatts of capacity proposed in the application at such time as it is needed to meet the load requirements of the applicant.

This supplement is intended to be read in conjunction with the application. For ease of reference and convenience, pertinent material and data have been extracted from the application and compiled in this supplement. Revision to exhibits of the application have been made where appropriate.

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SUPPLEMENTAL

EXHIBIT A

TWIN FALLS PROJECT NO. 18

SUPPLEMENTAL EXHIBIT A

PROJECT DESCRIPTION

Introduction

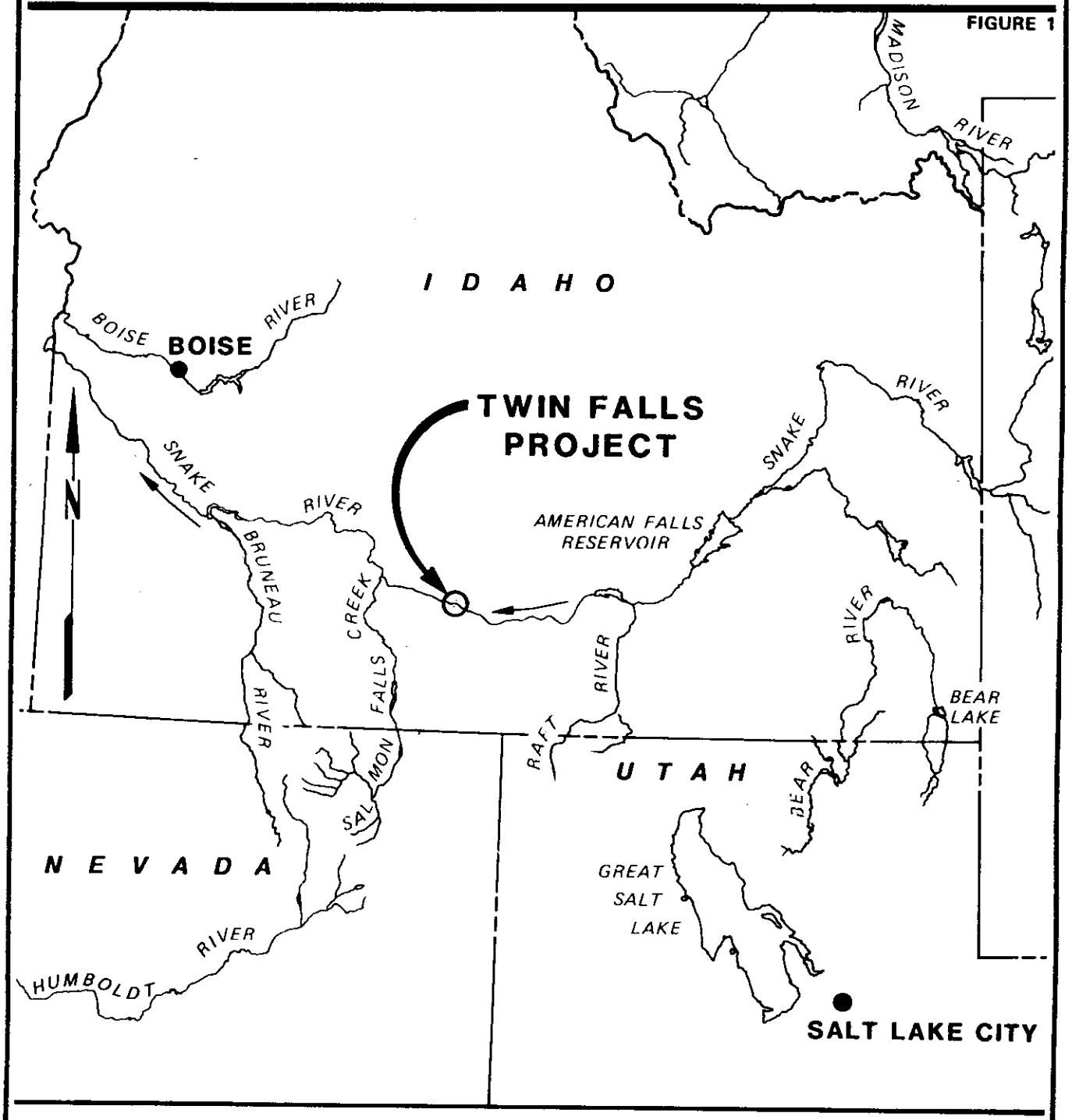
The Twin Falls Project is located on the Snake River in the counties of Jerome and Twin Falls at River Mile 620 above the mouth of the Snake River. The site is about 120 miles southeast of Boise and about three miles upstream from the town of Twin Falls, as shown on Supplemental Exhibit A, Figure 1. The project develops the head at Twin Falls, a natural drop of about 130 feet.

The project area lies west of the Continental Divide at about 42.5 degrees north latitude and 104.3 degrees west longitude. The area is located more than 500 miles from the Pacific Ocean; nevertheless, the climate is influenced by maritime air brought on the prevailing westerly winds. The average temperature in the area is about 49°F ranging from averages of about 27°F in January to 72°F in July. Annual precipitation averages about nine inches. Precipitation occurs fairly consistently over the year except for July through September when it is well below the average monthly total.

The area around the project in the central Snake River Basin has large areas of irrigated farm land. Principal crops in the area are the Idaho Russet potato, dry edible beans, sugar beets, and hay.

SUPPLEMENTAL EXHIBIT A

FIGURE 1



IDAHO POWER COMPANY
TWIN FALLS HYDROELECTRIC PROJECT

LOCATION MAP

1. PHYSICAL COMPOSITION OF EXISTING DEVELOPMENT

The original license for the Twin Falls Hydroelectric Project was issued to Idaho Power Company in 1934. The project has been in operation since 1935. It consists of a low concrete arch dam with an overflow spillway, a non-overflow concrete gravity dam, a dike, a power intake on the left side of the non-overflow section, and a power tunnel, penstock, and powerhouse. The powerhouse contains a single vertical-shaft Francis unit which is capable of developing 13,300 HP at a head of 142 feet. The generator has a nominal rating of 9375 kVA at 0.9 power factor.

The project originally was conceived in 1922 as a staged development with a raisable gravity dam across the north falls (where the low concrete arch is located). The first-stage normal pool level was to have been at elevation 3499 feet above mean sea level (elevation) and later raised to elevation 3529. In 1930, an amended application was filed which indicated that the normal pool level would be increased to elevation 3542 for ultimate development. In 1934, a final amendment was filed which proposed a low concrete arch constructed to elevation 3508. Flashboards were added to raise the normal pool level to elevation 3511.4. The crest of the existing non-overflow section was set at elevation 3520 and both dams were designed to allow raising the normal pool level by 30 feet at some future date. The existing turbine can operate with the normal water surface at elevation 3542; however, the generator operation at higher output is dependent on the availability of cooling water of adequate temperature.

Project maps were prepared from aerial photos taken in June 1981 for the dam and reservoir area at a scale of 1:4800 and for the dam, powerhouse, and downstream canyon area at a scale of 1:1200. It was determined that the historic elevations for the existing facilities and reservoir levels are in error by about 7.9 feet. All elevations included in the descriptive material of this application and appendices have been adjusted by 8.0 feet to account for this error.

EXISTING DEVELOPMENTS

The major existing elements of the project include:

- An arch dam across the north falls which is equipped with 3.4-foot flashboards to develop a normal pool elevation of 3511.4;
- A low concrete dike located on the island between the north and south falls;
- A gravity, non-overflow concrete dam across the south falls which includes, as an integral part, the intake to the existing powerhouse;
- A 10-foot diameter steel-lined tunnel; and
- A semi-outdoor powerhouse containing a single unit with a generator rating of about 9 MW.

Pertinent data for the existing facilities are presented in Supplemental Table A-1. The existing project facilities are shown on Supplemental Exhibit F, sheets 1 through 3.

Dam

There are three sections of the existing dam: a non-overflow gravity section; a low concrete dike; and a low concrete arch structure.

The crest of the non-overflow section is at elevation 3520, about 34 feet above the river channel. The crest is 5.0 feet wide and 203 feet long. The freeboard is 3.0 feet based on the spillway design discharge of 60,000 cfs shown on original design drawings. The section has a vertical upstream face and a downstream slope of

Supplemental Table A-1

SIGNIFICANT DATA FOR EXISTING FACILITIES AT THE TWIN FALLS HYDROELECTRIC PROJECT

Dam (3 Sections)	
Non-Overflow Concrete Gravity	
Crest Length	203 feet
Crest Elevation	3520
Crest Width	5 feet
Low Concrete Dike ("Island Dike")	
Crest Length (Non-Overflow/ Overflow)	108/207
Crest Elevation	3516/3509 1/
Concrete Arch (Overflow)	
Crest Length	474 feet
Crest Elevation	3508/3511.4 2/
Crest Width/Base Width	3.5 feet
Spillway and Outlets	
Service Spillway	
Total Length	681 feet 3/
Capacity (at elevation 3517)	60,000 cfs
Trash Sluiceway	6 x 8 feet
Low-Level Sluice	2 x 3 feet
Intake and Water Conductor	
Intake Opening	10 x 10 feet
Intake Gate	10 x 10 feet
Water Conductor	
Length	136 feet
Diameter	10 feet (steel-lined)
Powerhouse (Pit-type, Semi-Outdoor)	
Turbine	
Type	Vertical-shaft Francis
Rated Head	142 feet
Output at Rated Head	13,300 HP
Maximum Discharge	960 cfs
Generator	
Rating	9375 kVA (at 0.9 power factor)
Synchronous Speed	240 rpm
Transformer (6.9 kV.138 kV)	9000 kVA

1/ To elevation 3512 with flashboards up.
2/ With flashboards up.
3/ Arch dam (474 feet) plus 207-foot long section of concrete dike.

2H:3V. The section includes a 2.0 foot by 3.0 foot low-level sluiceway and a power intake constructed integrally with the dam.

The island dike is defined as the dam section from the north end of the non-overflow section to the southern vent structure of the arch section. The dike consists of a 108-foot long section with a crest at elevation 3516 and a 207-foot long section with its crest at elevation 3509. Flashboards are installed on the lower level section of elevation 3512. A 6.0 foot wide by 8.0 foot deep trash sluiceway, controlled by stoplogs, is located through this section near the non-overflow section.

The arch section excluding the thrust block has a crest length of 494 feet. The effective overflow length is 474 feet. The crest is at elevation 3508; flashboards are used to raise the normal pool to elevation 3511.4. The arch has a base width of 5.0 feet and a crest width of 3.0 feet. Cantilever action has been eliminated by the installation of a tar-paper layer between the base and stem.

Spillway and Outlets

The existing development includes a spillway (overflow dam), a low-level sluice, and a high-level sluice.

The total length of the spillway section is 681 feet; 207 feet have a crest at elevation 3509 (3512 with flashboards) and 474 feet have a crest at elevation of 3508 (3511.4 with flashboards). The discharge capacity of the spillway with all flashboards removed is 60,000 cfs at water surface elevation 3517.[1/]

1/ Design drawing E51139, Phoenix Engineering Corporation, dated January 15, 1936.

The flashboards were designed to fail as follows: when the water surface reaches elevation 3512.7, alternate sections of two panels of flashboards will fail; when the water surface reaches elevation 3514, all flashboards on the island dike will fail; and when the water surface reaches elevation 3514.8, the remaining flashboards will fail.

The low-level sluice consists of a rectangular slide gate installed on the upstream dam face and a 2 foot x 3 foot sluiceway. The invert of the sluice is at elevation 3486. No information on the capacity is available. The sluice has not been used in recent times.

Intake and Water Conductor

The intake and upstream portion of the water conductor are integrated with the non-overflow gravity section. The water conductor essentially is a steel-lined shaft which ends at the powerhouse.

The intake is a single opening 10-feet high by 10-feet wide with the centerline at elevation 3492. The intake is protected by trash screens from elevation 3510 to 3486. The velocity through the screens at full-gate turbine operation is about 1.5 ft/s. The intake control consists of 10 foot x 10 foot Broome (tractor) gate which is operated by a 40 ton capacity gate hoist.

The water conductor has an internal diameter of 10 feet and essentially consists of a steel-lined, inclined shaft. Water turns down through 60 degrees in an arc distance of 26 feet in the gravity section, enters the 110-foot long inclined shaft, turns to nearly horizontal, and enters the powerhouse. The penstock from the end of the tunnel to the powerhouse is encased in a concrete anchor block. The velocity in the water conductor at full-gate discharge through the unit (960 cfs) is about 12 ft/s.

Powerhouse

The powerhouse is a pit-type, semi-outdoor structure housing a single turbine-generator unit. The structure is about 40-feet long by 37-feet wide by 50-feet high. The powerhouse is constructed of mass and reinforced concrete. A 50-ton gantry crane is located on rails on the powerhouse walls which extend 40 feet over an area adjacent to the powerhouse. The yard area around the powerhouse is based on dumped-stone fill supported by a masonry wall on the pool side. The transformer foundation is supported on hand-placed stone and the crane area is supported on stone between two reinforced concrete walls.

2. PROJECT RESERVOIR

The existing project reservoir has a normal surface area of 85 acres at elevation 3511.4. The total storage capacity is about 1000 acre-feet at the normal pool elevation (3511.4). The existing plant will be operated on a run-of-river basis and the limited available reservoir storage will not be used on a daily basis for peaking type operation.

3. TURBINE AND GENERATOR UNIT

The turbine is a vertical shaft Francis unit with a rated head of 142 feet. The unit was designed for a maximum operating head of 179 feet, in anticipation of raising the water surface. Under existing conditions, the unit develops 13,300 HP at a speed of 240 rpm. The generator has a nominal rating of 9375 kVA at 0.9 power factor.

4. ELECTRICAL TRANSMISSION

A three phase, 60 Hz, 6.9kV/138kV, 9000 kVA transformer connects to a one mile long 138 kV, 3-phase, single circuit, transmission line which connects to the existing 138 kV Shoshone Falls - American Falls line tap part of the applicant's interconnected transmission system.

5. ACCESSORY EQUIPMENT

The powerhouse includes the following major pieces of accessory equipment:

- A 50-ton gantry crane for plant maintenance;
- Bulkheads for draft tube closure;
- A plant control system capable of operating the project as proposed; and
- Electrical leads, circuit breakers, and switchgear.

The powerhouse is also provided with appropriate air, water, plumbing, heating and ventilating systems, and electrical lighting and equipment power supply systems.

6. LANDS OF THE UNITED STATES

All lands of the United States that are enclosed within the project boundary described on Supplemental Exhibit G are identified and tabulated in Supplemental Table A-2.

Supplemental Table A-2

TWIN FALLS PROJECT LANDS

PARCEL OF LAND	AREA WITHIN PROJECT BOUNDARY IN ACRES	
DESCRIPTION	GOV'T & P.S.R.	PVT & STATE
(Trans. Line Only)		
T.9S., R.18E., BM,		
Section 33		
NW¼ NE¼	1.73	
SW¼ NE¼	4.80	
NW¼ SE¼	5.11	
SW¼ SE¼	3.15	
SE¼ SW¼	1.61	
T.10S., R.18E., BM,		
Section 4, Lot 2	2.00	
(Lands)		
T.10S., R.18E., BM,		
Section 4		
Lot 1	39.44	
Lot 2	24.89*	
Lot 3		14.67**
Lot 5		22.23**
Lot 6		6.37
SE¼ NW¼		20.55**
T.10S., R.18E., BM,		
Section 3		
Lot 5	5.15	
Lot 6		2.47
Lot 7		1.23
Lot 8	1.15	
Lot 9	0.81	
T.10S., R.18E., BM,		
Section 10		
Lot 1	0.35	
Lot 2	0.15	
Lot 3		3.07
SE¼ NW¼		
Lot 4	2.00	
Lot 5	0.73	
TOTAL:	93.07	70.59

TOTAL ACRES WITHIN PROJECT BOUNDARY FOR TWIN FALLS PROJECT (US & PRIVATE LANDS)	163.66
TOTAL ACRES PRIVATE LANDS WITHIN PROJECT BOUNDARY	70.59
TOTAL ACRES US LANDS WITHIN PROJECT BOUNDARY	93.07
TOTAL ACRES US LANDS WITHIN PROJECT BOUNDARY WITHIN TRANSMISSION LINE RIGHT OF WAY	18.39
TOTAL ACRES US LANDS WITHIN PROJECT BOUNDARY EXCLUSIVE OF TRANSMISSION LINE RIGHT OF WAY	74.68

* Excludes Transmission Line Right of Way

** Idaho Power Company Lands Owned in Fee (57.45 Acres)

SUPPLEMENTAL

EXHIBIT B

TWIN FALLS PROJECT NO. 18

SUPPLEMENTAL EXHIBIT B

PROJECT OPERATION

1. OPERATING MODE

The Twin Falls Project will continue to be operated on a run-of-river basis. The discharge capacity of the plant is 960 cfs through the existing unit. The minimum discharge of the plant is 380 cfs (the minimum discharge of the existing unit).

The annual plant factor is approximately 89 percent, based on generator nameplate rating of 9375 kVA and 0.9 power factor.

2. ENERGY PRODUCTION

Average annual energy production will be about 65.8 GWh. The estimate of the project's dependable capacity under the critical water period July, 1934 - June, 1935, including the dependable reserve requirements and applicant power obligations, taking seasonal variations and other characteristics into account, is 7.7 MW during the month of July, the peak load month for the applicant's system. All of the dependable capacity at the site is developed by the existing unit.

Streamflow

Snake River streamflows are affected by storage and diversion for irrigation. The State of Idaho publishes streamflow data, based on historic records from USGS gages, that have been adjusted to reflect current levels of withdrawal for irrigation (depletion). The most current data comprise 51 years of flow data adjusted to 1980 levels of depletion. Under these conditions, the minimum, mean, and maximum monthly flows for the Snake River at the project are 310, 2580, and 19,340 cfs, respectively.

Long term streamflow records are available in two forms for use in estimating energy production. These include a 51 year series of average flow by month (1928-78) and an annual flow duration curve based on the monthly flows for the same period of record. Average flows by month are presented on Supplemental Exhibit B, Figure 1, which shows data for the 1980 depletion levels resulting from upstream irrigation diversions. Duration curves for the 1980 depletion levels are presented on Supplemental Exhibit B, Figure 2 (Sheet 1- Annual; Sheet 2- Curves for April and June).

Area-Capacity Curve

The area-capacity curve for the reservoir, shown on Supplemental Exhibit B, Figure 3, was developed from topographic maps with a scale of 1:4800 and a contour interval of five feet. The maps were prepared from aerial photographs and ground-control points established in 1982 as a part of the studies for the application.

Tailwater Rating Curve

The tailwater rating curve for existing conditions, presented on Supplemental Exhibit B, Figure 4, was developed by the applicant using flow data from the Kimberly Gage and elevation measurements in the tail pool.

Plant Capability

The headwater elevation for the energy studies was assumed to be constant at elevation 3511.4. Gross head was computed by subtracting head water and tailwater elevations at each discharge. Net head was computed on the basis of the conservative assumption that hydraulic losses equal 2.5 percent of the gross head.

Efficiencies for the existing turbine were based on curves furnished by Allis-Chalmers. The turbine efficiencies used in the energy studies are shown below.

Flow in Percent of Full-Gate Discharge	Turbine Efficiency (%)
100	85.5
90	88.7
80	91.5
70	90.6
60	87.4
50	83.4
40	77.7
30	a/
25	a/

a/ Francis turbines are not operated at less than 40 percent of the full-gate discharge.

A curve of plant turbine efficiency versus flow for the existing installation is shown on Supplemental Exhibit B, Figure 5. The maximum discharge for the existing Francis unit was estimated, using Allis-Chalmers data, to be 960 cfs at the existing normal pool level (elevation 3511.4).

A histogram of forecast average energy output using 1980 depletion level flows is presented on Supplemental Exhibit B, Figure 6. Supplemental Exhibit B, Figure 7 presents the actual net energy produced by the existing plant for the past 20 years. These figures help verify the accuracy of the energy studies.

3. POWER UTILIZATION

Normally, the power and energy produced at the project is utilized in the applicant's system. The physical location of the project is near the center of the applicant's system which allows this plant to make an important contribution to the area's electrical

reliability and stability. Furthermore, the applicant is electrically interconnected with all adjoining systems so that any surplus power and energy from the project can be made available for use in those systems, including the exchange of power with other companies through existing interconnections. The applicant currently is operating under the following interconnection and coordination agreements:

FERC Rate Schedule	Purpose	Entity
15	Interconnection Agreement	Montana Power Co., Utah Power & Light Co.
44	AMPS Interconnection Agreement	Washington Water Power Co., Idaho Power Co., Montana Power Co., Pacific Power & Light Co., Utah Power & Light
22	Exchange Agreement	Bonneville Power Adm.
28	Interconnection Agreement	Pacific Power & Light Co. Washington Water Power Co.
51	Interconnection Agreement	Bonneville Power Adm.
Docket No E-9179	Intercompany Pool Agreement	Washington Water Power Co., Idaho Power Co., Montana Power Co., Utah Power & Light Co., Pacific Power & Light Co., Portland General Electric Co., Puget Sound Power & Light Co., and Sierra Pacific Power Co.

The applicant also consults on regular basis with other utilities on power system planning through the following formal organizations:

Western Systems Coordination Council (WSCC)

Consisting of approximately 40 utilities in Western United States and Canada.

Associated Mountain Power Systems (AMPS)

Consisting of the following companies:

The Washington Water Power Company
Idaho Power Company
The Montana Power Company
Utah Power & Light Company
Pacific Power & Light Company

The system also consults with BPA and other utilities on matters relating to planning.

Pacific Utah Montana Idaho (PUMI)

A group of four companies:

Pacific Power & Light Company
The Montana Power Company
Idaho Power Company
Utah Power & Light Company

The group plans and coordinates future generation capacity and transmission needs for their operating areas. PUMI also consults with BPA and other utilities on matters relating to planning.

Intercompany Pool (ICP)

Consisting of the following companies:

The Washington Water Power Company
Idaho Power Company
The Montana Power Company
Utah Power & Light Company
Pacific Power & Light Company

Puget Sound Power & Light Company
Portland General Electric Company
Sierra Pacific Power Company

The Intercompany Pool plans and coordinates transactions between member companies.

SUPPLEMENTAL EXHIBIT B
FIGURE 1

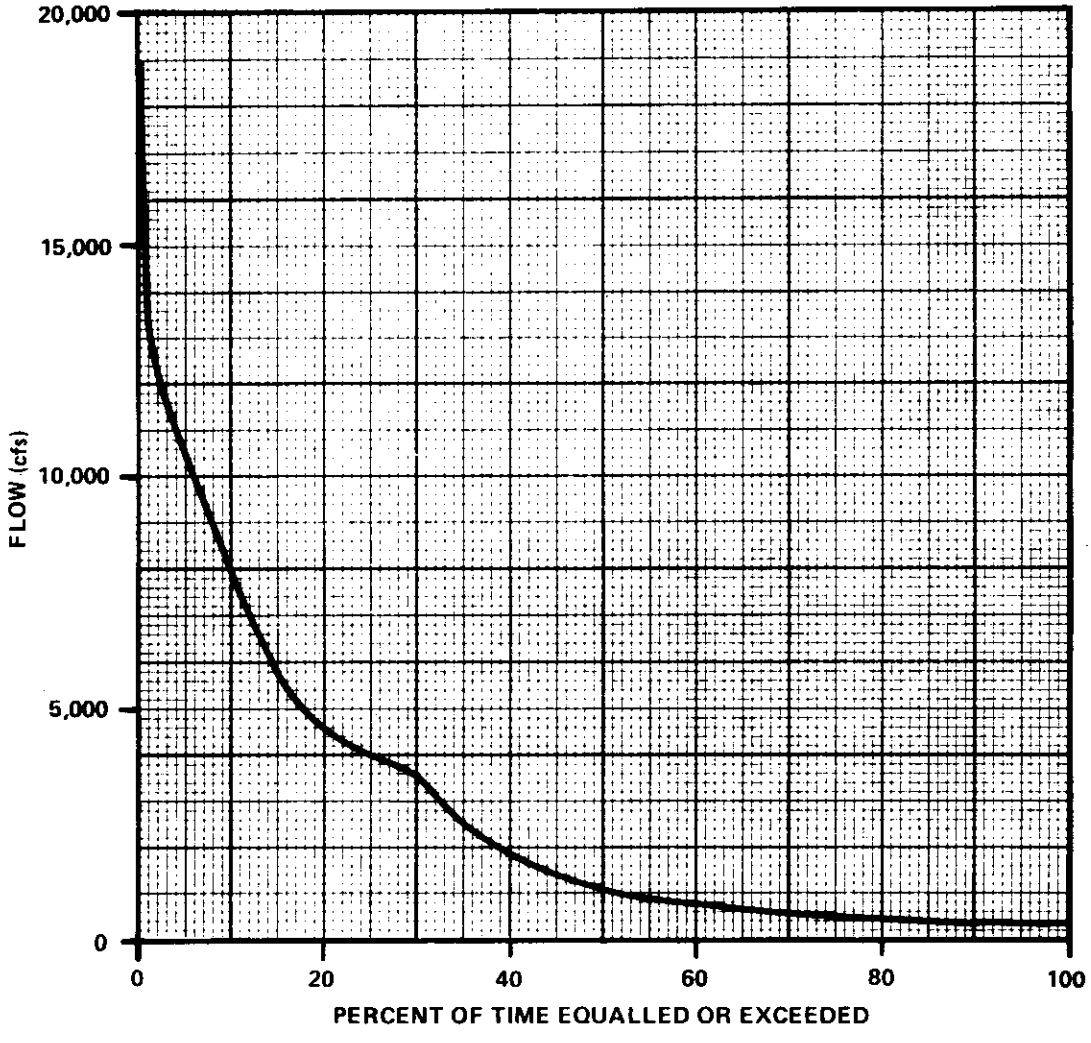
AVERAGE MONTHLY STREAMFLOW AT TWIN FALLS
1980 DEPLETION LEVEL
(CFS)

WATER YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
1928	2795.0	4645.0	6844.0	9361.0	12590.0	6825.0	11955.0	4182.0	661.0	761.0	975.0	672.0	5135.7
1929	568.0	4012.0	3647.0	2247.0	3479.0	4585.0	3946.0	452.0	630.0	807.0	645.0	697.0	2130.0
1930	556.0	1529.0	3655.0	1346.0	1349.0	3540.0	412.0	455.0	485.0	594.0	645.0	697.0	1280.9
1931	631.0	638.0	2079.0	1160.0	819.0	455.0	379.0	392.0	418.0	407.0	441.0	460.0	691.2
1932	511.0	522.0	742.0	955.0	738.0	453.0	365.0	400.0	453.0	534.0	596.0	602.0	572.2
1933	530.0	907.0	2219.0	1178.0	851.0	463.0	365.0	428.0	410.0	524.0	598.0	502.0	749.3
1934	571.0	559.0	844.0	1163.0	860.0	446.0	367.0	364.0	393.0	368.0	395.0	391.0	559.1
1935	527.0	529.0	616.0	742.0	718.0	415.0	335.0	330.0	328.0	342.0	365.0	390.0	468.5
1936	525.0	507.0	644.0	1074.0	1223.0	653.0	343.0	991.0	630.0	531.0	607.0	669.0	697.2
1937	561.0	833.0	2119.0	1035.0	826.0	396.0	358.0	382.0	420.0	477.0	536.0	412.0	697.3
1938	538.0	529.0	2196.0	1150.0	770.0	414.0	404.0	3063.0	388.0	807.0	544.0	630.0	959.3
1939	603.0	3041.0	3775.0	1121.0	3493.0	4847.0	1121.0	2826.0	369.0	490.0	549.0	607.0	1863.2
1940	577.0	1293.0	2123.0	1211.0	968.0	424.0	817.0	374.0	378.0	506.0	423.0	464.0	795.7
1941	572.0	1303.0	2279.0	1219.0	948.0	420.0	337.0	337.0	375.0	503.0	413.0	452.0	763.3
1942	545.0	991.0	2667.0	867.0	754.0	427.0	362.0	394.0	460.0	485.0	551.0	630.0	762.8
1943	489.0	1422.0	2864.0	1290.0	1827.0	10872.0	16219.0	2207.0	326.0	792.0	887.0	1429.0	3382.1
1944	2463.0	4489.0	5809.0	4783.0	3606.0	3750.0	3284.0	420.0	443.0	694.0	575.0	647.0	2575.8
1945	568.0	1900.0	3721.0	1097.0	1404.0	3987.0	3293.0	2447.0	854.0	741.0	907.0	1448.0	1867.3
1946	2832.0	4509.0	6092.0	5850.0	9396.0	7008.0	9906.0	2288.0	1601.0	712.0	923.0	687.0	4276.8
1947	1752.0	4576.0	3594.0	3094.0	6989.0	6060.0	5043.0	4283.0	388.0	720.0	599.0	659.0	3120.1
1948	545.0	3792.0	3632.0	3033.0	7158.0	4729.0	3810.0	4561.0	5552.0	789.0	924.0	659.0	3066.9
1949	1143.0	4351.0	3579.0	2045.0	4309.0	10066.0	3245.0	7487.0	480.0	727.0	635.0	697.0	3232.8
1950	602.0	2081.0	3796.0	1437.0	9010.0	7615.0	13104.0	309.0	1051.0	1709.0	975.0	1472.0	3543.2
1951	2852.0	7155.0	9278.0	8726.0	14281.0	11443.0	7727.0	7102.0	428.0	732.0	975.0	657.0	5899.2
1952	2171.0	4461.0	4547.0	8420.0	11355.0	8018.0	10753.0	6923.0	1583.0	782.0	924.0	622.0	5002.3
1953	605.0	3603.0	3628.0	1824.0	5854.0	4891.0	1397.0	415.0	4832.0	741.0	629.0	697.0	2395.9
1954	613.0	2439.0	3779.0	1337.0	4381.0	5956.0	8563.0	5200.0	507.0	735.0	619.0	679.0	2886.9
1955	517.0	1358.0	2770.0	1243.0	923.0	1402.0	3794.0	433.0	423.0	720.0	583.0	637.0	1232.6
1956	568.0	1357.0	3735.0	3202.0	11533.0	12074.0	9528.0	3567.0	1239.0	741.0	639.0	684.0	4045.9
1957	525.0	4377.0	3776.0	5596.0	10373.0	6559.0	9769.0	6491.0	515.0	691.0	942.0	672.0	4143.6
1958	590.0	3841.0	3635.0	3826.0	4768.0	4375.0	2390.0	7506.0	514.0	707.0	604.0	677.0	2780.0
1959	590.0	1339.0	3565.0	1350.0	799.0	1494.0	461.0	438.0	445.0	680.0	557.0	642.0	1035.3
1960	465.0	1560.0	3589.0	1149.0	3478.0	4430.0	2643.0	386.0	411.0	462.0	552.0	588.0	1631.4
1961	529.0	1271.0	2109.0	1107.0	959.0	437.0	380.0	372.0	390.0	335.0	374.0	390.0	720.4
1962	504.0	1347.0	2267.0	1014.0	878.0	3421.0	10093.0	4572.0	430.0	659.0	897.0	630.0	2227.2
1963	556.0	1199.0	3376.0	1289.0	992.0	2920.0	4564.0	361.0	8117.0	720.0	614.0	669.0	2107.3
1964	558.0	1214.0	3955.0	1294.0	4413.0	6012.0	8483.0	2168.0	7070.0	704.0	924.0	687.0	3099.3
1965	525.0	3063.0	4212.0	12240.0	9791.0	10645.0	11484.0	1842.0	443.0	683.0	957.0	1484.0	4746.8
1966	2302.0	8156.0	9197.0	6715.0	4641.0	4899.0	424.0	952.0	452.0	525.0	609.0	672.0	3293.8
1967	555.0	1702.0	2580.0	1290.0	779.0	946.0	3097.0	2354.0	5802.0	764.0	947.0	697.0	1789.8
1968	590.0	4111.0	3824.0	4791.0	5867.0	4654.0	2537.0	374.0	1762.0	704.0	975.0	1467.0	2613.3
1969	2306.0	4498.0	5738.0	7341.0	14718.0	8119.0	3985.0	5162.0	475.0	714.0	588.0	640.0	4463.2
1970	555.0	1236.0	3866.0	1637.0	7415.0	5483.0	2865.0	4139.0	7546.0	766.0	924.0	1095.0	3091.4
1971	1659.0	4445.0	4492.0	18598.0	13715.0	11423.0	15045.0	6813.0	10843.0	3855.0	952.0	1449.0	7723.4
1972	4274.0	11667.0	11186.0	19543.0	14114.0	16198.0	11170.0	4551.0	6384.0	789.0	926.0	1454.0	8467.7
1973	3379.0	5955.0	10222.0	7896.0	5312.0	6587.0	4321.0	5253.0	401.0	720.0	583.0	642.0	4279.9
1974	1003.0	4817.0	3756.0	9996.0	12512.0	10335.0	16722.0	1983.0	8107.0	807.0	924.0	1445.0	5961.5
1975	2431.0	4403.0	8250.0	9550.0	10822.0	9208.0	4161.0	3716.0	6547.0	5164.0	926.0	1474.0	5937.4
1976	2288.0	5787.0	8962.0	12580.0	10668.0	12342.0	12313.0	12781.0	417.0	717.0	937.0	664.0	6693.0
1977	2329.0	4283.0	3731.0	4414.0	3781.0	3005.0	449.0	408.0	381.0	385.0	407.0	410.0	1990.7
1978	579.0	1420.0	2926.0	1307.0	903.0	591.0	5500.0	6276.0	411.0	725.0	879.0	1392.0	1906.2
AVERAGE	1125.9	2959.3	4048.7	4069.3	5178.6	5034.6	5086.0	2774.7	1811.1	818.6	713.2	782.1	2850.1

IDAHO POWER COMPANY
TWIN FALLS
HYDROELECTRIC PROJECT

AVERAGE MONTHLY STREAMFLOWS AT TWIN FALLS 1980 DEPLETION LEVEL

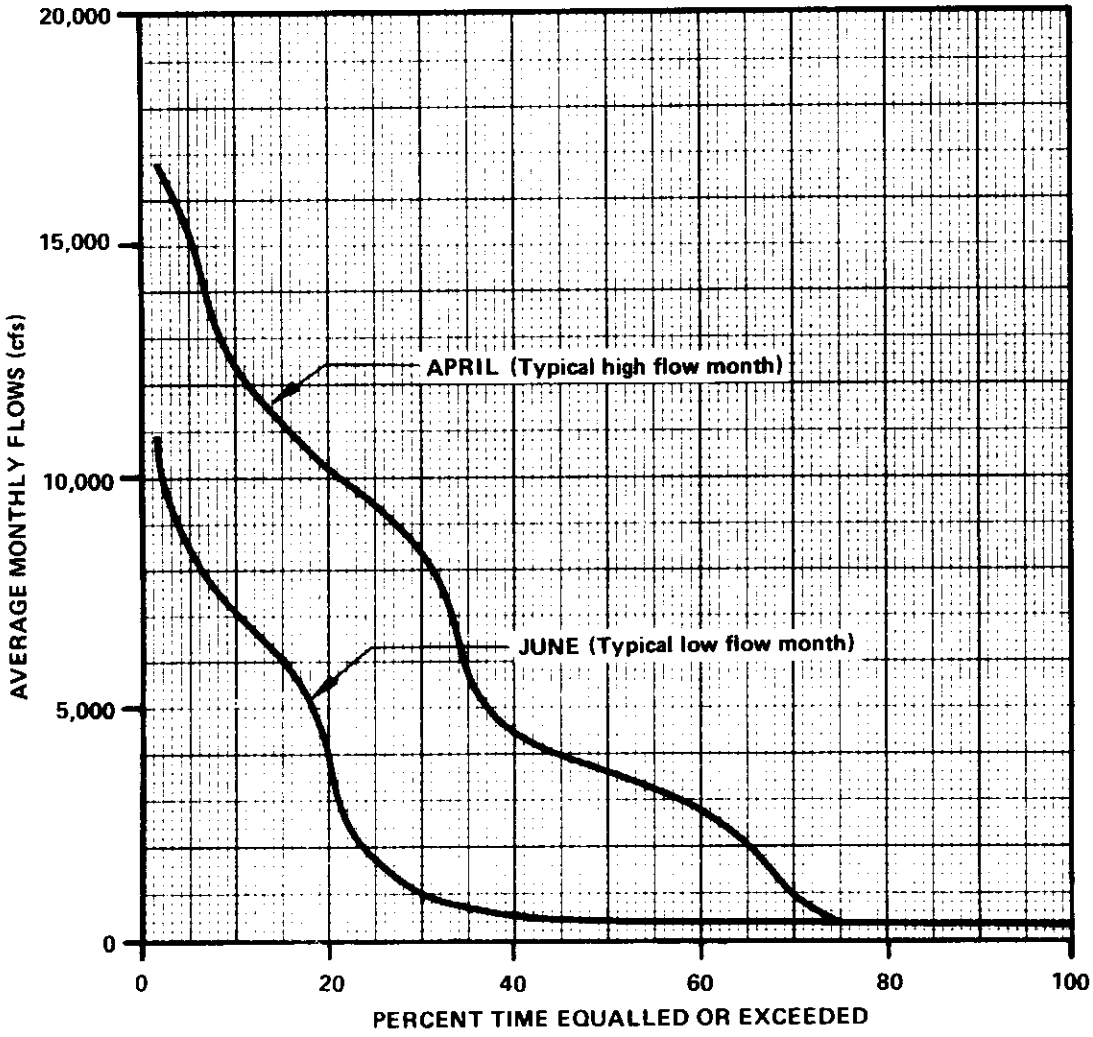
SUPPLEMENTAL EXHIBIT B
FIGURE 2
Sheet 1 of 2



NOTE: Curves derived using monthly flow data for water years 1928 through 1978 at Kimberly adjusted to the 1980 depletion level

IDAHO POWER COMPANY
TWIN FALLS HYDROELECTRIC PROJECT

ANNUAL FLOW DURATION CURVE

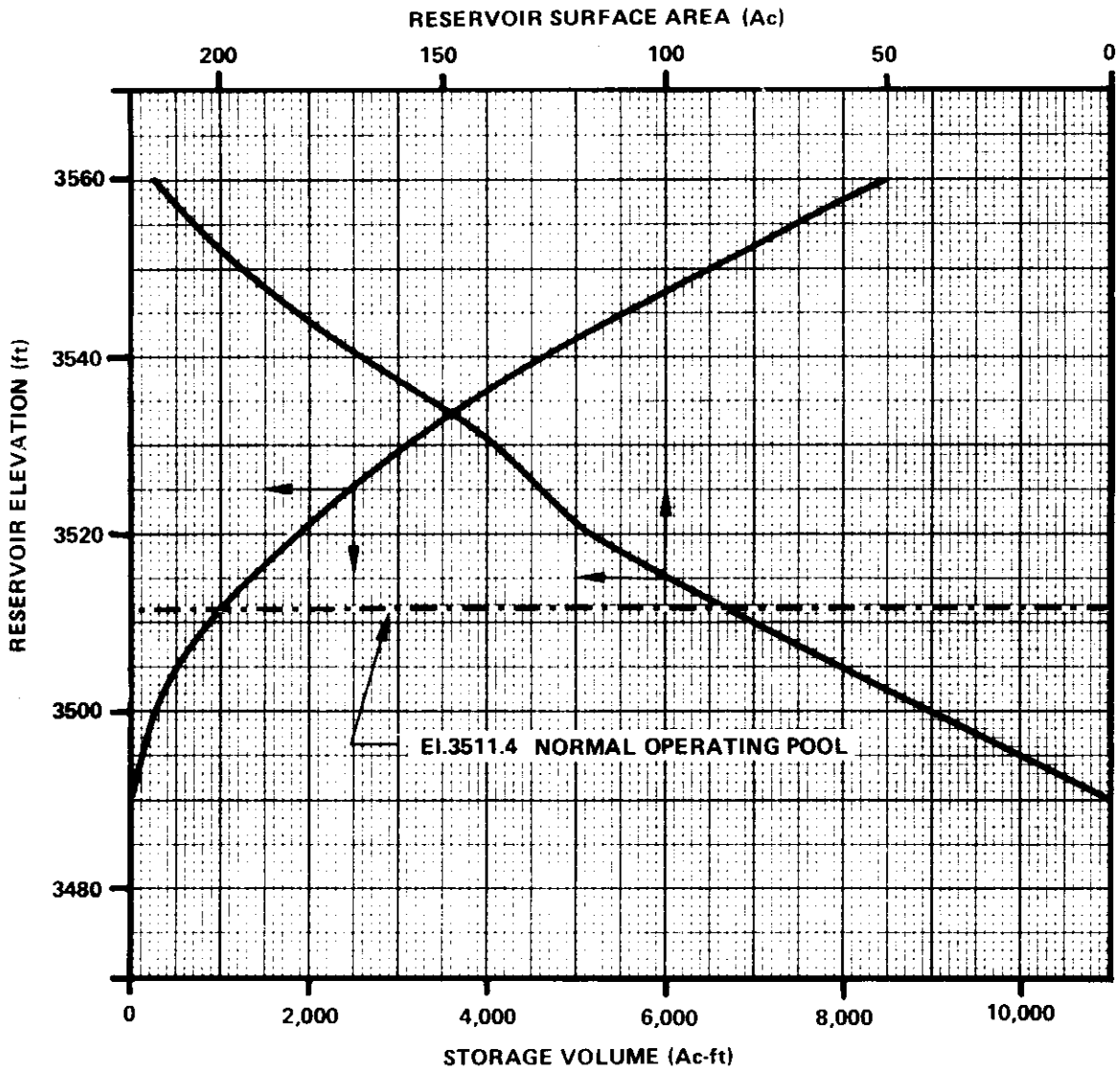


NOTE: Curves derived using monthly flow data for water years 1928 through 1978 at Kimberly adjusted to the 1980 depletion level

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FLOW DURATION OF MEAN MONTHLY FLOW

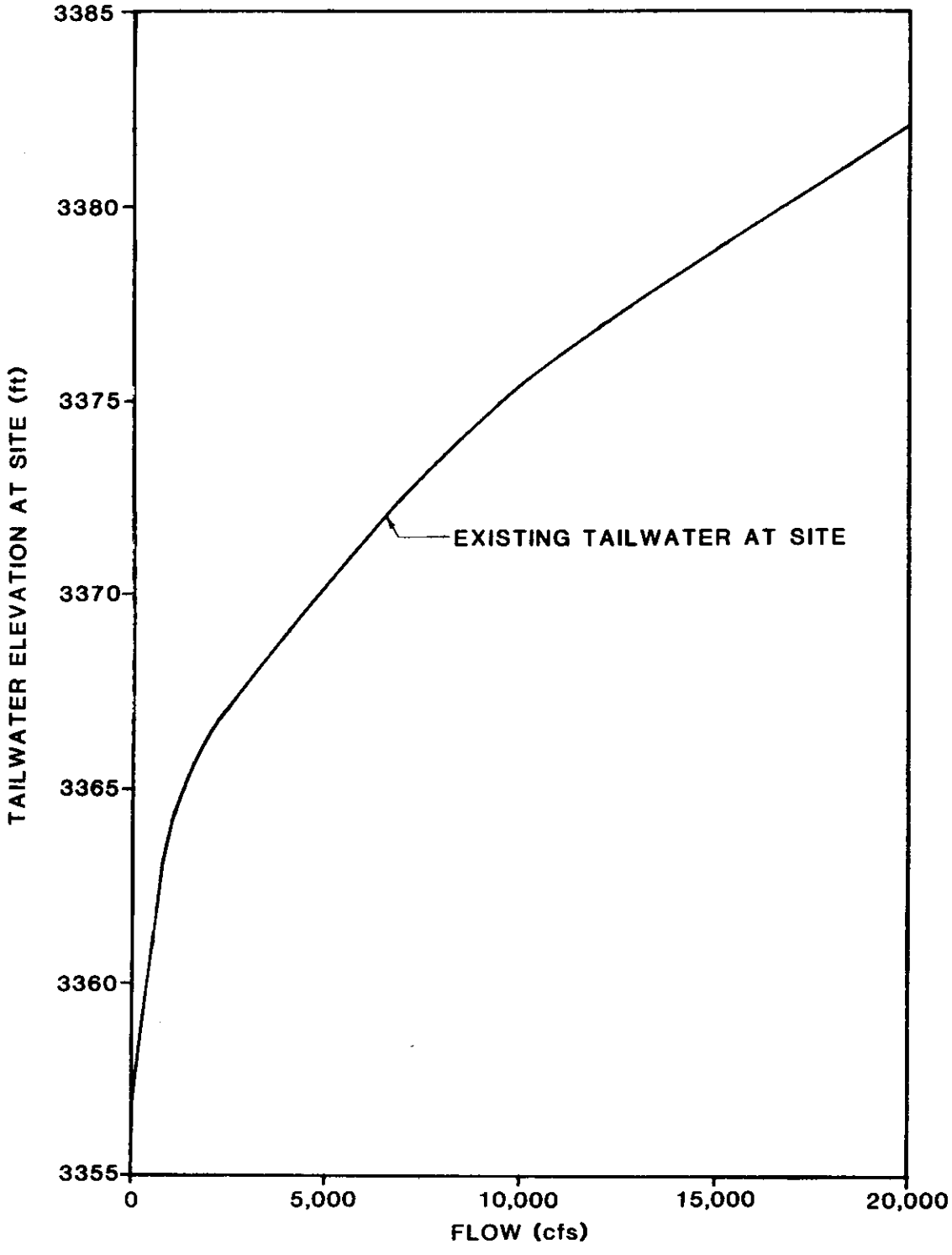
SUPPLEMENTAL EXHIBIT B
FIGURE 3



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RESERVOIR AREA–VOLUME CURVES

SUPPLEMENTAL EXHIBIT B
FIGURE 4



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TAILWATER CURVE

WATER QUALITY-TWIN FALLS RESERVOIR

LOCATION: 1 - 3 DATE: September 9, 1982

Depth (Meters)	1/3 Distance From South Shore Temp °C	1/3 Distance From South Shore D.O.(mg/l)	Center of Reservoir Temp °C	1/3 Distance From North Shore Temp °C
Surface		9.62		
1	19.5		19.0	19.5
2	19.5		19.0	19.0
3	19.0		19.0	19.0
3.5				18.75
4	19.0		19.0	
5	19.0		19.0	
6	19.0		19.0	
7	19.0		18.75	
7.5	19.0			
8			18.75	

LOCATION: 1 - 4 DATE: September 9, 1982

Depth (Meters)	1/3 Distance From South Shore Temp °C	1/3 Distance From South Shore D.O.(mg/l)	Center of Reservoir Temp °C	1/3 Distance From North Shore Temp °C
Surface		10.82		
1	19.75		19.25	20.0
2	19.75		19.0	19.75
3	19.25		19.0	19.25
4	19.0		19.0	19.0
5			18.5	18.75
5.3				18.75
6			18.5	
6.7			18.5	

The Basin is bordered by mountains on all but the western edge and drains 28,400 square miles.

Seven trend stations are located on the Snake River from the Wyoming border to the basin boundary. Other trend stations are maintained on the Henry's Fork, the Blackfoot River, the Portneuf River, Rock Creek, Salmon Falls Creek, and the Malad River.

Ambient water quality conditions are summarized and evaluated by using EPA's Water Quality Index. The WQI reduces the mass of monthly data to a single overall measure which expresses the quality of a stream or river. The index is an aggregation of a standardized set of parameters and associated criteria which provides a means for measuring and comparing water quality status with respect to water quality goals. Sub-indices which are weighted by the relative severity of the criteria being exceeded for each group.

The WQI numbers span a scale from zero to 100, with zero meaning no evidence of pollution and 100 indicating severe pollution. Twenty is used as a break point for parameters which exceed a minimum criteria. Therefore, less than 20 indicates a stream which on the average experiences no or minimal pollution. Sixty is used as the break point indicating severe pollution. For this report the WQI was divided into additional categories and given a descriptive rating of a very good, good, fair, poor and very poor (see Appendix E-3 of the application).

The water quality of the Snake River as it enters Idaho from the east in Wyoming is very high as recorded at Heise. As the river flows through the Upper Snake River Basin water quality decreases due to increased bacterial densities, increased nutrient concentrations, turbidity, suspended solids, and elevated summer temperatures.

The Henry's Fork of the Snake River contributes fecal coliform bacteria, dissolved solids, and phosphorus which is associated with irrigated farming, dryland farming, and livestock grazing. Concentrations of DDT and PCB's remain above background concentrations in fish from the Henry's Fork. Contamination from pesticides resulted

from the collapse of the Teton Dam in 1976. Similar levels of these organic compounds were found in fish in the Snake River at Menan which is below the Henry's Fork.

The overall water quality of the Blackfoot River is rated as fair due to bacteria, suspended sediment, and turbidity. The water quality of the Snake River below the Blackfoot River is generally similar to the water quality at Menan with exception of increasing concentrations of nutrients (nitrate and phosphorus) and a slight increase in bacterial densities.

The Portneuf River which empties into the upper end of American Falls Reservoir is severely polluted in comparison to the Snake River at Blackfoot. The Portneuf River is degraded by high bacterial concentrations, nutrients (nitrate and phosphorus) turbidity, and suspended solids. Point sources, nonpoint sources, and natural sources (springs, phosphate deposits) contribute to the overall water quality problem in the Portneuf River. Several major point sources are being removed from the river by through land treatment. An ongoing 208 project on Marsh Creek (tributary to Portneuf River) is being conducted by the Portneuf Soil and Water Conservation District to identify critical areas and formulate water quality plans for district farmers for the control of sediment.

Overall water quality changes little from above American Falls Reservoir to below the reservoir, and to the Snake River at Burley. Turbidity and nutrients improve slightly at the Burley station in comparison to upstream stations due to the effect of Snake River reservoirs on settling out solids and associated nutrients. As a yearly trend, bacterial densities have increased at both the Neeley station and Burley station.

Bacterial densities, nutrients, and solids increase in Lake Milner in comparison to upstream stations. In addition, both bacteria and nutrients have increased with time resulting in an overall fair water quality rating.

Water quality remains very poor in Rock Creek due to bacteria, nutrients, turbidity, and suspended sediment. An ongoing 208 project is examining irrigated agriculture, and a Rural Clean Water Grant is expected to help fund implementation of Best Management Practices (BMP) in this drainage. Salmon Falls Creek has similar water quality problems although less severe than Rock Creek, resulting in a fair/poor water quality rating.

High quality water from Thousand Springs recharges the Snake River in the Hagerman area helping to increase overall water quality. At the basin boundary at King Hill, however, water quality problems remain with elevated nutrient levels. Overall water quality has decreased from a very high rating (WQI is 5/8) at Heise to a good to fair rating at King Hill (WQI is 18/21).

In addition to the 208 projects on Rock Creek and Marsh Creek mentioned above, a current 208 project is examining irrigation return flows in Cedar Draw Creek and channel stability problems on the Big Lost River. A future 208 project is planned for studying sediment losses from dryland farming in the Willow Creek drainage.

The United States Geological Survey's water quality information at the Kimberly gage number 13090000 (downstream), and at Milner Dam gage number 13087900 (upstream) for the water year October 1980 to September 1981 is shown in Appendix E-3 of the application. These are the two nearest gaging stations to the project.

2.3 Agency Recommendations To Protect Or Improve Water Quality

2.3.1 Environmental Protection Agency

Agency comments on the existing project and proposed new development are included in the application.

No specific measures were recommended to protect or improve water quality.

2.4 Measures Recommended By The Applicant To Protect Or Improve Water Quality

2.4.1 Existing Measures

At the present time, no specific measures are taken to insure that water quality standards are maintained at or below Twin Falls Dam.

2.4.2 New Measures

No additional measures are believed to be necessary to protect existing or future water quality in the project vicinity. Numerous rapids exist on the Snake River directly above and below the project waters providing substantial aeration opportunities. The project reservoir is a small, (approximately 1.5 miles long) shallow body of water with a rapid flow-through time. The water column does not appear to stratify. The bottom of the reservoir and the upstream canyon bottom consist of lava rock or large basalt boulders and little sedimentation occurs.

It is unlikely that water quality changes appreciably as water flows through the project reservoir.

2.5 The Continuing Impact On Water Quality

No continuing impacts on water quality are expected as a result of the existing project.

2.6 Water Quality Certificate

Applicant believes the project as described in this supplement will have no affect on water quality. As part of its application, the applicant requested a water quality certificate pursuant to Section 401 of the Federal Water Pollution Control Act (Clean Water Act) (33 U.S.C. 1341) from the Bureau of Water Quality, Idaho Department of Health and Welfare. Applicant has again requested a water quality certificate for the project. A copy of the letter to the Bureau of Water Quality requesting the water quality certificate based on this supplement is included in Supplemental Appendix E-1.

III. REPORT ON FISH, WILDLIFE AND BOTANICAL RESOURCES

3.1 Fish Wildlife And Botanical Resources Of The Project And Its Vicinity

3.1.1 Fish

The Snake River within the project area is classified as a fishing stream of statewide importance (PNRBC 1971). Recent stocking records of the Idaho Department of Fish and Game indicate that artificially produced game fishes have not been directly introduced into waters within the project boundary. Bell (1979a) and Cochnauer (Tim Cochnauer, IDFG, 1982, personal communication) indicate that spawning habitat for rainbow trout, cutthroat trout and rainbow/cutthroat trout hybrids occurs in Vinyard Creek and other spring areas within the project boundary. Keeping the present elevation of the dam and reservoir maintains these spawning areas.

A small unnamed spring exists on the south side of the river channel immediately downstream of the USGS Kimberly Gage. This tributary is identified as M13-0899.5 by the U. S. Geological Survey. The stream, from its point of emergence on the canyon wall to the high water line of the Snake River, measures approximately 400 feet in length and falls approximately 5 feet. Four stream flow measurements between 1923 and 1959 have produced a range of recorded discharges from 4.81 to 12.80 cfs. On March 16 and May 16, 1983, water temperature of this spring was measured at 14.0°C and 14.1°C respectively. Substrate of this spring/stream consists predominantly of fines contributed by adjacent, steeply sloped banks of blowsand. Potential exists for limited rough fish spawning, however, gamefish spawning potential in this stream is extremely limited.

Appendix E-4 of the application identifies the fishes of Idaho that inhabit the Snake River Drainage above Shoshone Falls (Simpson & Wallace 1978). Gilbert and Evermann (1895) reported that Shoshone Falls, located approximately 2.7 miles downstream of the project

area, forms a natural barrier of approximately 210 feet in vertical height, preventing any historic existence of native anadromous species of fish inhabiting the project area.

A paucity of information exists regarding the fishery resources of the project area. Very little research has been conducted in the area due to low use patterns (Robert J Bell, IDFG, 1982, personal communication). Research conducted on Milner Reservoir, the impoundment upstream of the project area, indicates the presence of rainbow trout, mountain whitefish, brown bullhead, channel catfish, yellow perch, largemouth bass, black crappie, Utah sucker, Utah chub, and Carp (Reid 1972, Parametrix 1975, 1976). Research by Bell (1979b) below Minidoka Dam, at the head of Milner Reservoir, indicates the presence of rainbow trout, cutthroat trout, brown trout and mountain whitefish. Additional studies by Bell (1972) cited sucker, chubs and carp as inhabitants of Murtaugh Lake, an impoundment formed by irrigation demand and releases from Milner Reservoir. On July 9, 1981, a total of 42,500 small mouth bass fry at an approximate size of 1,491/lb were planted in Milner Reservoir (IDF&G 1981). These fish originated at Mammoth Springs National Fish Hatchery, Arkansas. During 1979, studies were conducted on the Snake River immediately below Milner Dam. These investigations by Simpson (1979) and Cochnauer (1979) identified rainbow trout, cutthroat trout, mountain whitefish, redside shiners, coarsescale suckers and carp as inhabitants of that segment of the river.

All the species found in the Milner Reservoir and Snake River from Milner Dam to the project area can be expected to be found in the project reservoir. Studies to date of these areas immediately above the project area indicate a large preponderance of Utah suckers and Utah chubs.

Investigations conducted by applicant (IPC 1982b) during September 1982 yielded the following results:

Fyke net - 3' diameter by 12' length with a 50-foot lead fished a total of 45 hours produced 85 Utah suckers, 3 Utah chubs, and 6 brown bullheads.

Experimental Gill net - 125' long by 6' deep made up of five equal length sections of 3/4", 1", 1½", 2" and 2½" square mesh monofilament material fished for a total of 45 hours produced only one Utah sucker, one Utah chub and one redside shiner.

Hook and line angling for a total of 20 hours produced two cutthroat or rainbow/cutthroat trout hybrids. The lengths of the six bullheads collected during this study were from 28-32 cm. The trout taken measured 35.5 and 27.75 cm.

Species found in the project reservoir can be expected to be found in the project area below Twin Falls Dam with the addition of the Northern squawfish (IPC 1983b). Visual observances made by applicant indicate that large numbers of carp and suckers utilize the small unnamed spring area immediately downstream from the USGS Kimberly Gage.

3.1.2 Wildlife

Appendix E-2 of the application identifies the species of wildlife that may occur in South Central Idaho (Wilson 1977). Of this list, the bald eagle and peregrine falcon are listed as endangered or threatened (USFWS 1982). In addition, the white-faced ibis, swainsons hawk, ferruginous hawk, long billed curlew, yellow billed cuckoo and spotted bat are identified as possibly appropriate for a proposed listing as endangered or threatened; however, substantial data are not currently available to biologically support a ruling. IDWR et. al. (1975) identifies the Snake River area in the vicinity of the project as bald eagle wintering habitat. The same report cites the area as waterfowl production and wintering habitat, valley quail habitat and mule deer habitat. In 1977 a BLM classification of "sensitive species" identified ten species of mammals and birds that inhabit southern Idaho during some part of their lives. This class-

ification includes the spotted skunk, bobcat, white-faced ibis, bald eagle, osprey, pigeon hawk, gyrfalcon, mountain quail, long-billed curlew, and western burrowing owl. The "sensitive" classification is assigned to:

1) Animals not yet officially listed but which are undergoing a status review or are proposed for listing according to Federal Register notices published by the Secretary of the Interior, the Secretary of Commerce, or according to comparable state document published by State officials;

2) Animals whose populations are consistently small and widely dispersed, or whose range is restricted to a few localities, such that any appreciable reduction in numbers, habitat availability, or habitat condition might lead toward extinction; and

3) Animals whose numbers are declining so rapidly that official listing may become necessary as a conservation measure. Declines may be caused by one or more of several factors, including: destruction, modification, or curtailment of the species' habitat or range; over utilization for commercial, sporting, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; and/or other natural or manmade factors adversely affecting the species' continued existence.

Idaho Department of Fish and Game records of wildlife sightings in the project area from 1975 to 1980 indicate that of the ten listed by the BLM, all except spotted skunk, gyrfalcon and mountain quail have been sighted in Jerome County and all but spotted skunk and mountain quail have been sighted in Twin Falls County. The Idaho Department of Fish and Game also lists the bobcat, a potential inhabitant of the project area, as a species of special concern (IDFG 1978). This classification has been afforded the bobcat because, "... the species is extremely susceptible to trapping and due to high pelt prices and past uncontrolled harvest, certain populations have

been considered reduced." Keeping the present elevation of the dam and reservoir precludes impact to this species.

Numerous field trips to the project area by applicant staff indicate use of the area by yellowbelly marmot, beaver, porcupine, racoon and skunk. Beaver activity in the vicinity of the present power plant may be the result of the recent closure of a commercial beaver farm located in the immediate area. No species of special concern or species listed by the Federal Government as threatened or endangered have been observed by applicant, or are known to occur, within the project boundary.

3.1.3 Botanical Resources

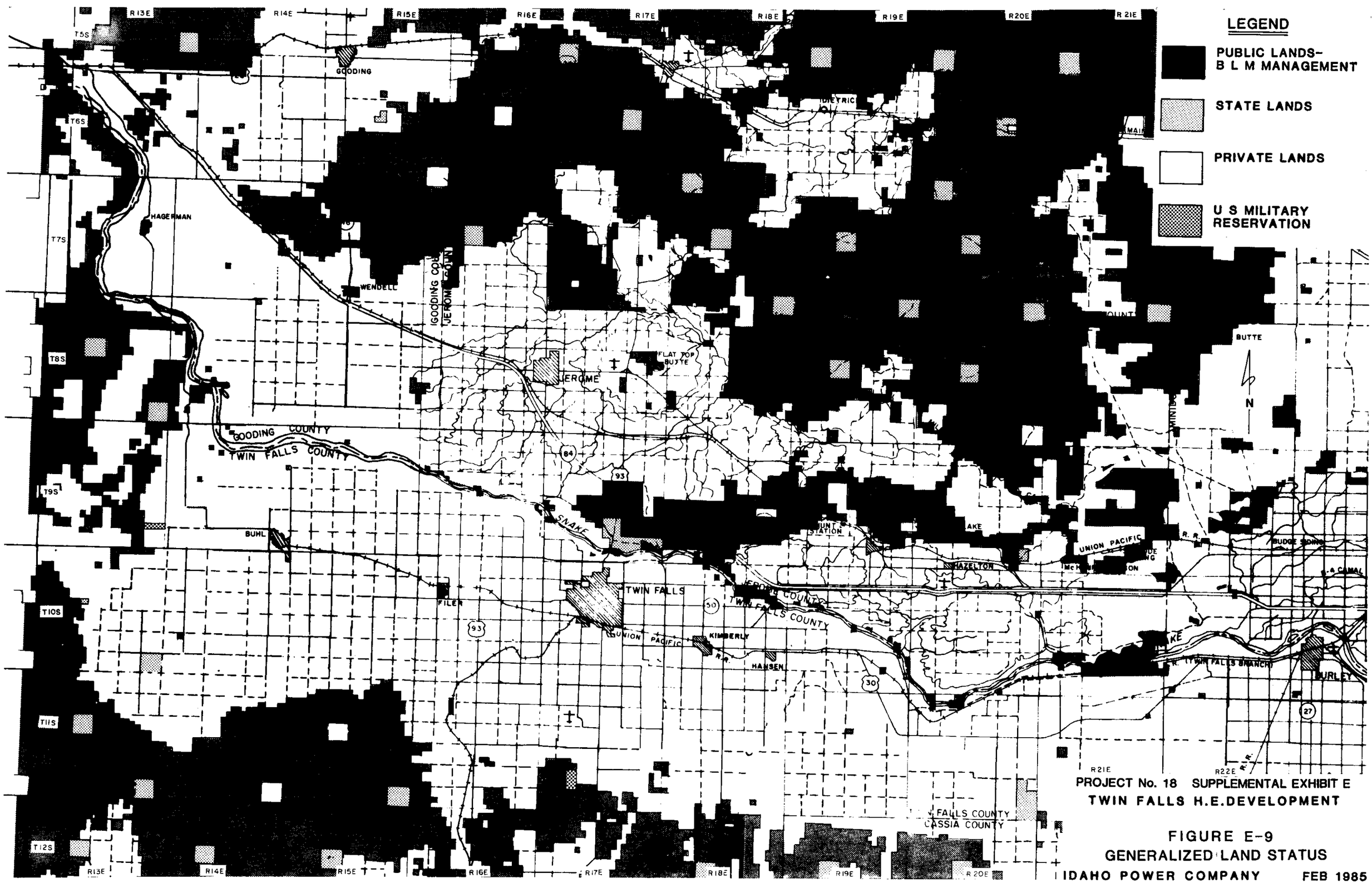
The construction of Twin Falls Dam caused alteration of the plant cover which existed in the project area at that time. Conversion of the surrounding lands from shrub/grass habitat to irrigated agricultural lands had been occurring since the completion of the Milner Dam and the extensive canal systems which are associated with it.

Since construction of the dam, vegetation within the project boundary has developed. No records exist as to the time of vegetation development or of the sequential progression of its development.

A survey of submergent aquatic plants was not conducted for this report. However, plants found commonly in the Snake River are likely found within the reservoir and the river. A list of aquatic plants which may occur in the project boundary are included in Appendix E-4 of the application.

A list of vascular plants, which includes the common taxa known to occur within or around the project boundary, including upstream and downstream of the project, is contained in Appendix E-4 of the application.

Existing vegetation within the project boundary is illustrated on Supplemental Figure E-12.



PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-9
GENERALIZED LAND STATUS
IDAHO POWER COMPANY FEB 1985

generation, irrigation storage, flood control, and recreation with a few exceptions. Privately owned dams generally have not created reservoirs which are used for a great amount of water storage. However, the impoundments have contributed substantially to recreation and wildlife uses of the river, as well as serving as the source of efficient, reliable electric energy for the region.

The river serves as a major source of irrigation water upon which the states agricultural industry is based. By the time it leaves Idaho, its water has been used several times for irrigation, as well as industrial and urban purposes.

Of the 780 miles of the Snake River located in Idaho, approximately 65 percent is in a free-flowing condition. Sixty-eight miles of the river located below Hells Canyon Dam are classified as Wild and Scenic.

Water quality of the Snake River as it enters Idaho from the east in Wyoming is rated very high. Tributaries which empty into the upper river contribute to a decrease in water quality due to bacteria, turbidity, suspended solids and increased nutrients. High quality water from the Thousand Springs recharges the Snake in the vicinity of Hagerman, helping to increase overall quality. As the river flows through the western portion of the plain, bacterial densities, suspended sediment and nutrients continue to increase, with a corresponding decrease in water quality. Tributaries in this reach of the river drain some of the most highly industrialized and urbanized areas in the state. Monitoring at Weiser shows the worst water quality conditions measured in the river in Idaho. By contrast, water quality improves greatly after passing through Brownlee, Oxbow and Hells Canyon reservoirs. Below Hells Canyon Dam bacterial densities, turbidity and suspended solids improve greatly and are similar to levels found near the headwaters of the river. Nutrient concentrations are the only major pollutant category that continue to cause water quality concerns below the dam.

1.6 Socioeconomics - Employment, Population Size and Density

The present reservoir is bounded by two counties, Jerome County to the north and Twin Falls County to the south. Both counties' principal economic base is agriculture. Services which are closely allied to agriculture are considered to be parts of that principal agricultural base. Cattle raising, feeding and processing are related economically to the agricultural base. The Snake River Plain counties have long been known for the production of seed crops.

Aquaculture is becoming a more significant agricultural activity in south-central Idaho. The many spring water outlets along the Snake River below the project, which are unaffected by the project, provide waters ideally suited for trout production. The world's largest commercial hatchery is located in Gooding County.

The major employing industries of the area are trade, services, food processing, and government. A few major employers are represented by Ore-Ida, Idaho Frozen Foods, J R Simplot, Del Monte, Green Giant, U. S. Communications, and Amalgamated Sugar. The area is gradually broadening its industrial base with manufacturers of plastic housewares (Tupperware), fiber cartons and custom business forms. In localized areas there is a shortage of experienced registered nurses and skilled craftsmen. In the future there is expected to be a need for experienced workers in the skilled crafts, and an increasing demand for workers in the service and domestic occupations.

Twin Falls County is the most populous of the eight counties included in south-central Idaho. This county contains approximately 40 percent of both the population and the labor force of the area.

1.6.1. Employment

Employment data are reported in various publications for Idaho counties. It should be noted that not all data sources are comparable, complete and consistent. The following data were obtained from the County Profiles of Idaho, 1981, for Jerome and Twin Falls counties.

Jerome County

Percent of labor force unemployed:

1970 - 5.3% 1975 - 5.2% 1979 - 4.1%

Month and percent of highest unemployment:

1975 - Jan - 7.4% 1979 - Jan - 7.0%

Month and percent of lowest unemployment:

1975 - May - 3.7% 1979 - Oct - 2.4%

Percent of females in labor force:

1960 (14 yrs or older) - 24.1% 1970 (16 yrs or older) - 36.5%

Twin Falls County

Percent of labor force unemployed:

1970 - 4.6% 1975 - 5.9% 1979 - 4.5%

Month and percent of highest unemployment:

1975 - Feb - 7.7% 1979 - Jan - 6.5%

Month and percent of lowest unemployment:

1975 - Oct - 4.5% 1979 - Sept - 3.4%

Percent of females in labor force:

1960 (14 yrs or older) - 32.4% 1970 (16 yrs or older) - 40.4%

In the 12 year period from 1967 through 1979, manufacturing employment in the two counties increased 155 percent. Agricultural employment figures revealed a 39.6 percent increase in 12 years. Military personnel increased within the two counties from 18 persons in 1967 to 415 in 1979, an increase of 23 fold. The number of persons employed by construction work multiplied by almost 2.4 times in this 12 years.

1.6.2 Population Size And Density

Jerome County

County's population as percentage of the state total:

1980: 1.6%

Population:

1950: 12,080 1960: 11,712 1970: 10,253 1980: 14,840

Percent of population change 1970-80: 44.7%

Idaho: 1970-80: 32.4%

Population per square mile:

1950: 20.3 1960: 19.7 1970: 17.2 1980: 24.9

Percent of 1980 population*:

Rural: 53.6% Urban: 46.4%

City Population

Place	1970 Census	1980 Census	% of Change
Eden	343	355	3.5%
Hazelton	396	496	25.3%
Jerome	4183	6891	64.7%

Twin Falls County

County's population as percentage of the state total:

1980: 5.6%

Population:

1950: 40,979 1960: 41,842 1970: 41,807 1980: 52,927

Percent of population change - 1970-80: 26.6%

Idaho: 1970-80: 32.4%

Population per square mile:

1950: 21.0 1960: 21.5 1970: 21.5 1980: 27.2

Percent of 1980 population:

Rural: 43.6% Urban: 56.4%

City Population

Place	1970 Census	1980 Census	% of Change
Buhl	2975	3629	22.0%
Castleford	174	191	9.8%
Filer	1173	1645	40.2%
Hansen	415	1078	159.8%
Hollister	57	167	193.0%
Kimberly	1557	2307	48.2%
Murtaugh	124	114	-8.1%
Twin Falls	21914	26209	19.6%

* Census Bureau defines urban as incorporated cities of 2,500 persons or more and urbanized areas.

The population of the two-county region in 1980 was 67,767. Seventy-eight percent of this region's population resides in Twin Falls County. The City of Twin Falls is the largest city in the region with a population of 26,209, 38.67% of the region's total (1980 Census of Population and Housing, U. S. Department of Commerce, Bureau of Census).

The population of the two-county region increased by 30.17% from 1970 to 1980, which was nearly equal to the State's population increase of 32.4% in the same 10 year period.

1.7 Wetlands and Floodplains

Wetlands in the south-central portion of the Snake River have similar characteristics throughout the area. Utilizing the U. S. Fish and Wildlife Service's classification scheme for wetland habitats, the project area contains the following three systems: Riverine, Lacustrine, and Palustrine.

Flooding in the south-central portion of the Snake River is not considered to be a problem. The river and its incoming streams are confined to their channels and what flooding does occur, occurs in minor localized areas. Regulation of streamflows and reservoir levels by the use of dams upstream of the proposed project minimizes flooding problems within the project boundaries.

1.8 Air Quality

Air quality across the southern portion of Idaho is generally good to excellent. Federal standards have been set for six major pollutants: total suspended particulates, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide and lead. The most serious air pollution problems in this portion of the state are due to total suspended particulates and carbon monoxide concentrations in excess of the standards.

Suspended particulate matter is a widespread problem throughout the northwest. Some particulate emissions come from easily identified stationary industrial sources such as smoke stacks. The rest, which cannot be pinpointed to a specific source, are area sources, such as space heating and fugitive dust. Fugitive dust can be created by industrial and agricultural operations and by vehicles on paved as well as unpaved roads. In areas with little major industrial development and low population densities, such as southern Idaho, fugitive dust is composed mostly of natural soil particles. For this reason, many areas are considered to be attaining air quality standards even though particulate standards are exceeded. Major point sources of total suspended particulates in southern Idaho are located in the Pocatello and Soda Springs areas.

The major source of carbon monoxide in Idaho is motor vehicles, and the most severe violations of standards are recorded where automobiles are concentrated. Carbon monoxide problems are compounded by adverse climatic conditions. During the winter months, extremely stable inversions develop which severely inhibit the dispersion of pollutants resulting in high pollution concentrations. Outside of urban areas, carbon monoxide levels are not considered excessive.

1.9 Historical Background

The earliest occupation in Idaho dates from 13000 B.C. at Wilson Butte Cave several miles north of the project area. It is not known

if modern day Indians are descendants of these early inhabitants. Early inhabitants of south Idaho apparently lacked permanent band organization or tribal political unification and lived in small, highly mobile groups. Occasionally, larger congregations would appear, particularly in association with food gathering activities, such as salmon fishing during the fish runs or gathering of plant food stuff. By the mid-1700s changes in the Indian lifestyle commenced as a result of European exploration of the new world. Direct contact with explorers occurred in the early part of the 1800s. Fur traders entered southern Idaho from Canada and the Upper Missouri River. Fur trapping and trade continued through the region but began to decline after 1840, and by 1860 the fur trade era of Idaho history had come to an end. By 1840, westward expansion was creating a demand for a route to the Oregon Territory. Early immigrants crossed southern Idaho between 1840 and 1862 via what became known as the Oregon Trail. In the 1860s with the discovery of gold, the construction of railroads and the introduction of irrigation ditches, people began to settle and remain in Idaho. By the late 1880s cattle and sheep ranching were the mainstays of the agricultural economy.

Upon completion of Milner Dam and the associated irrigation canals in 1905, agricultural development in the Snake River Plain was assured and continues to this day.

Industrial diversification has greatly transformed Idaho in recent years. Rapid growth of Idaho's phosphate industry, located in the eastern portion of the Snake River Plain, occurred during the late 1940s. Forest product and construction industries continued to grow. Agriculture, however, continued as the state's major economic base. Because of Idaho's strategic location in the Mountain West, a recently developed mobile home industry has gained economic significance in the past decade.

In recent years the tourist industry has become a major factor in Idaho's economy. The resort area surrounding Sun Valley has been a major recreational attraction since 1936. Craters of the Moon, a national monument since 1924, is another feature of tourist interest.

II. REPORT ON WATER USE AND QUALITY

2.1 Existing And Proposed Uses Of Project Waters

At the Twin Falls site, the Snake River drains an area of more than 17,000 square miles. Flows in the river are regulated by American Falls Reservoir about 100 miles upstream and other reservoirs having a combined usable capacity of about 4.7 million acre-feet. During the irrigation season the entire flow is subject to diversion at Milner about 20 miles upstream from the project.

Streamflow data are available for two USGS gaging stations on the Snake River near the Twin Falls Project. The Kimberly Gage (No. 13090000), located about 1500 feet downstream from the project, has been operational since 1923 (Supplemental Figure E-10). Mean annual runoff at Kimberly is 2.09 million acre-feet for the 1923-80 period of record. The maximum discharge at Kimberly is estimated to be 27,200 cfs based on a gage height reading made in July, 1927. The minimum discharge of 95 cfs occurred in April, 1977. The Milner Gage (No. 13088000), located about 20 miles upstream from the project, has been operational since 1909.

Streamflows at the project are affected by irrigation withdrawals upstream at Milner Dam. The historic monthly streamflows at Kimberly were adjusted to reflect the 1980 level of upstream development, as determined by the Idaho Department of Water Resources. A 51-year adjusted record was developed and is set out in Supplemental Exhibit B, Supplemental Figure 1 and summarized in Supplemental Table II-1.

SUPPLEMENTAL TABLE II-1

Month	Average Flow (CFS)	Average Runoff (Million Acre-Feet)
January	4069.3	0.25
February	5178.6	0.29
March	5034.6	0.31
April	5086.0	0.30
May	2774.7	0.16
June	1811.1	0.12
July	818.6	0.05
August	713.2	0.04
September	782.1	0.05
October	1125.9	0.07
November	2959.3	0.17
December	4048.7	0.25
	Total	2.06

The average annual flow is 2850.2 cfs.

The existing Twin Falls plant has a designed capacity of 960 cfs to generate about 9 MW.

The project does not involve a consumptive use of water, as all water is returned to the river through the power plant or spillway.

2.2 Existing Water Quality

2.2.1 Applicable Water Quality Standards

Applicable water quality standards are outlined in "Idaho Water Quality Standards and Wastewater Treatment Requirements" - Idaho Department of Health and Welfare, Division of Environment, Title 1, Chapter 2, Water Quality Standards and Wastewater Treatment Requirements: Effective June 28, 1973, as amended.

Appendix E-3 of the application includes a copy of the water uses to be protected for the Snake River between Milner Dam and Buhl and also contains definitions of the uses and standards.

The following are designated water uses to be protected in the Snake River between Milner Dam and the city of Buhl, Idaho.

1. Agricultural Water Supply
2. Cold Water Biota
3. Salmonid Spawning
4. Primary Contact Recreation
5. Secondary Contact Recreation

2.2.2 Water Quality in the Project Impoundment

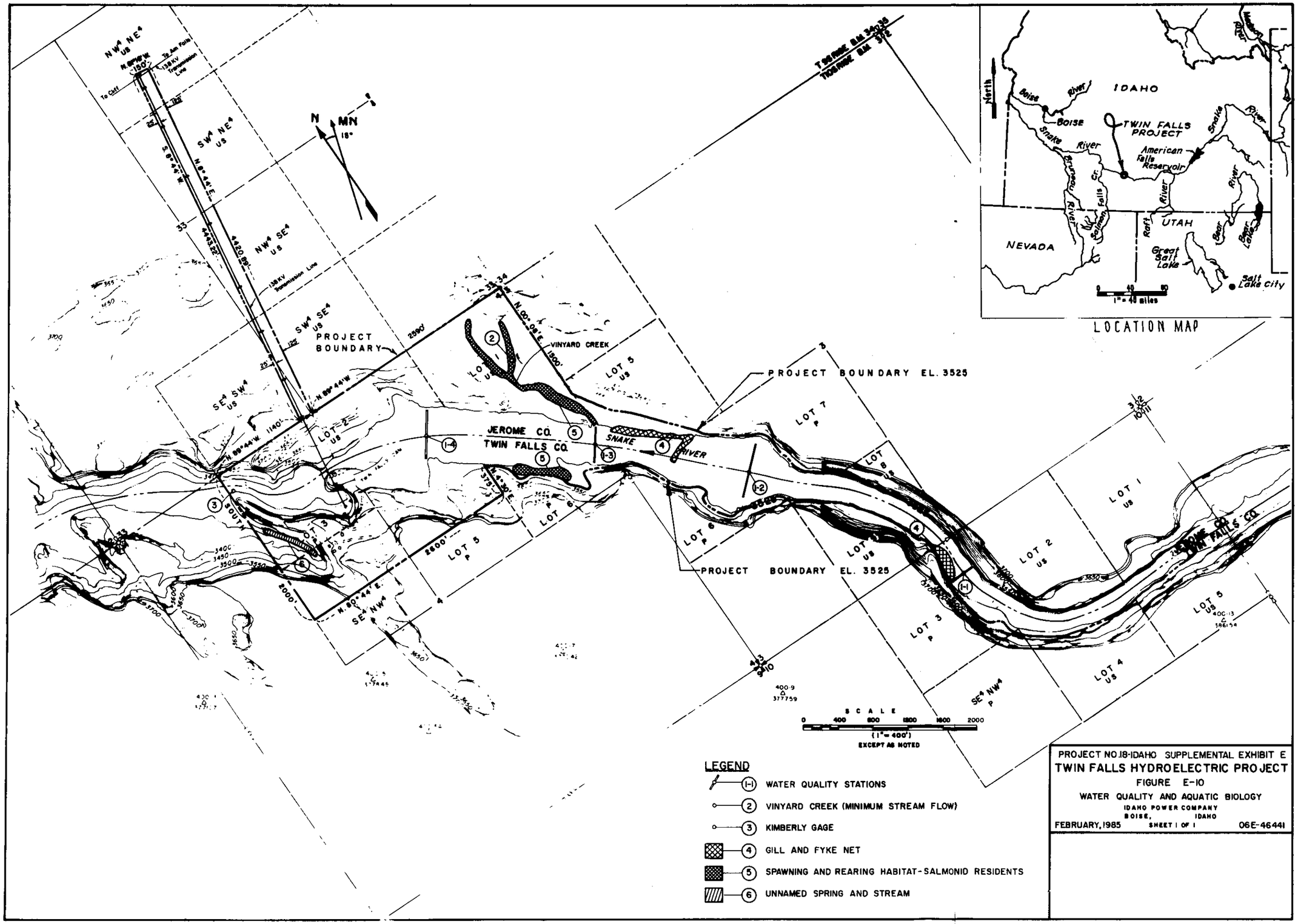
In September of 1982, dissolved oxygen and temperature of the project reservoir were measured at the four locations illustrated on Supplemental Figure E-10. These measurements are shown in Supplemental Table II-2.

2.2.3 Upstream and Downstream Water Quality

The Division of Environment, Idaho Department of Health and Welfare, maintains a water quality surveillance system consisting of an ambient monitoring network (trend stations) and intensive or special surveys. The ambient monitoring system is used to measure trends in water quality at major rivers and tributaries. Stations are located at state and hydrologic basin boundaries, on significant tributaries, and at locations which bracket major land use or pollution source areas.

The system determines ambient water quality, provides for evaluation of trends or shifts in water quality, and assists in assessing the effectiveness of the water pollution control program.

The Upper Snake River Basin is located in southeastern Idaho and is the largest hydrologic basin in the State (Supplemental Figure E-11). The Basin includes all the drainages to the Snake River from the Montana and Wyoming border on the east to King Hill which forms the basin boundary west of Twin Falls. It also includes the Northern Streams, which sink into the lava fields and basalt and assist in recharging the Snake River Plain Aquifer.



PROJECT NO.18-IDAHO SUPPLEMENTAL EXHIBIT E

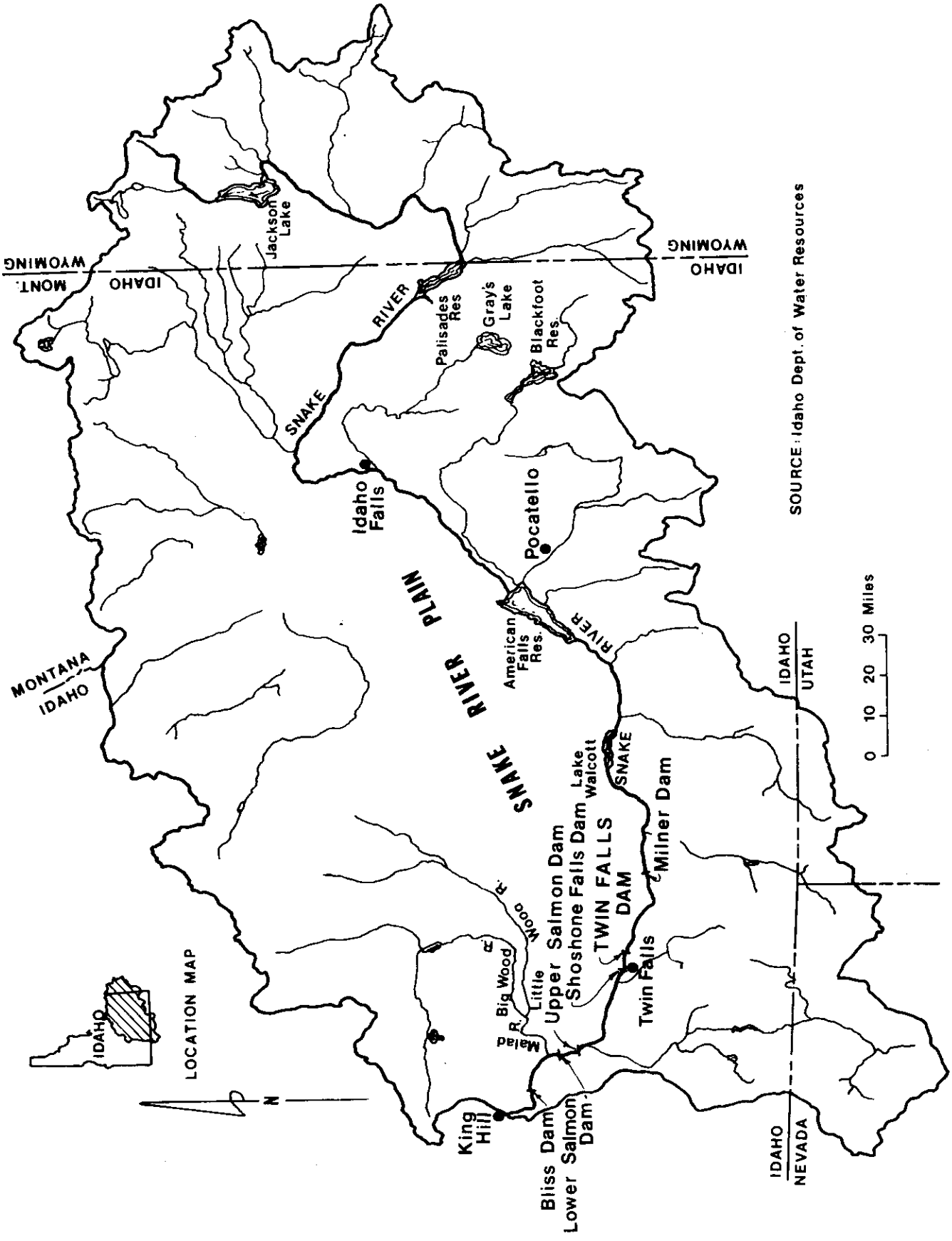
TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-10

WATER QUALITY AND AQUATIC BIOLOGY

IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46441



PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

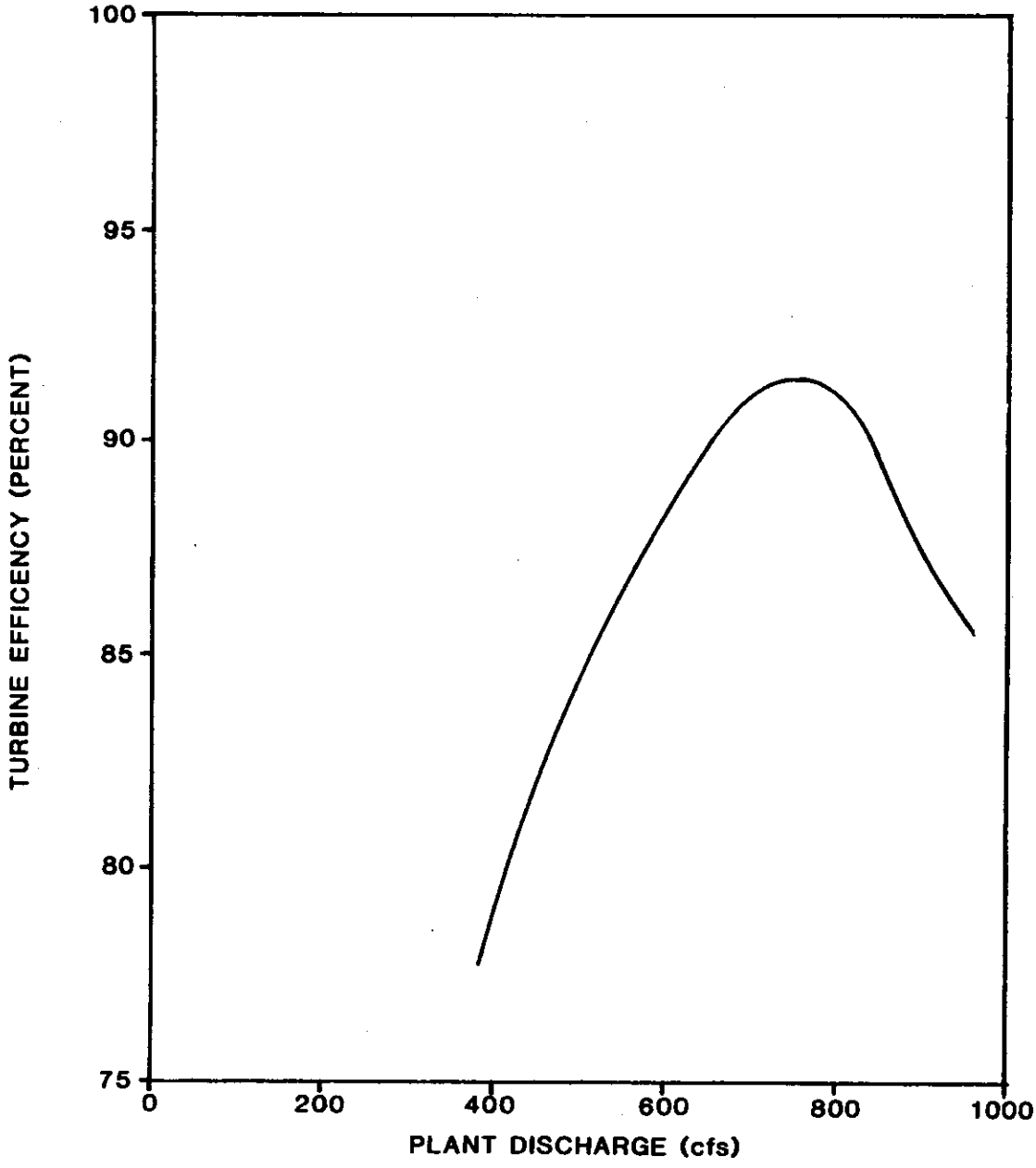
FIGURE E-11
UPPER SNAKE RIVER BASIN
IDAHO POWER COMPANY FEB 1985

WATER QUALITY-TWIN FALLS RESERVOIR

LOCATION: 1 - 1			DATE: September 9, 1982
Depth (Meters)	1/3 Distance From South Shore Temp °C	D.O.(mg/1)	Center of Reservoir Temp °C	1/3 Distance From North Shore Temp °C
Surface		9.5		
1	19.5		19.0	19.0
2	19.5		19.0	18.75
2.3	19.25			
3			19.0	18.75
3.65				18.75

LOCATION: 1 - 2			DATE: September 9, 1982
Depth (Meters)	1/3 Distance From South Shore Temp °C	D.O.(mg/1)	Center of Reservoir Temp °C	1/3 Distance From North Shore Temp °C
Surface		9.14		
1	19.0		19.0	20.0
2	18.5		19.0	19.75
3	18.5		19.0	19.5
4	18.5		19.0	19.0
5	18.75		19.0	19.0
5.5	18.75			
6			19.0	19.0
6.7			19.0	
7				19.0

SUPPLEMENTAL EXHIBIT B
FIGURE 5



IDAHO POWER COMPANY
TWIN FALLS HYDROELECTRIC PROJECT

EXISTING TURBINE
EFFICIENCY CURVE

Supplemental Exhibit B
Figure 7

Actual Net Energy Produced
1964 - 1983

Year	Annual Generation MW-HR
1964	67,449
1965	71,002
1966	58,778
1967	67,701
1968	59,344
1969	55,298
1970	71,044
1971	59,361
1972	73,634
1973	57,525
1974	71,583
1975	71,112
1976	69,753
1977	46,826
1978	63,369
1979	56,227
1980	64,966
1981	68,023
1982	76,534
1983	75,120
20-yr AVERAGE	65,232 MW-HR

SUPPLEMENTAL

EXHIBIT C

TWIN FALLS PROJECT NO. 18

SUPPLEMENTAL EXHIBIT C

CONSTRUCTION HISTORY

History of Project

The existing dam, water conductor, and powerhouse were constructed in 1935-36 by Idaho Power Company forces. The 9 MW generating unit was placed in operation in December, 1935 and has been operating continously since that time except for routine maintenance shutdowns. New stator windings (General Electric) were installed in 1971. The exciter and pilot exciter were reconditioned by General Electric in 1971.

SUPPLEMENTAL

EXHIBIT D

TWIN FALLS PROJECT NO. 18

SUPPLEMENTAL EXHIBIT D

COSTS

Statements of costs and financing relative to the existing project are provided in Exhibit D of the application.

SUPPLEMENTAL

EXHIBIT E

TWIN FALLS PROJECT NO. 18

SUPPLEMENTAL EXHIBIT E

ENVIRONMENTAL REPORT

I. GENERAL DESCRIPTION OF THE LOCALE

1.1 Topography

The proposed project is located on the Snake River in south-central Idaho, (Supplemental Figure E-1) in the counties of Jerome and Twin Falls at River Mile 620 above the mouth of the Snake River. The site is about 120 miles southeast of Boise and about three miles upstream from the town of Twin Falls.

The project area lies west of the Continental Divide at about 42.5 degrees north latitude and 104.3 degrees west longitude.

The Snake River crosses the state in an east-west direction and traverses a physiographic feature known as the Snake River Plain which is part of the Columbia Intermontane Geomorphic Province. It is for the most part, a volcanic feature, approximately 350 miles long and varying between 50 and 70 miles in width. It is divided into two sections, the Eastern Snake River section and the Malheur-Boise-King Hill sections. The project area is located near the boundaries of these two features. Physiographic features are located on Supplemental Figure E-2.

The eastern and western parts of the Plain differ in physiography and structure. The eastern section developed from extremely fluid basalt extruded from many local vents, building a broad, level plain with little dissection. The western section is more diversified. It begins a few miles above the town of Twin Falls, and its main physiographic feature is the Snake River Canyon, which in places exceeds 500 feet in depth. A number of tributary canyons join the Snake and contribute to physiographic relief.

PROJECT LOCATION MAP



KEY MAP

N

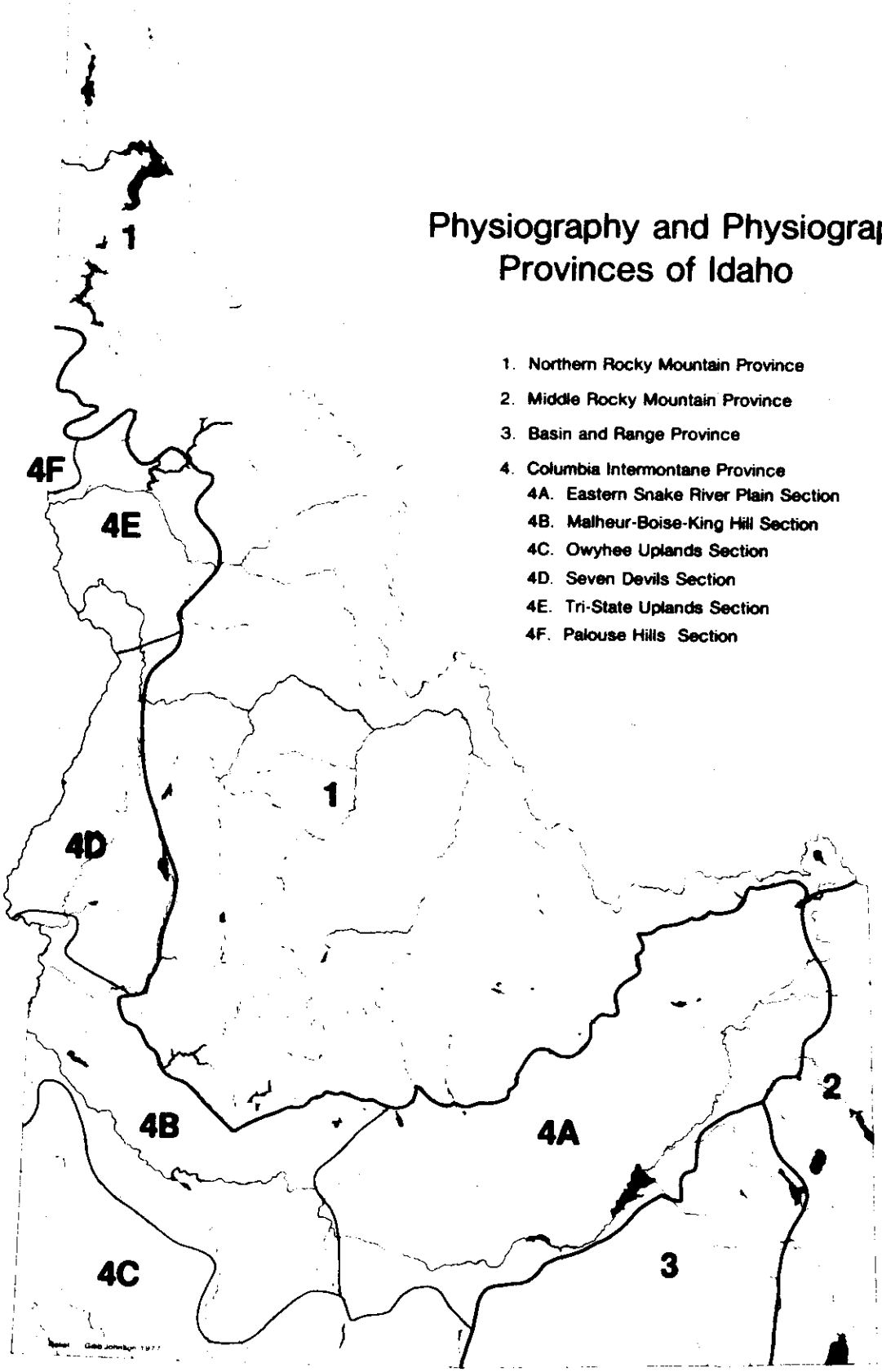
ELMORE
CAMAS
BLAINE
Mt Home
GOODING
King Hill
LINCOLN
Shoshone
MINIDOKA
C J Strike Dam
American Falls Dam
84
JEROME
Minidoka Dam
American Falls
Twin Falls Dam
Shoshone Falls Dam
86
POWER
Twin Falls
Burley
OWYHEE
TWIN FALLS
Milner Dam
CASSIA
84

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-1
PROJECT LOCATION MAP

Physiography and Physiographic Provinces of Idaho

1. Northern Rocky Mountain Province
2. Middle Rocky Mountain Province
3. Basin and Range Province
4. Columbia Intermontane Province
   - 4A. Eastern Snake River Plain Section
   - 4B. Malheur-Boise-King Hill Section
   - 4C. Owyhee Uplands Section
   - 4D. Seven Devils Section
   - 4E. Tri-State Uplands Section
   - 4F. Palouse Hills Section



From Ross and Savage (1967).

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT
FIGURE E-2
PHYSIOGRAPH and PHYSIOGRAPHIC PROVINCES of IDAHO

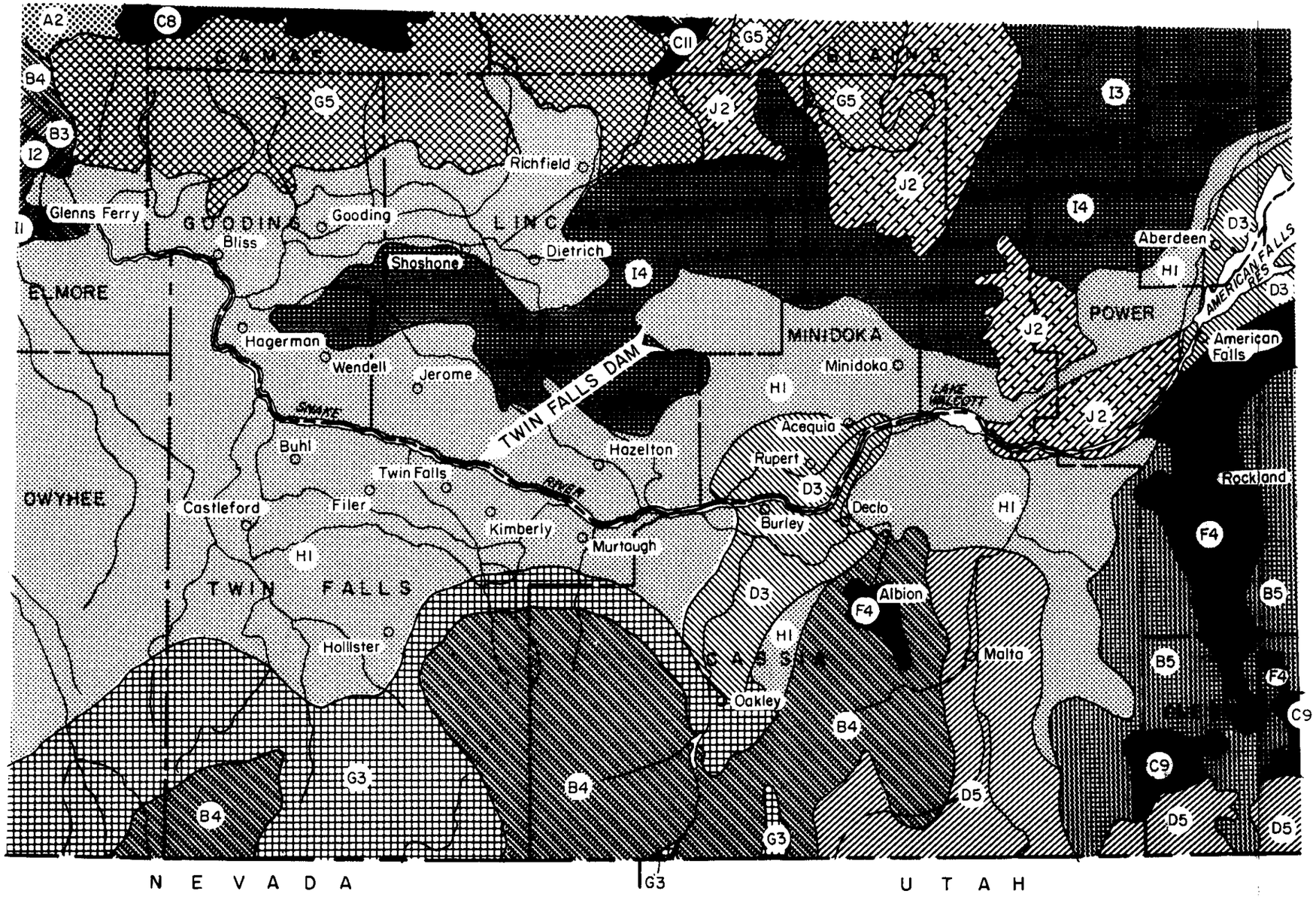
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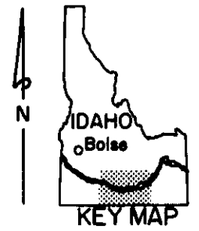
To the north, the plain is bounded by the Northern Rocky Mountain Province consisting of mountains formed by the granitic Idaho Batholith and faulted volcanics. To the south, it is bounded by the Basin and Range Province which is characterized by sub-parallel, block-faulted mountains separated by open valleys.

The project area is located on Quaternary Basalt flows of the Snake River Plain of southern Idaho. In plan, the geologic province is a crescent-shaped, sixty mile wide, down-warped structural basin, approximately 350 miles in length. The basin extends from the Wyoming/Idaho border near Yellowstone National Park, westerly to the Idaho/Oregon border. A maximum thickness of approximately 2500 feet of clastic deposits and volcanic extrusives of Tertiary and Quaternary age are contained within the basin.

The project is located in the Snake River Canyon entrenched 250 to 350 feet below the general level of the basalt plain. Much of the upland area is mantled with a cover of loessial soil. There is little residual soil within the immediate project area, due to erosion by a major flood(s) which passed through the Snake River gorge 18,000 to 30,000 years before present. Abandoned cataracts and plunge pools along the canyon rim are attributed to the passage of floodwaters deep enough to nearly fill the present canyon. Supplemental Figure E-3 is a generalized soil map of the project environs.

Bedrock in the project area consists of two major rock types, the deepest of which is an extrusive, porphyritic andesite or dacite, called the Shoshone Rhyolite. The unit crops out at the base of the Twin Falls. Overlying this unit is a series of basalt lava flows. The basalt flow sequence is interrupted by at least two erosional surfaces or unconformities. One unconformity is present beneath the left abutment and another, representing a former Snake River Channel, is exposed high above the reservoir level in Box Canyon, 0.5 mile east-northeast of the site.





LEGEND

A. Stony medium to coarse textured, light and dark colored soils, moderately steep and steep mountainous - dominantly forested (Inceptisols-Alfisols-Mollisols-Entisols)

A2

B. Medium and moderately coarse textured dark colored soils, steep and moderately steep, mountainous-grassland, forest (Mollisols)

B3 B4 B5

C. Moderately coarse to moderately fine textured light and dark colored soils that are nearly level to sloping, and formed in alluvium, lake sediments, and glacial outwash-grassland, forest (Entisols-Inseptisols-Mollisols-Alfisols-Histosols)

C8 C9 C11

D. Moderately coarse to moderately fine textured, light colored, nearly level to sloping soils formed in alluvium and lake sediments-grassland, sagebrush (Aridisols-Entisols-Mollisols)

D3 D5

F. Deep, medium textured, dark colored sloping to steep soils formed in wind-laid silts - dominantly grassland (Mollisols)

F4

G. Medium and gravelly medium textured, dark colored soils that are predominantly moderately deep and shallow over bedrock-grassland, shrubs (Mollisols)

G3 G5

H. Predominantly medium textured, deep and moderately deep light colored soils formed in wind-laid silts, undulating - dominantly grassland, shrubs (Aridisols)

H1

I. Medium and stony medium textured light colored soils that are mostly shallow and moderately deep over bedrock and nearly level and undulating - grassland, shrubs (Aridisols)

I1 I3 I2 I4

J. Rock outcrop and shallow medium and moderately coarse textured, dark colored soils

J2

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-3
GENERAL SOIL MAP
IDAHO POWER COMPANY FEB 1985

1.2 Potential Geologic Hazards and Problems

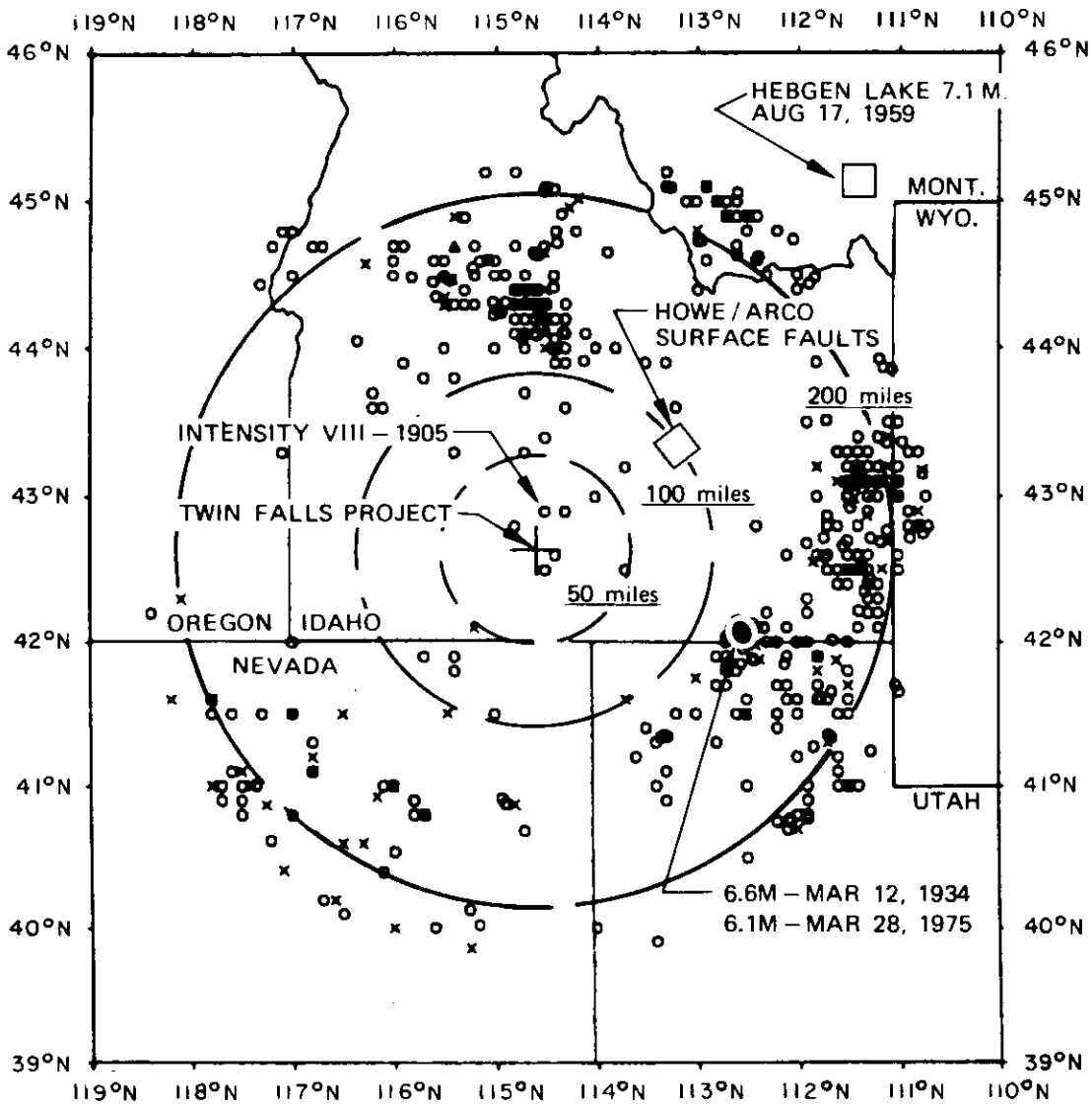
The project site is in an area of only moderate earthquake risk (Harza Engineering, 1983). This zone is characterized by effective peak seismic accelerations of 0.05 to 0.10 g. The largest recorded events within 200 miles of the site were an event of magnitude of 6.6 occurring in northern Utah, 125 miles to the southeast on March 12, 1954 and an event of intensity XIII occurring in central Idaho 110 miles to the northeast on October 28, 1983. The largest seismic events in southern Idaho in historic time have not exceeded Intensity VIII on the Modified Mercalli Scale (NOAA 1982). Supplemental Figure E-4 illustrates the regional seismicity plan.

1.3 Climate

The area is located more than 500 miles from the Pacific Ocean. The climate nevertheless is influenced by maritime air brought on the prevailing westerly winds. Climate in the project area is semi-arid, characterized by hot summers and moderately cold winters. The mean temperature in the area is about 49°F ranging from about 27°F in January to 72°F in July. A histogram of mean monthly temperature is provided on Supplemental Figure E-5. Annual precipitation averages about nine inches. Precipitation occurs fairly consistently over the year as indicated on Supplemental Figure E-6 except for July through September when it is well below the average monthly total.

1.4 Land Development and Vegetative Cover

Irrigated agriculture occurs where soils, terrain and available water permit. Potatoes, grains, sugar beets and alfalfa are the principal crops. Land unsuitable or not yet developed for row crop or grain production is used extensively for livestock grazing. Supplemental Figure E-7 illustrates generalized land uses surrounding the project.



NGSDC/EDIS/NOAA BOULDER, COLORADO
783 EARTHQUAKES PLOTTED
82/05/04. 16.05.00.

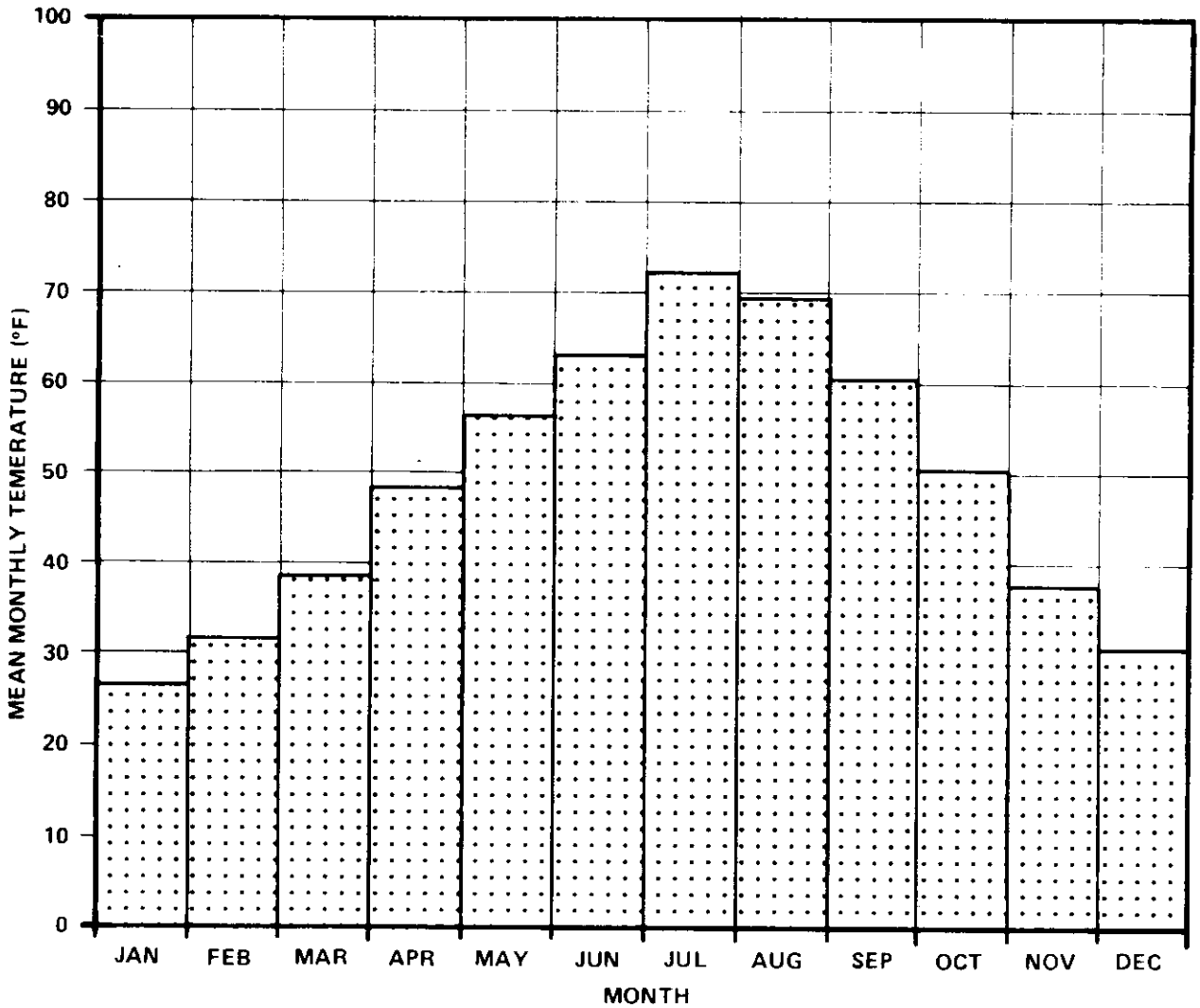
MAGNITUDE	
O	0.00 M 3.99
X	3.99 M 5.99
Δ	5.99 M 7.00

0 100 200
SCALE IN MILES

N

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E. DEVELOPMENT

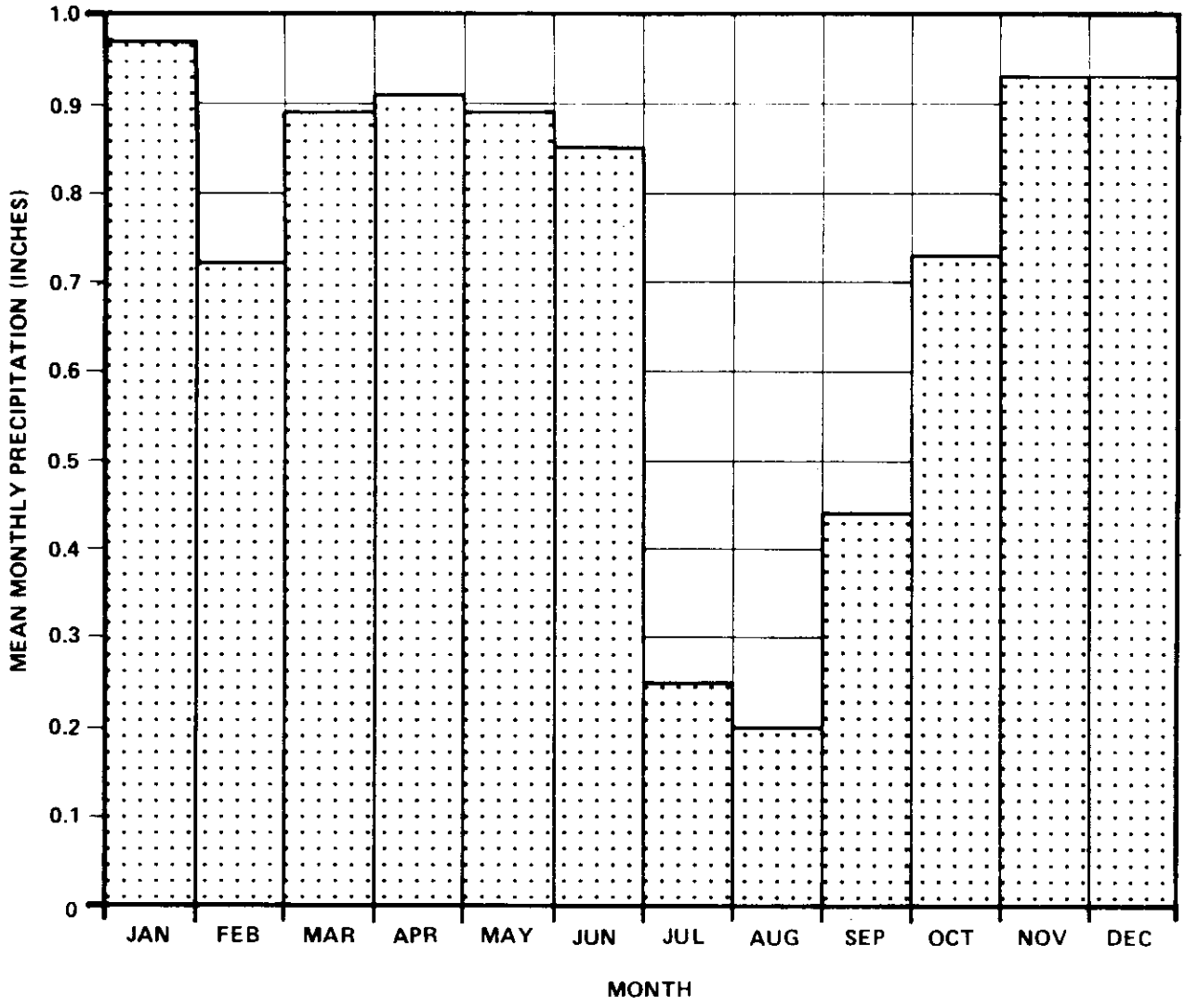
FIGURE E-4
REGIONAL SEISMICITY PLAN



SOURCE: Climates of the States: Idaho
No. 60–10
U.S. Dept. of Comm., Weather Bureau

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E–5
TEMPERATURE HISTOGRAM



SOURCE: Climates of the States: Idaho
No. 60–10
U.S. Dept. of Comm., Weather Bureau

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-6
PRECIPITATION HISTOGRAM
IDAHO POWER COMPANY FEB 1985

LEGEND

- GRASS, MEADOW, SAGE and BRUSH
- RANGELAND-SAGE and BRUSH
- RANGELAND-GRASS and MEADOW
- CROPLAND
- STATE HIGHWAYS
- I-84
- RAILROAD

T5S T6S T7S

R13E R14E R15E R16E R17E R18E R19E R20E R21E R22E R23E

GOODING COUNTY
LINCOLN COUNTY
JEROME COUNTY
MINIDOKA COUNTY
TWIN FALLS COUNTY
CASSIA COUNTY

GOODING
SHOSHONE
DIETRICH
BESSLEN STATION
UNION PACIFIC R.R.
NOTCH BUTTE
STAR LAKE
HAGERMAN
WENDELL
JEROME
FLAT TOP BUTTE
KIMAMA BUTTE
BURL
SNAKE RIVER
WILSON LAKE
FILER
TWIN FALLS
KIMBERLY
HANSEN
AIRPORT
HAZELTON
McHENRY STATION
SCHODDE SIDING
BUDGE SIDING
BURLEY

26 46 93 84 25 24 30 27

N

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E. DEVELOPMENT
FIGURE E-7
GENERALIZED LAND USE
PROJECT VICINITY
IDAHO POWER COMPANY FEB 1985

The Malheur-Boise-King Hill section of the Snake River Plain extends from about the center of the plain to the west to about the town of Weiser. Along with the Snake, portions of the Boise, Payette and Bruneau rivers are located within this section. The more level portions have been placed under irrigation. The most intensively developed agricultural lands, many of the industrial operations and the largest concentration of population in Idaho occur here.

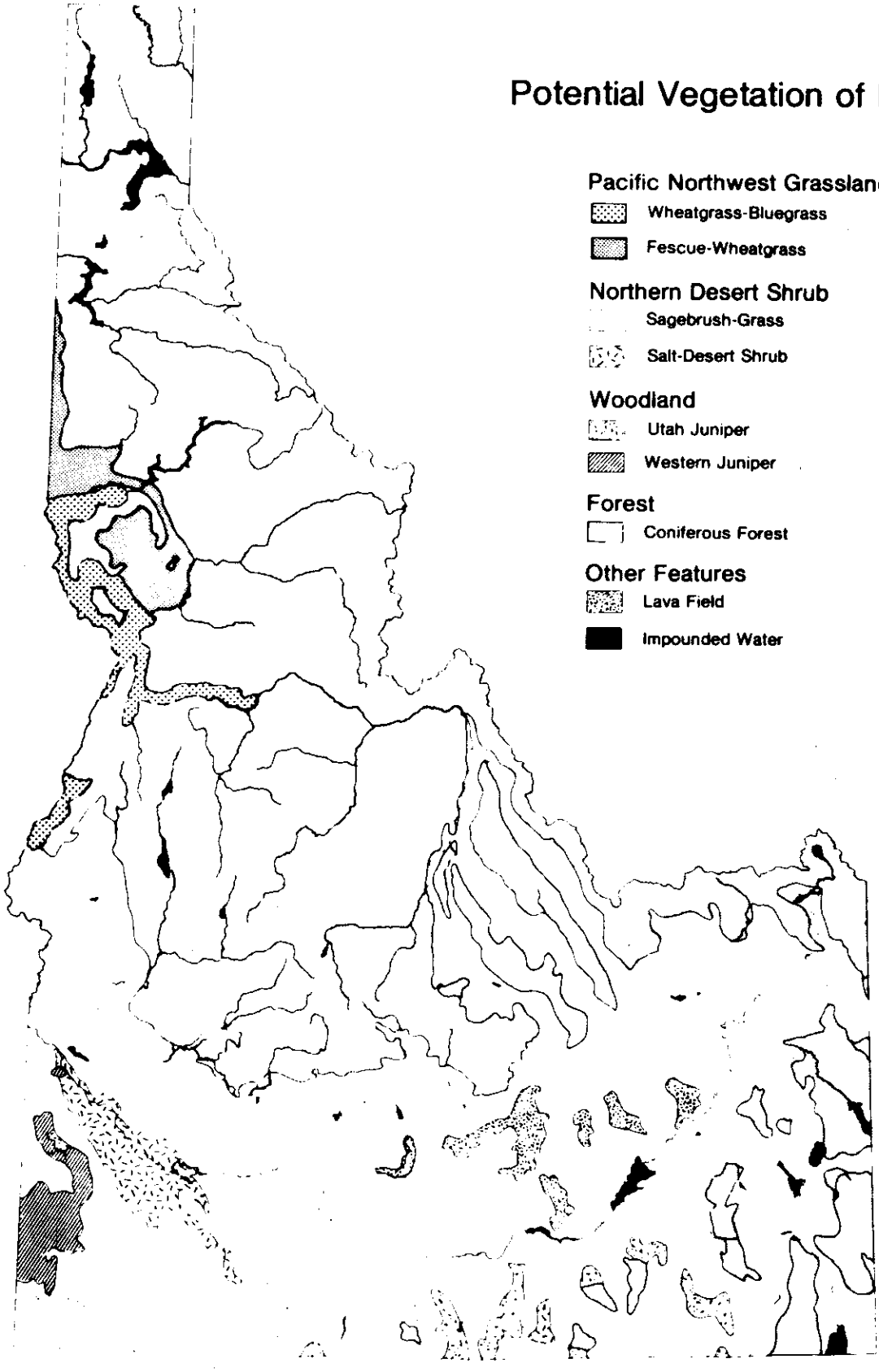
Sagebrush-grass vegetation types are the second most abundant vegetation associations occurring in Idaho. They are concentrated in the south of the state and are largely coincident to the Snake River Plain. Most of the extensive south Idaho farmland was developed from areas supporting this type of vegetation. The cumulative affects of land uses over the past 140 years have caused major alterations of the native plant communities. Large tracts of land have come under private ownership and have been converted to productive agricultural croplands. Grazing and fire have also caused substantial alterations to the native plant cover. Supplemental Figure E-8 illustrates the potential vegetation of Idaho.

Nearly sixty percent of the lands which make up the twenty-five counties lying within, or partially within, the Snake River Plain is used as rangeland. Another twenty percent is allocated to irrigated lands or tilled drylands. Ten percent is composed of forest, while only two and one-half percent is dedicated to pasture or grazing croplands. The remaining eight percent is used for urban built up areas, roads, farmsteads and other lands not suitable for agricultural uses (Supplemental Table I-1).

Supplemental Figure E-9 is a map depicting generalized land status surrounding the project.

1.5 The Snake River

The Snake River has been characterized as the working river of Idaho. Within the state, 12 private and federal dams are located on it. Federally constructed dams serve a multi-purpose role of power



From Tisdale et al. (1969).

PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-8
POTENTIAL VEGETATION of IDAHO

IDAHO POWER COMPANY FEB 1985

Supplemental Table I-1
MAJOR LAND USES OF COUNTIES
WITHIN OR PARTIALLY WITHIN THE
SNAKE RIVER PLAIN*

COUNTY	(ACRES) FOREST	RANGE	TOTAL CROPLANDS	PASTURE OR GRAZING	OTHER
Washington	92,700	706,100	134,000	38,568	3,500
Gem	49,800	238,100	66,300	16,728	1,800
Canyon	11,500	29,400	322,800	37,716	11,200
Ada	2,000	464,800	172,500	23,849	30,100
Payette	-	167,200	87,900	13,693	28,100
Elmore	502,300	1,299,300	138,700	14,012	12,000
Owyhee	103,600	4,585,800	191,700	32,077	9,000
Camas	149,400	401,300	122,200	10,436	3,400
Gooding	-	246,200	126,900	32,860	88,700
Twin Falls	8,800	857,100	372,500	57,761	7,800
Blaine	238,600	1,035,800	99,700	22,473	321,000
Lincoln	-	268,200	100,800	17,143	400,600
Minidoka	-	168,300	229,300	18,807	82,500
Cassia	46,400	1,113,000	453,300	58,222	15,500
Power	30,600	369,000	308,200	20,037	125,600
Bannock	118,000	343,700	237,900	20,005	18,800
Bingham	51,900	632,300	428,200	56,291	221,000
Butte	118,100	927,900	87,300	14,800	299,300
Jefferson	1,000	190,800	368,400	23,649	257,500
Bonneville	395,200	337,100	354,300	29,935	98,300
Madison	53,000	26,500	260,300	11,442	17,000
Teton	95,100	62,000	120,000	16,631	15,500
Clark	174,300	857,600	83,200	6,066	5,500
Freemont	547,000	397,500	210,200	27,166	45,700
SUBTOTAL	2,789,300	15,794,900	5,277,300	642,830	2,229,600
PERCENT TOTAL	10.43%	59.08%	19.74%	2.40%	8.34%
				TOTAL	26,733,930

* 1978 Rangeland Resources of Idaho

Supplemental Table V-3
PROJECTED SPRINGS REGION PARTICIPATION IN
ACTIVITY OCCASIONS: 1980 TO 2000

ACTIVITIES	1980	2000
Water		
Fishing	942,065	1,410,472
Boating, sailing	464,313	877,091
Water skiing	326,517	616,792
Swimming	1,894,697	3,579,098
White water kayaking or canoeing	44,695	74,714
River floating	126,877	212,094
Land		
Bicycling	3,028,519	5,720,898
Motorcycling	1,035,208	1,730,500
Four-wheel drive vehicle off-road	393,609	657,976
Mountain climbing	83,624	139,789
Backpacking	201,850	337,423
Hiking	416,678	696,538
Nature walks	537,789	898,992
Walking for pleasure	6,283,334	10,503,512
Tent camping	309,985	518,185
Recreational vehicle camping	550,765	920,684
Horseback riding	1,215,432	2,031,771
Hunting	671,903	1,885,983
Rock hounding	155,713	260,298
Downhill skiing	563,167	1,063,827
Cross-country skiing	122,818	232,004
Snow sledding, tobogganing	347,486	656,404
Ice skating	125,435	209,684
Snowmobiling	471,802	891,238
Picknicking	856,425	1,431,640
Pleasure driving	3,045,066	5,090,273
Visiting historical and archaeological sites	432,538	723,051
Viewing outdoor sporting events	1,102,971	1,843,779
Attending outdoor concerts dramas, programs	100,925	168,711
Outdoor photography	449,839	751,972
Baseball, softball	840,565	1,405,129
Tennis	955,909	1,597,941
Golf	620,082	1,171,341
Other outdoor games and sports	880,698	1,663,644

5.5 Special Areas Within The Project Boundary

Neither the project boundary nor its immediate vicinity contain any river segments included in or proposed to be included in the National Wild and Scenic Rivers System. No segments of the National Trails System are affected by the project. Likewise, the project boundary and the immediate environs do not contain any areas included in or being considered for wilderness designation under the Wilderness Act.

VI. REPORT ON LAND MANAGEMENT AND AESTHETICS

6.1 Existing Land Management

Lands under the management and control of Federal and State agencies comprise a portion of the lands adjacent to the project area. These consist of public domain lands under the administrative jurisdiction of the Bureau of Land Management, public lands that have been withdrawn for their power site or irrigation potential, and lands controlled by the State of Idaho. The several land classifications which occur adjacent to or within the project boundary are described below.

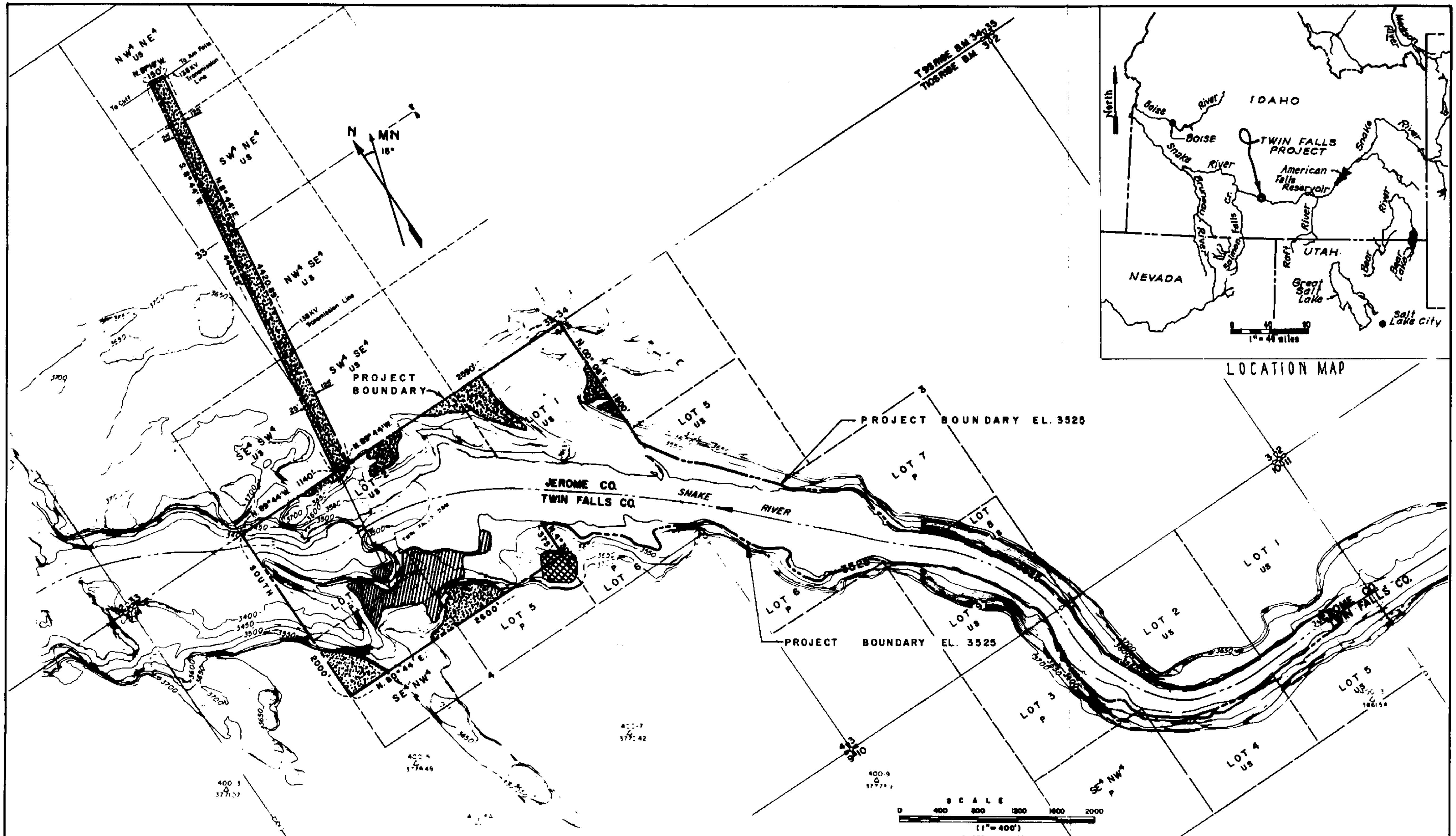
Generalized land uses are illustrated on Supplemental Figure E - 17.

6.1.1 Public Domain

Lands of the United States that have not been appropriated or reserved for other specific purposes and which are managed in the public interest by the Bureau of Land Management under provisions of the Taylor Grazing Act are designated as public domain. Most of these lands are leased to stockmen under controlled grazing densities, but ultimate resource management responsibilities remain with the Bureau of Land Management.

6.1.2 Power Site Withdrawal

These are public lands that have been judged to be promising as hydroelectric power sites and consequently withdrawn from the public domain. Lands in a power site withdrawal cannot be disposed of in the manner of public domain lands, but can be leased for grazing and other nonpermanent purposes until needed by hydroelectric development. Lands in this category include potential damsites as well as those areas potentially flooded by power reservoirs or occupied by transmission facilities.



EXISTING LAND USES	APPROXIMATE ACRES WITHIN CANYON	APPROXIMATE ACRES WITHIN PROJECT BOUNDARY*
IDAHO POWER CO. DEVELOPMENT (HOUSING & PARK AREAS)	11.2	11.2
PRIVATE	2.5	0.7
RANGELAND	0.0	32.8
UNDESIGNATED USE (WITHIN CANYON)	417.7	129.8

*This acreage includes land use inside surveyed meander lines, therefore, will not compare with acreages shown in the Project Lands Table.

PROJECT NO. 18-IDAHO SUPPLEMENTAL EXHIBIT E

TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-17
GENERALIZED LAND USE
IN PROJECT VICINITY
IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46444

6.1.3 Reclamation Withdrawal

Large compact blocks of public land that exhibit productive capabilities for large scale irrigation development by the Bureau of Reclamation. Reclamation withdrawal lands are leased for grazing and farming as well as other nonpermanent uses until mandated by the requirements of irrigation development.

6.1.4 Reclamation and Power Site Withdrawal

Some of the land adjacent to the Snake River is designated as both reclamation and power site withdrawal. This means that a portion of the tract may be flooded or otherwise used for future power purposes while the remainder could become part of an irrigation development. In the event this dual category is used for power purposes, the provisions of the power site withdrawal would prevail and irrigation development would not proceed. These withdrawals can be leased for nonpermanent uses as in the other withdrawals until committed to one of the designated uses.

6.1.5 State Lands

Lands granted to the State of Idaho under provisions of the Statehood Act for the support of public schools are identified as state lands. These primarily consist of Sections 16 and 36 in each survey township as well as islands in the Snake River. In some instances, land trades or selection of substitute lands may have occurred. The result has been that the State controls some irregular sized and shaped tracts that are not necessarily related to the school sections.

6.1.6 Private Land Ownership

Lands that have been converted from the public domain or state land trust to fee ownership by individuals or groups are defined as private land ownership. In large measure, these are the more productive lands, particularly those adjacent to the Snake River

6.3 Measures Proposed To Assure Project Works Blend With The Surrounding Environment

Based on the recreation survey discussed in Section IV of the application, the viewing public appears to be generally satisfied with the visual quality of the existing project.

The project site is not available for viewing by the general public unless a special effort is made to visit it. It is not located on any main thoroughfares or readily apparent to the casual traveler. The only developed road access is by the road leading to the project itself.

No new measures are proposed to assure that project works blend with the surrounding environment.

6.4 Wetland Or Floodplains Within Or Adjacent To The Project Boundary

6.4.1 Wetlands

The U. S. Fish and Wildlife Service has recently developed a classification system for the purposes of inventorying, evaluating and managing the nation's wetlands. The classification system includes a variety of areas that fall into one of several categories:

1) Areas with hydrophytes and hydric soils (marshes, swamps and bogs).

2) Areas without hydrophytes but with hydric soils (areas where physical or chemical activities prevent the growth of hydrophytes).

3) Areas with hydrophytes but where hydric soils have not yet developed.

4) Areas without soils but with hydrophytes (seaweed, covered, rocky shores).

5) Areas without hydrophytes and without hydric soils (gravel beaches or rocky shores without vegetation).

Also included in the classification system are designations of deepwater habitats. Wetlands and deepwater habitats are defined separately because traditionally the term wetland has not included deep permanent water. Five major systems were defined by the classification scheme; Marine, Estuarine, Riverine, Lacustrine and Palustrine. The first four of these include both wetland and deepwater habitats but the Palustrine includes only wetland habitats.

The U. S. Fish and Wildlife Service has not inventoried the project reach of the Snake River for wetland habitats since the 1950s. However, the project area does contain areas which could be qualified for inclusion under the new classification system. Aside from the deepwater habitats (the river and reservoir) most of the wetland areas are located along the margins of the water bodies. In the absence of a detailed survey specifically for wetlands using the Fish and Wildlife system, it is safe to say that wetlands are largely coincidental to areas identified as riparian zones in Section III and illustrated on Supplemental Figure E-12.

The project area contains three of the systems discussed above:

1) The Riverine System - This system includes all wetlands contained within a channel, with two exceptions:

   a) wetlands dominated by trees, shrubs persistent emergents, emergent mosses or lichens, and

   b) habitats with water containing ocean derived salts in excess of 0.05%.

2) Lacustrine System - This system includes wetlands and deepwater habitats with all of the following characteristics:

a) situated in a topographic depression or river channel,

b) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% aerial cover, and

c) total acreage exceeds 20 acres.

3) The Palustrine System - This system includes all non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5%.

Each system is divided into various subsystems.

The emergent vegetation adjacent to rivers and lakes is often referred to as the "shore zone" or "zone of emergent vegetation" and is considered distinct from the river or reservoir. The emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes, including mosses and lichens. This vegetation is present for most of the growing season in most years.

The scrub-shrub wetland includes areas dominated by woody vegetation less than 20 feet in height. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Tree shrub species in the project area include cottonwood, hackberry, willow and skunkbrush.

The aquatic bed class includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season.

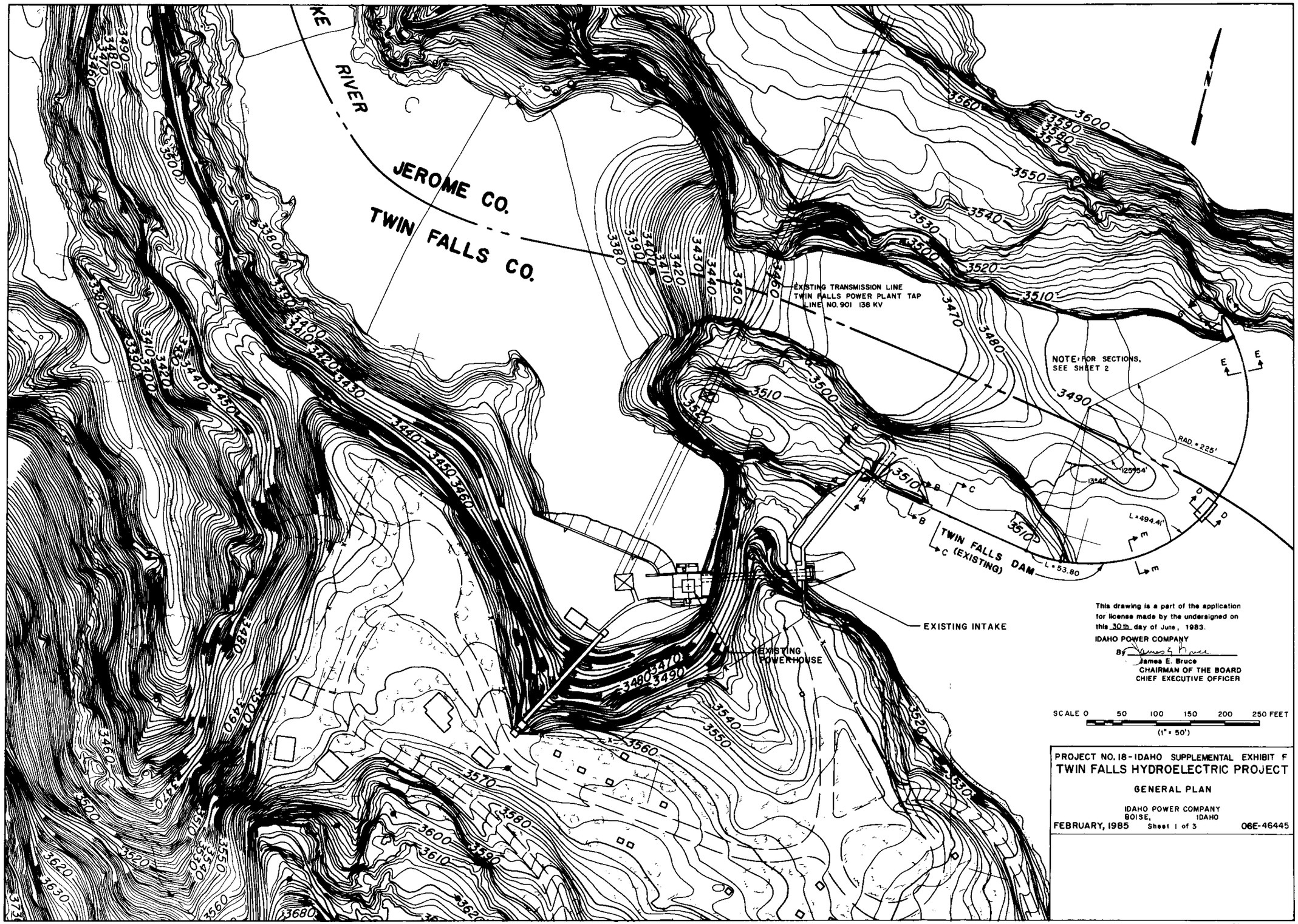
6.4.2 Floodplains

Flooding within Jerome and Twin Falls counties along the Snake River is not considered to be a major problem. The river and streams are well confined to their channels. What flooding does occur is in only a few localized areas. Flooding is not considered to be a problem within the project boundary.

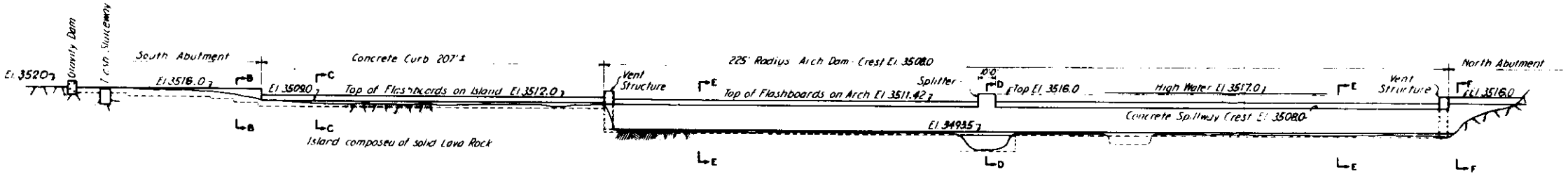
6.5 Applicant's Policy With Regard To Permitting Development Of Shoreline Facilities On Projects Lands And Waters

All types of shoreline development occurring on project lands or waters require a permit from the applicant.

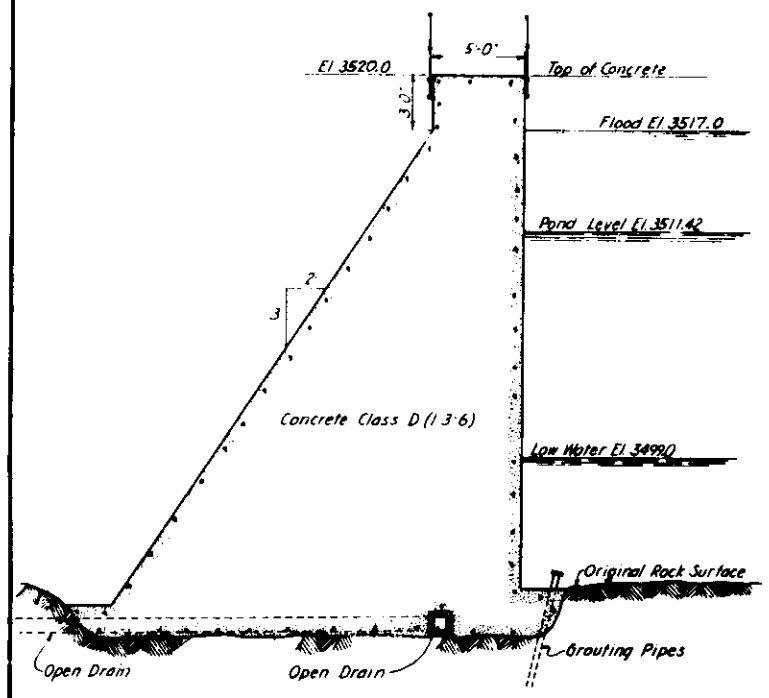
General conditions of the permit limit activities to those authorized by the permit and allow for reasonable protection of fish, wildlife, natural environmental values and water quality.


KE RIVER
JEROME CO.
TWIN FALLS CO.
EXISTING TRANSMISSION LINE
TWIN FALLS POWER PLANT TAP
LINE NO. 901 138 KV
NOTE: FOR SECTIONS, SEE SHEET 2
RAD. = 225'
125°54'
13°42
L = 494.41'
TWIN FALLS DAM
C (EXISTING)
L = 53.80
EXISTING INTAKE
EXISTING POWERHOUSE
This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983.
IDAHO POWER COMPANY
By James E. Bruce
James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER
SCALE 0 50 100 150 200 250 FEET
(1" = 50')
PROJECT NO. 18 - IDAHO SUPPLEMENTAL EXHIBIT F
TWIN FALLS HYDROELECTRIC PROJECT
GENERAL PLAN
IDAHO POWER COMPANY
BOISE, IDAHO
FEBRUARY, 1985 Sheet 1 of 3 06E-46445

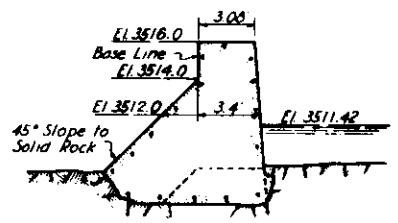
FERC Nº 18-



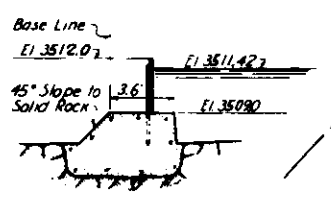
DEVELOPED PROFILE G-G OF DAM
(Looking Downstream)
Scale 1"=30'-0"



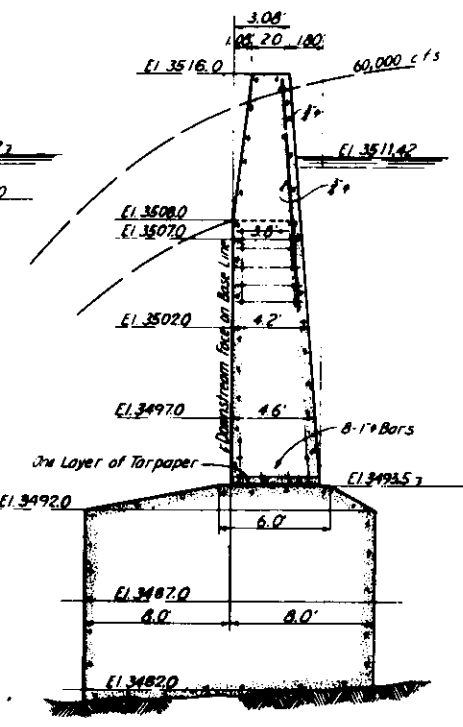
SECTION A-A
TYPICAL SECTION OF SOUTH CHANNEL DAM



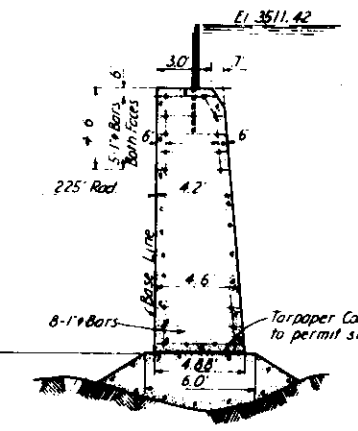
SECTION B-B



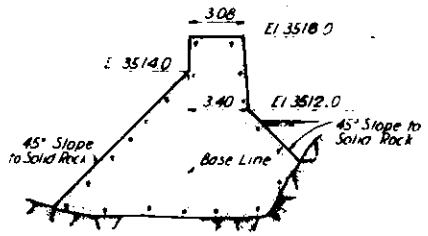
SECTION C-C



SECTION D-D



SECTION E-E



SECTION F-F

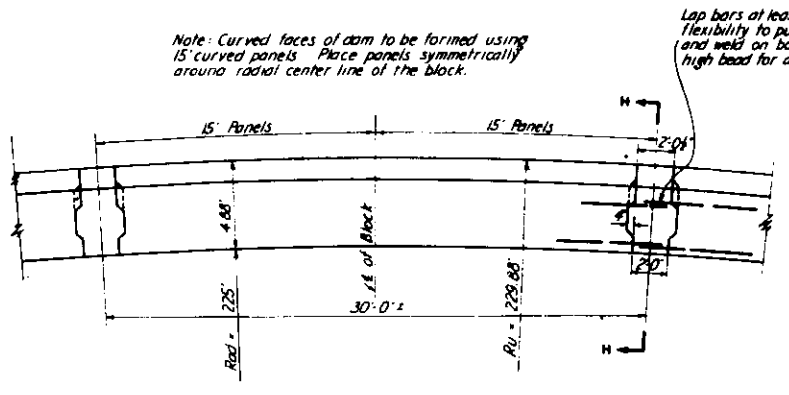
Scale of Sections - 1/4"-1'-0"

Notes:

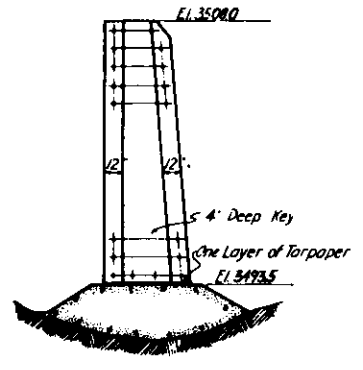
1. All elevations refer to new project datum. Elevations have been adjusted downward by 8.0' from original license project drawings. (See Exhibit A, attachment A-1)
2. Dam sections refer to exhibit F, sheet 1.

Note: Curved faces of dam to be formed using 15' curved panels. Place panels symmetrically around radial center line of the block.

Lap bars at least 15" to provide flexibility to pull bars together and weld on both sides using a ½" high bead for a minimum of 8".



PLAN OF CONSTRUCTION BLOCKS
Scale 1/4"-1'-0"

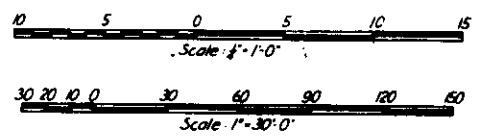


ELEVATION H-H

Elev.	Dimensions				Normal Stresses			
					Crown		Abutment	
	r_o	t	t/r_o	2θ	Extrados	Intrados	Extrados	Intrados
3507	226.9	3.0	0.067	125°54'	270 #/in²	246 #/in²	237 #/in²	282 #/in²
* 3507	226.9	3.0	0.067	125°54'	446	406	390	466
3502	227.1	4.2	0.185	125°54'	371	337	320	390
3497	227.3	4.6	0.202	125°54'	454	412	394	484
3493.5	227.44	4.85	0.215	125°54'	503	460	427	540

NOTE: Stresses calculated for Flood Water El 3517 except as noted.
* Stresses when a 4' Flashboard, topped by 2' of water is added.

NOTE:
The concrete to be used in this dam shall have compressive strength of not less than 3,000 lbs per square inch at the age of 28 days.



SCALES AS NOTED

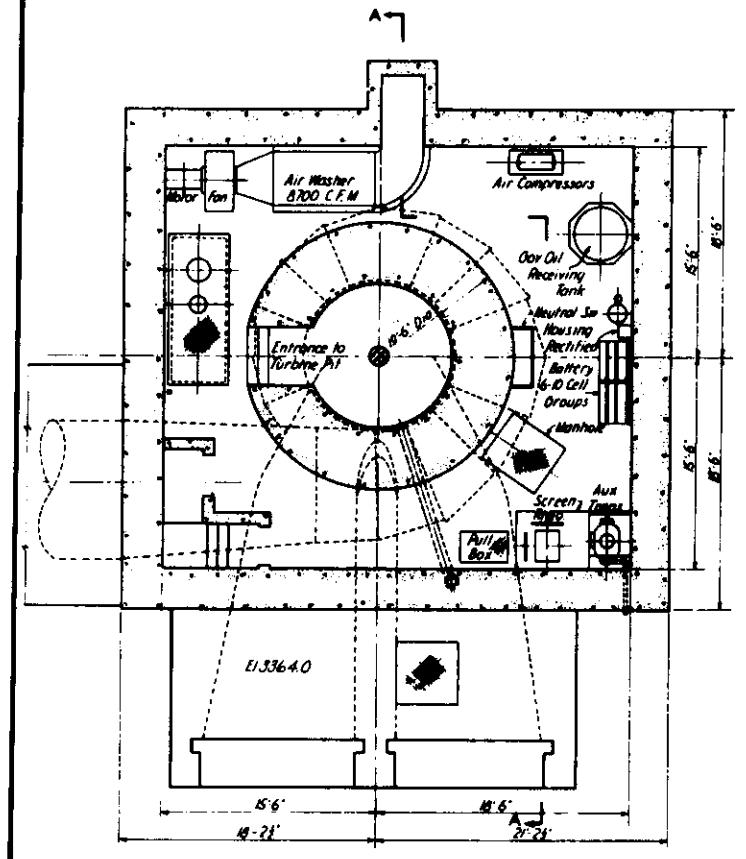
This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983

IDAHO POWER COMPANY

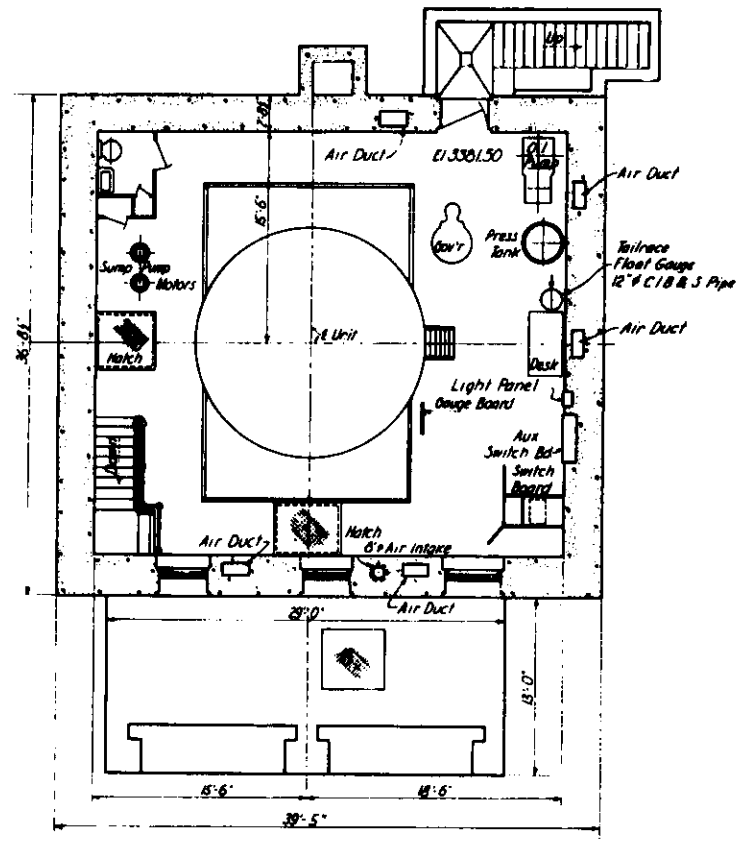
BY James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

PROJECT NO. 18 - IDAHO SUPPLEMENTAL EXHIBIT F
TWIN FALLS HYDROELECTRIC PROJECT
EXISTING DAM SECTIONS
IDAHO POWER COMPANY
BOISE, IDAHO
FEBRUARY, 1985 Sheet 2 of 3 06E-46445

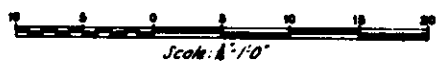
FERC Nº 18-

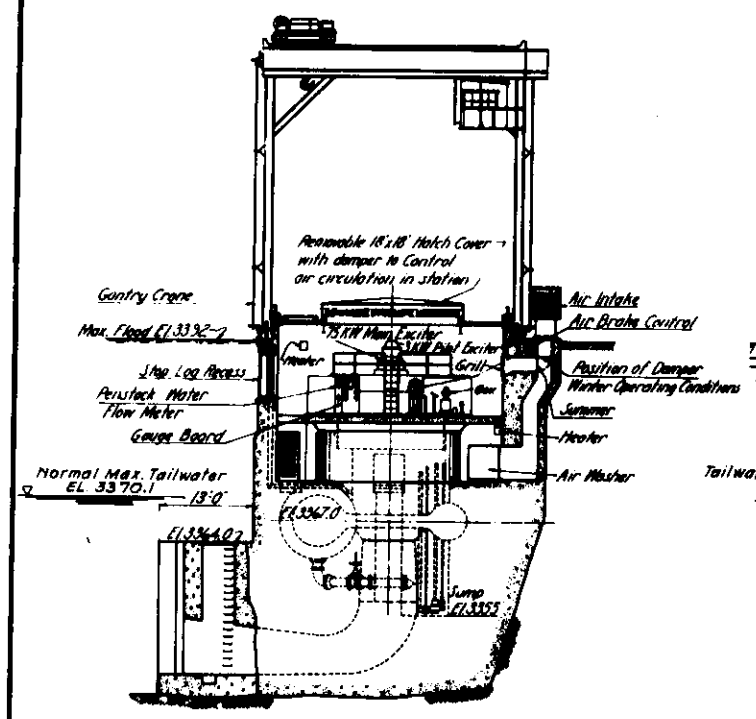


BASEMENT FLOOR

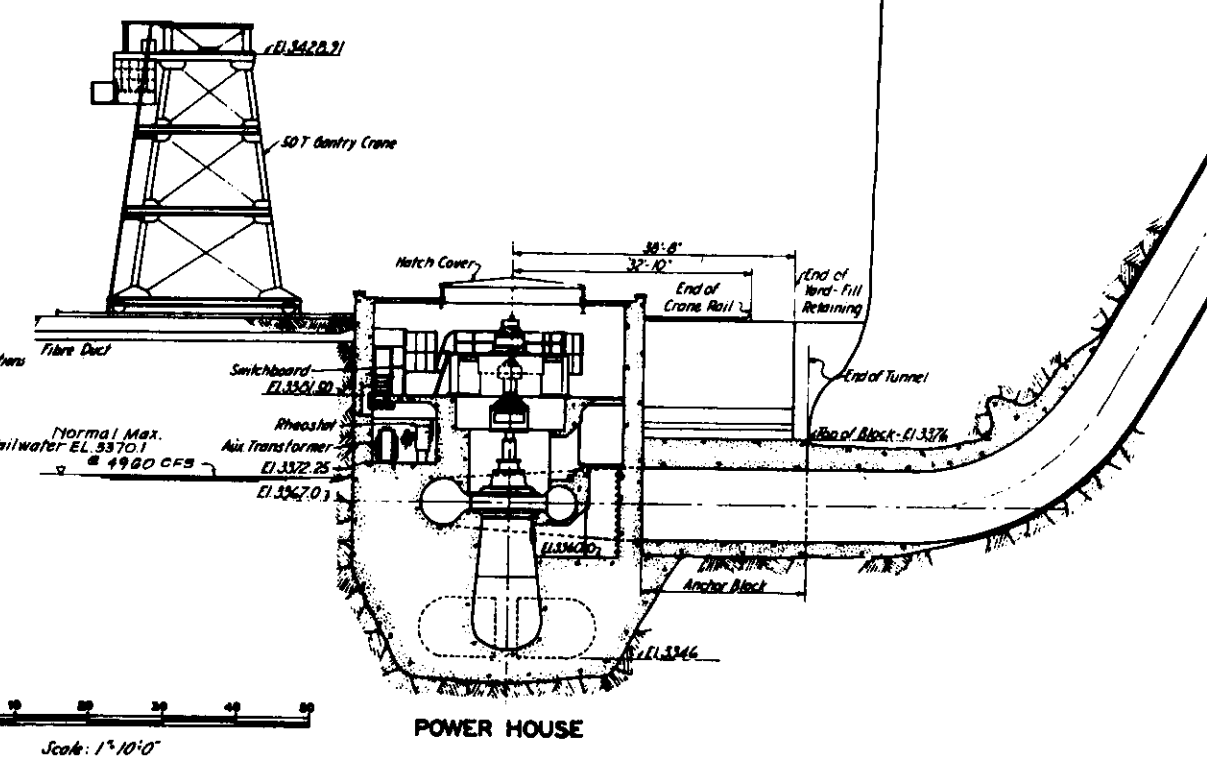


OPERATING FLOOR



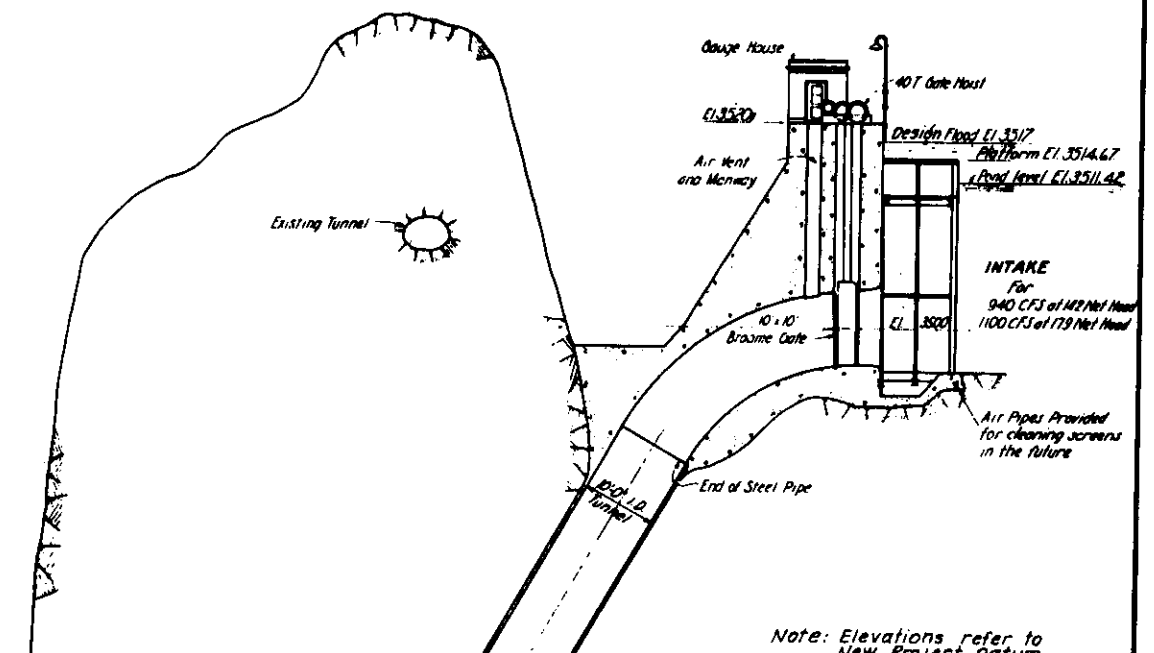


SECTION A-A



POWER HOUSE





Note: Elevations refer to New Project Datum.

This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983

IDAHO POWER COMPANY

By _____

James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

SCALE AS NOTED

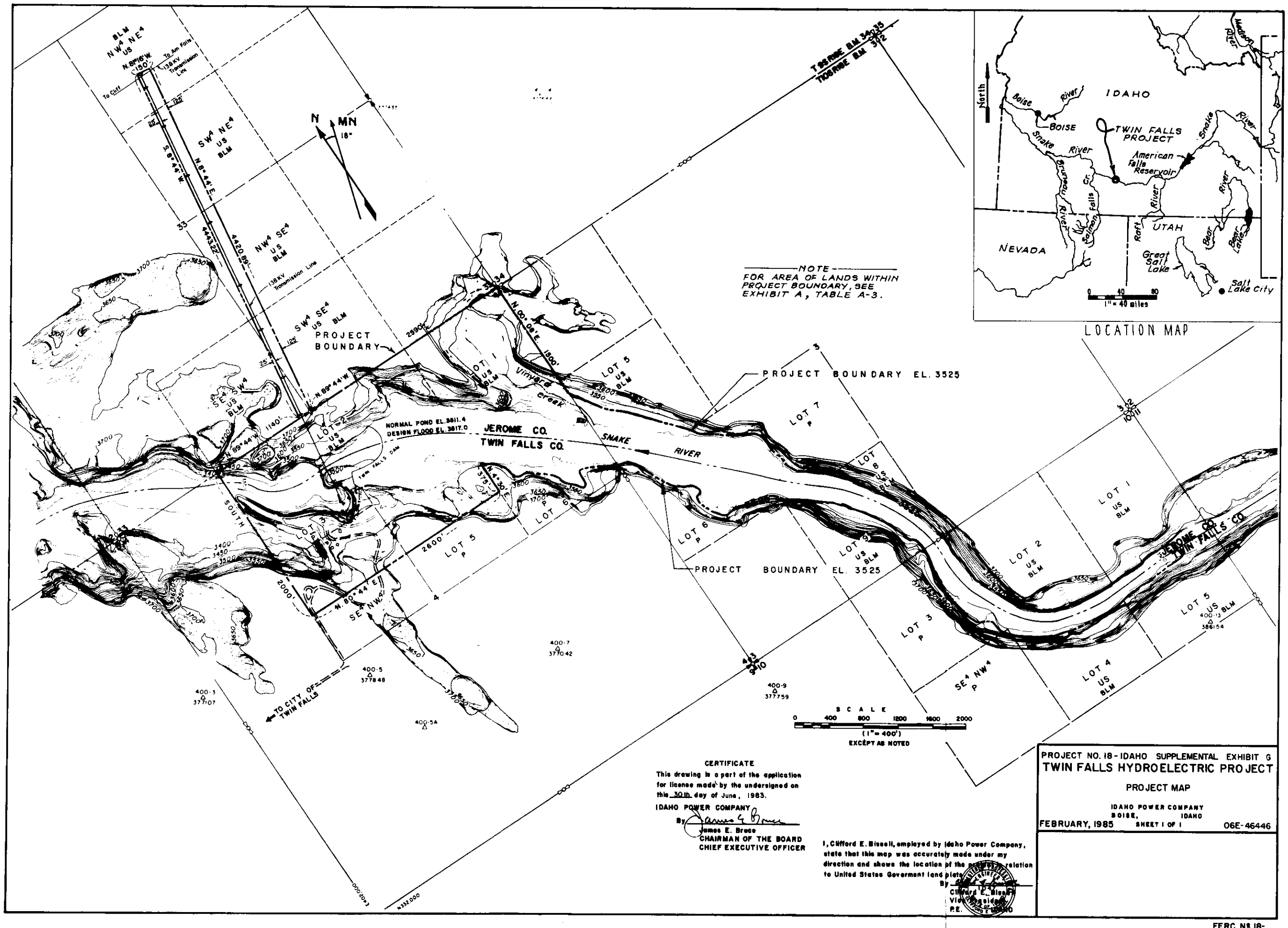
PROJECT NO.18 - IDAHO SUPPLEMENTAL EXHIBIT F

TWIN FALLS HYDROELECTRIC PROJECT

EXISTING INTAKE AND POWER HOUSE

IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 Sheet 3 of 3 06E-46445



NOTE
FOR AREA OF LANDS WITHIN PROJECT BOUNDARY, SEE EXHIBIT A, TABLE A-3.

LOCATION MAP

CERTIFICATE

This drawing is a part of the application for license made by the undersigned on this 30th day of June, 1983.

IDAHO POWER COMPANY

By James E. Bruce
James E. Bruce
CHAIRMAN OF THE BOARD
CHIEF EXECUTIVE OFFICER

I, Clifford E. Bissell, employed by Idaho Power Company, state that this map was accurately made under my direction and shows the location of the project in relation to United States Government land plats.

By Clifford E. Bissell
Clifford E. Bissell
Vice President of Engineering
P.E. IDAHO

PROJECT NO. 18 - IDAHO SUPPLEMENTAL EXHIBIT G
TWIN FALLS HYDROELECTRIC PROJECT
PROJECT MAP
IDAHO POWER COMPANY
BOISE, IDAHO
FEBRUARY, 1985 SHEET 1 OF 1 06E-46446

FERC Nº 18-

Although few of the miners ever made it rich, some of the claims did pan out. The Bloodsaw claim, situated on the North side of the river below the Twin Falls reportedly took $30,000 in one season. The claim employed five miners working sluice boxes. The gold rush was short-lived with the realization that gold recovery problems would prevent more than a very few companies from paying their own way. However, sporadic placer mining continued on the Snake River through the great depression. Mining which occurs on the Snake at the present time is done primarily for recreational purposes.

Small cattle herds were brought into the country to provide food for the gold rush. Some of the more enterprising cattlemen settled in the vicinity and began ranching operations. Livestock is reported to have done well on the bunch grass which grew among the sagebrush.

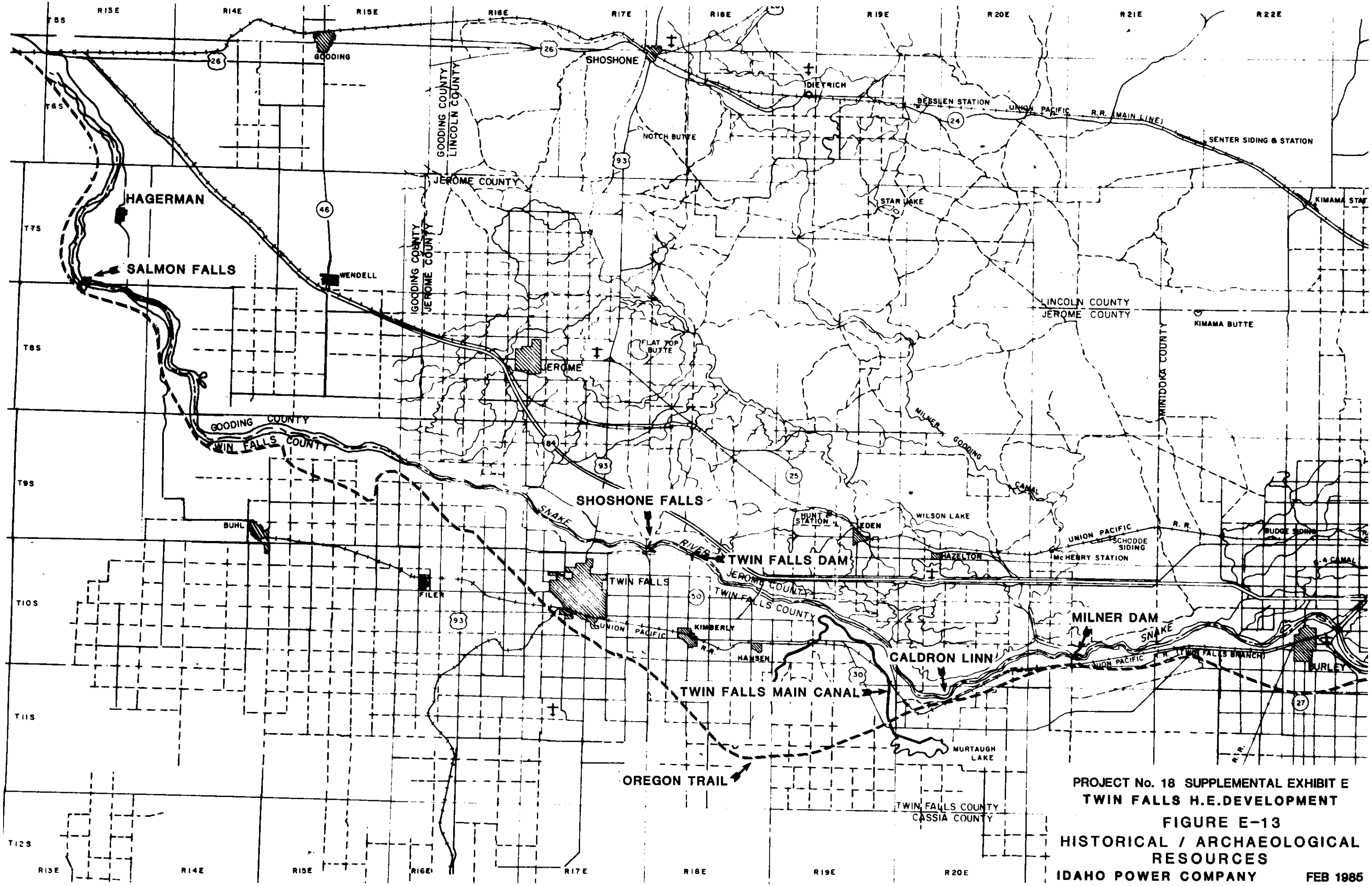
A major shift in development occurred with the construction of Milner Dam and the irrigation canal systems which were developed with it. Within a few years after its construction several thousand acres of desert lands were under irrigation. Agricultural development spurred the growth of several small communities which grew to meet the needs of the surrounding farmlands. The impact of agricultural development continues to this day and is a dominant force in the socio-economic structure of the region.

The first power development in the project area was known as the "The Great Shoshone and Twin Falls Electric Light and Power Company" founded by J. S. and W. S. Kuhn. The company was one of the predecessors of the present day Idaho Power Company.

4.2 National Register Of Historical Places

The project boundary does not contain any areas listed on the National Register of Historic Places.

Twin Falls and Jerome counties, the two counties adjoining the project boundary, contain the following locations, illustrated on Supplemental Figure E-13, which have been listed in the National Register.



PROJECT No. 18 SUPPLEMENTAL EXHIBIT E

TWIN FALLS H.E.DEVELOPMENT

FIGURE E-13

HISTORICAL / ARCHAEOLOGICAL RESOURCES

IDAHO POWER COMPANY FEB 1985

Twin Falls County

Place	Location	Date Listed
Alvis House	1311 Pole Line Rd	5/23/83
Buhl City Hall	City of Buhl	2/08/78
Idaho Power Substation	City of Twin Falls	6/23/78
Robert McCollum House	708 Shoshone St. Twin Falls	6/23/78
Ramona Theater	113 Broadway Buhl	12/22/76
H C Smith House	City of Twin Falls	4/03/78
Stricker Store and Homesite	NW¼ NW¼ Section 23 Township 11 South Range 18 East	8/30/79
Twin Falls City Park Historic District	City of Twin Falls	3/30/78

Jerome County

Place	Location	Date Listed
Caldron Linn	Vicinity of Murtaugh	6/27/72
Jerome National Bank	City of Jerome	6/09/78
Minidoka Relocation Center	City of Hunt	7/10/79
Wilson Butte Cave	Vicinity of Hunt	11/21/74

None of the sites presently listed in the National Register occur in the project boundary.

Applicant has previously consulted with the Idaho State Historic Preservation Officer (SHPO) concerning eligibility of sites. No sites within the boundary were determined to be eligible for the National Register.

4.3 Measures To Locate, Identify And Salvage Historical Or Archaeological Resources

At the request of the applicant, and after consultation with the Idaho State Archaeologist and SHPO, a literature search and an intensive on-the-ground cultural resource inventory of the project area was conducted by B. Robert Butler and Associates, of Pocatello, Idaho. The surveyors have considerable first-hand experience with the project locality, having conducted extensive cultural resource inventory work and evaluations in the same general vicinity during the mid-1970s for the Bureau of Reclamation. Generally speaking, cultural resources tend to be scarce along the canyon rim and in the canyon bottom from the Milner Damsite to the vicinity of the project's power plant, owing largely to the precipitous nature of the Snake River canyon itself in this vicinity, as well as to the arid environment of the region in general. Historically, this was simply a part of the Snake River Plain remembered with distress by travelers who crossed it between Oregon Trail and Oregon Short Line (railroad) days.

The Oregon Trail, perhaps the best known cultural resource in this locality, left the Snake River in the immediate vicinity of the Milner Dam and continued in a southwesterly direction past the modern-day town of Twin Falls, Idaho, before touching on the river again below Deep Creek. The Twin Falls Main Canal dissects the former route of the Oregon Trail just east of Murtaugh, Idaho (Cramer 1974, 1976). However, construction of the canal appears to have obliterated all traces of the Trail at this point. There were two good reasons for leaving the river traveling farther to the south; basalt bedrock outcrops all along the canyon rim, making travel extremely difficult and the perpendicular walls of the canyon made access to the waters of the river nearly impossible.

The project's power plant vicinity had not been surveyed (inventoried) previously. The tactics in the field were simple and straightforward. The location was surveyed on foot by a two-man team walking over every possible place for a site and clambering up and

down the canyon walls as required. Access to the location was relatively simple. No archaeological features were discovered through the course of the survey. Survey results are contained in "A Class III Resource Inventory of the Proposed Twin Falls Power Plant Expansion and the Milner Hydroelectric Project, South Central Idaho" included as Appendix E-5 of the application.

Since no historic or archaeologically significant sites were located as a result of the survey, the applicant does not propose any measures or actions to protect historic or archaeological resources. Likewise, no such measures have been recommended by agencies for the protection of historic or archaeological resources.

4.4 Schedule Of Activities

The literature search and ground survey activities were conducted during November of 1982. No further archaeological or historical work has been recommended or is contemplated.

V. REPORT ON RECREATIONAL RESOURCES

5.1 Existing Recreational Facilities At The Project

The applicant has built and maintained recreation facilities at the existing power plant site. The facilities are situated on a ten acre park located on the bluffs above the power plant. Facilities consist of picnic tables, some with electric outlets, a boat dock and boat ramp, covered electric cooking facilities and restroom facilities.

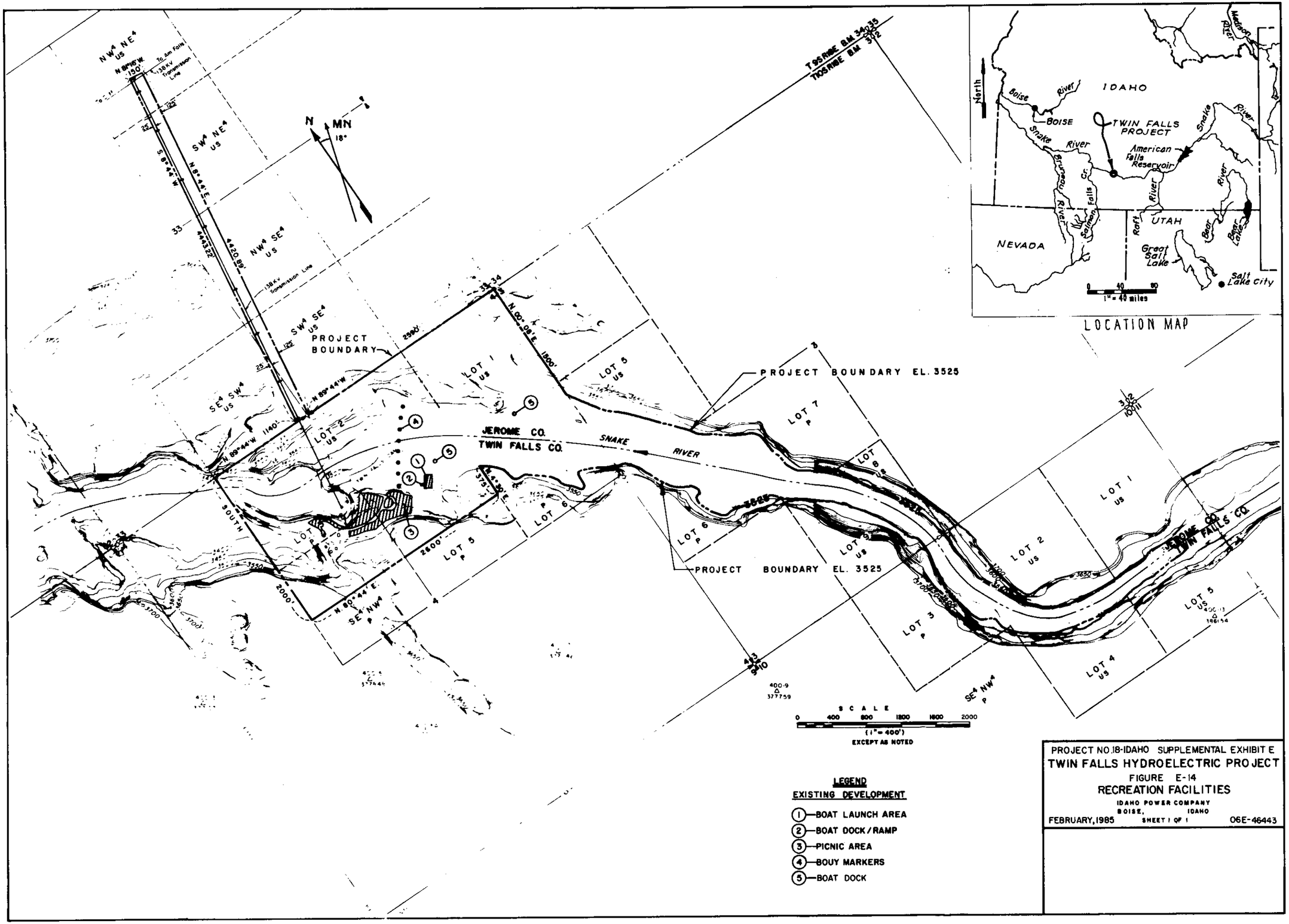
Two other privately-owned boat docks are located on the project reservoir. The existing facilities are shown on Supplemental Figure E - 14. All facilities owned and maintained by the applicant, are open for use by the public free of charge for day use purposes only. No overnight facilities are provided.

In addition to recreation facilities, tours of the power plant are provided upon request. Tours are normally accompanied by plant personnel due to access difficulty.

5.2 Estimate Of Existing And Potential Recreation Use Of The Project Area

5.2.1 Existing Use

Applicant maintains accurate records of visitations to the project recreation facilities. A monthly and yearly summary of visitors to the park is contained in the following table.



PROJECT NO.18-IDAHO SUPPLEMENTAL EXHIBIT E

TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-14

RECREATION FACILITIES

IDAHO POWER COMPANY

BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46443

Supplemental Table V-1
Monthly Summary
Recreational Use
Twin Falls Power Plant Park

MONTH	1978	1979	1980	1981	1982	TOTAL	AVERAGE
JAN	1140	1572	1674	718	462	5566	1113
FEB	507	2950	1296	1388	608	6749	1350
MAR	5550	4603	2299	2723	1563	16738	3348
APR	4958	7787	3751	3904	1432	21832	4366
MAY	7676	6327	2622	3592	4819	25036	5007
JUN	6532	4603	4921	7857	4849	28762	5752
JULY	11788	8260	8655	6510	5727	40940	8188
AUG	19107	6268	4375	7137	4028	40915	8183
SEPT	3484	2198	1744	3666	1646	12738	2548
OCT	3027	1331	1228	1244	1625	8455	1691
NOV	592	1071	1264	1306	2666	6899	1380
DEC	2285	1280	923	1063	1418	6969	1394

Annual Totals	Monthly Average
1978 - 66,466	5539
1979 - 48,250	4021
1980 - 34,752	2896
1981 - 41,108	3426
1982 - 44,320	3693

In addition to the applicant's records a telephone survey was conducted of the four counties surrounding the project boundaries (Twin Falls, Jerome, Minidoka and Cassia counties) to generally assess recreational use of the portion of the Snake River located between Minidoka Dam and Twin Falls Dam. The survey questions and methodology were developed in consultation with the Idaho Department of Parks and Recreation and The Idaho Department of Fish and Game. Portions of the survey were specifically designed to assess recreational activities and preferences in the project reservoir.

The survey was conducted between March 7 and March 14, 1983. Telephone numbers were randomly selected from telephone prefixes

listed in the Magic Valley Telephone Directory. Calling was done in the evenings between 5:30 and 9:30 p.m., Monday through Thursday. A copy of the telephone survey questionnaire is attached in the application as Appendix E-6.

For the purposes of the survey, the study portion of the river was divided into four discrete segments. Specific questions were asked about recreation activities within each segment and suggestions for improvements to existing recreation activities were solicited.

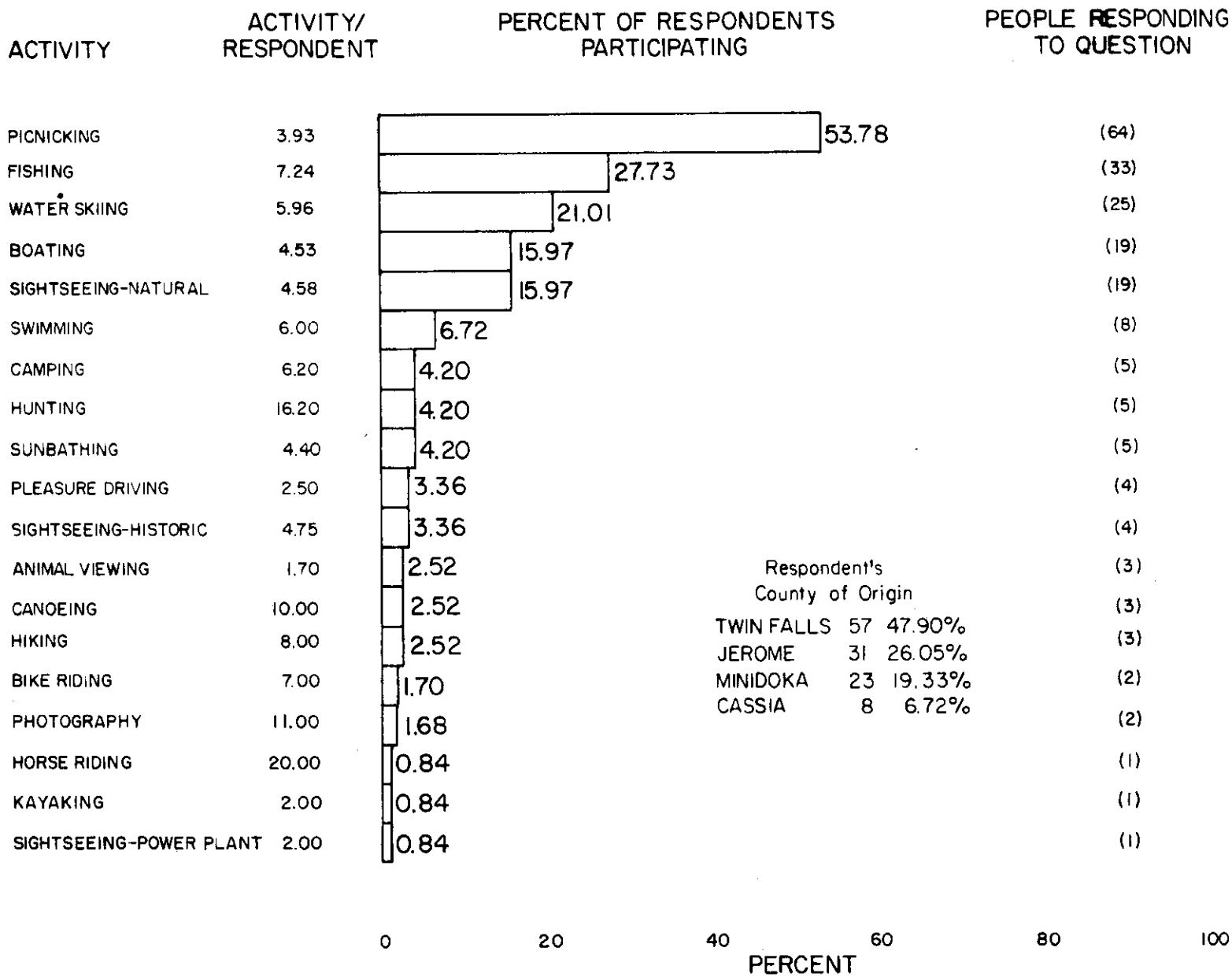
Of the 819 completed interviews, 621 individuals (75.82%) indicated that they did not use the Snake River for recreation purposes. Of the 198 (24.18%) who did indicate that they used the river, only three refused to grant an interview (1.52%). Of the 195 who consented to the interview, 119 (61.03%) indicated that they used the project reservoir for recreation purposes.

Supplemental Figure E-15 indicates the distribution of the responses of the recreationists using the project vicinity. Activities are ranked according to popularity by number of respondents. Average number of activities per respondent and the percent of respondents participating in a given activity are also shown, as well as the respondents' county of residence.

The survey indicated the five most popular activities engaged in at the project are picnicking, fishing, water skiing, boating and sightseeing.

Several questions were asked concerning the relative value the respondent placed on certain activities. Picnicking, reservoir-oriented activites and sightseeing all ranked of high value to most of the respondents, while visting the power plant ranked comparatively low in value. The relative ranking of values is illustrated on Supplemental Figure E-16.

Respondents were solicited for suggestions to improve recreation opportunities throughout the study area. Eighty-three suggestions



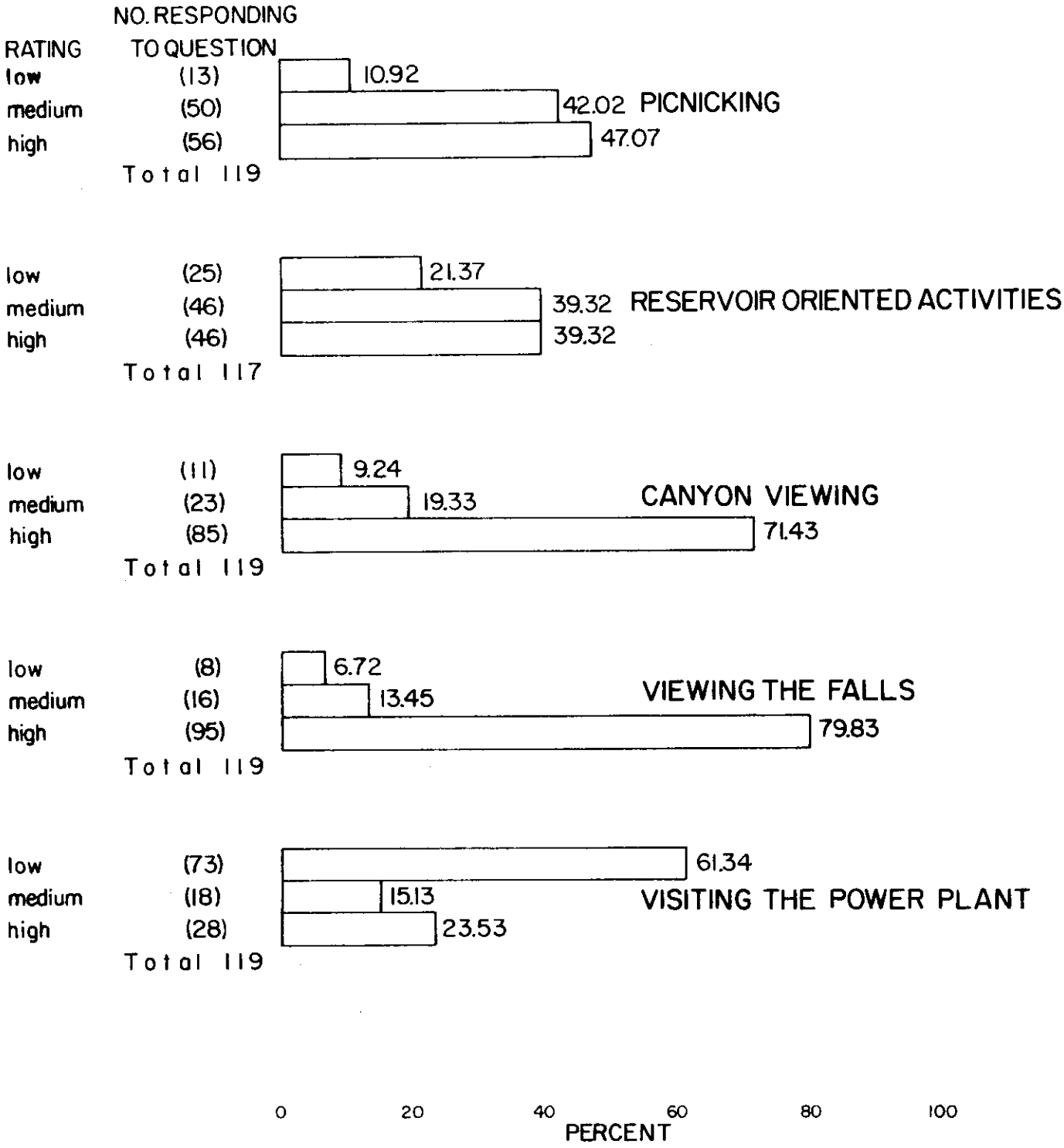
PROJECT No. 18 SUPPLEMENTAL EXHIBIT E

TWIN FALLS H.E. DEVELOPMENT

FIGURE E-15

FREQUENCY DISTRIBUTION-
RECREATIONAL ACTIVITIES

IDAHO POWER COMPANY FEB 1985



PROJECT No. 18 SUPPLEMENTAL EXHIBIT E
TWIN FALLS H.E.DEVELOPMENT

FIGURE E-16
VALUE RATING-
SELECTED ACTIVITIES
IDAHO POWER COMPANY FEB 1985

were received, including nine which were not applicable or were difficult to interpret. Because of the way the questions were asked, it is difficult to segregate the suggestions by river section or to isolate all of the suggestions which were targeted at the project reservoir.

Supplemental Table V-2 is a summary of suggested recreation improvements through the 56 miles of river segment evaluated by the survey.

Supplemental Table V-2
Suggested Recreation Improvements

Activity Related Suggestion	Number of Suggestions
Boating	16
Picnicking	12
Better Maintenance	10
Restrooms	8
Improved access	7
Satisfied as is	5
Swimming area	3
Policing of recreation sites	3
Removal of fees*, improved parking, fish planting	2 each
Improved overnight camping, better access to power plant, playground equipment, no additional access	1 each
Difficult to interpret or not appropriate to report	9

* No fees are charged at the project facilities.

The suggested improvements are all related to activities which presently occur at the project area. The data suggest there is little, if any, public desire for the encouragement of activities which do not presently occur at the project.

5.2.2 Project Use

The Idaho Department of Parks and Recreation has prepared a report on statewide recreation needs. In the Department's 1977 Idaho Outdoor Recreation Plan (SCORP), recreation needs were developed for six planning regions in the state. The project is in south central

Idaho, in an area designated as the Springs Section. Supplemental Table V-3 is extracted from the SCORP document and gives projections to the year 2000 for recreation activities in the planning region. Although regional in extent, these data provide an indication of future recreation activities which may occur in the project area. No other methods of predicting recreation growth in the project area have been attempted by the applicant. As the table indicates, overall recreation activities are expected to roughly double by the turn of the century.

5.3 Agency Recommendations - Recreation

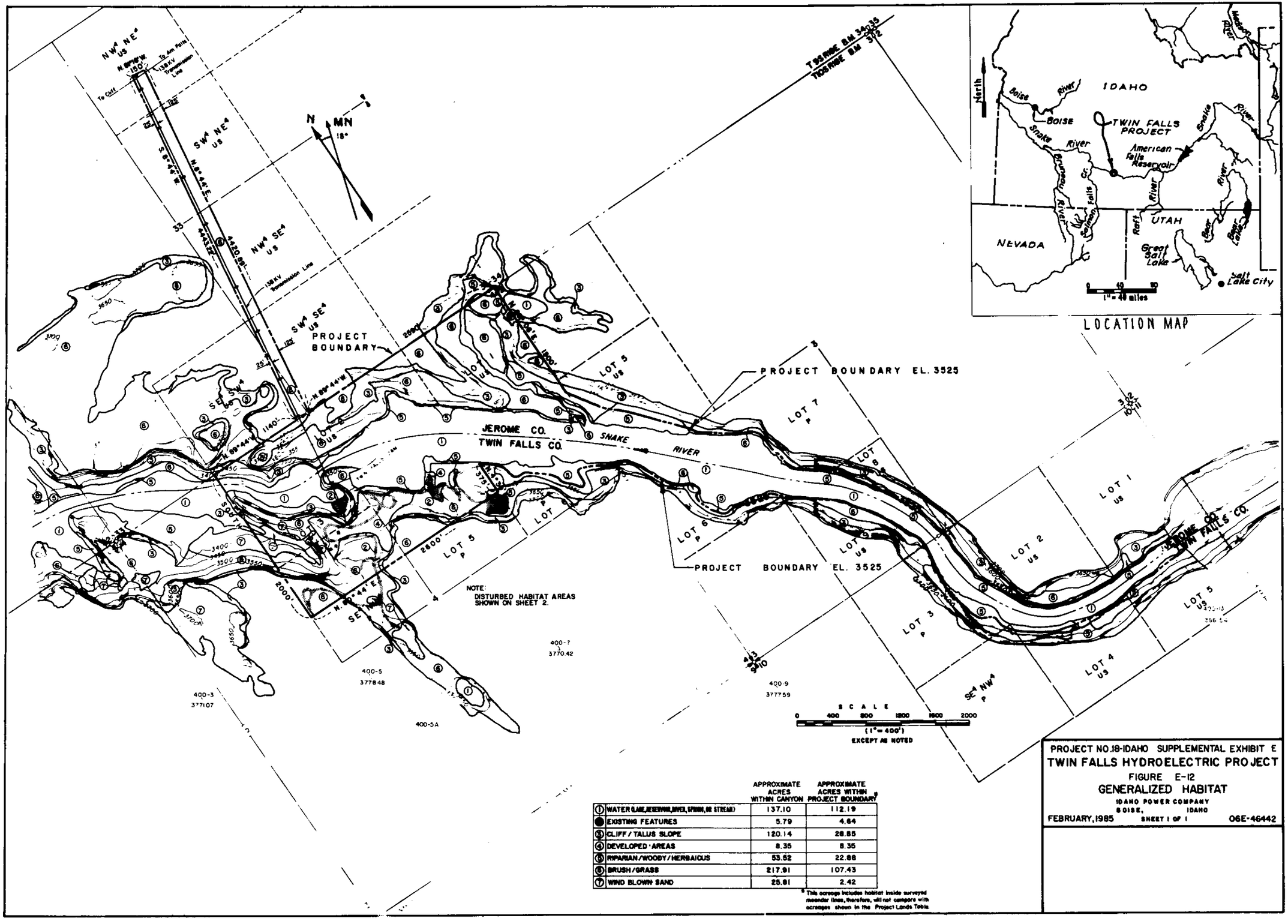
Agency comments on the existing project and proposed new development are included in the application.

The project will have no impacts to the existing recreation activities which take place at the project and its environs. Recreation will be allowed to continue as it does at the present time. Topographic considerations within and around the project area limit the opportunity to develop additional recreational facilities. Likewise, the small size of the reservoir also limits the amount of water-related activities which can occur within the project boundary.

Since the project will not have any long-term adverse impacts to recreation use of the project area and the immediate vicinity, no additional proposals are being recommended by the applicant. However, the applicant anticipates that consultation will occur as necessary with state and federal agencies to evaluate the effectiveness of the existing facilities to meet future needs.

5.4 Applicant Recommendation - Public Safety

The applicant will continue to maintain the existing safety barrier upstream of the power plant intake structures and spillway to assure public safety. Other safety measures, such as fencing or otherwise limiting public access to electrical equipment, powerhouses, tailrace and spillway are in existence and will continue.



	APPROXIMATE ACRES WITHIN CANYON	APPROXIMATE ACRES WITHIN * PROJECT BOUNDARY
(1) WATER (LAKE, RESERVOIR, RIVER, SPRING, OR STREAM)	137.10	112.19
EXISTING FEATURES	5.79	4.64
(3) CLIFF / TALUS SLOPE	120.14	28.85
(4) DEVELOPED AREAS	8.35	8.35
(5) RIPARIAN / WOODY / HERBAICUS	53.52	22.88
(6) BRUSH / GRASS	217.91	107.43
(7) WIND BLOWN SAND	25.81	2.42

* This acreage includes habitat inside surveyed meander lines, therefore, will not compare with acreages shown in the Project Lands Table.

PROJECT NO.18-IDAHO SUPPLEMENTAL EXHIBIT E

TWIN FALLS HYDROELECTRIC PROJECT

FIGURE E-12

GENERALIZED HABITAT

IDAHO POWER COMPANY
BOISE, IDAHO

FEBRUARY, 1985 SHEET 1 OF 1 06E-46442

Several habitat types are illustrated on the exhibit map. They include river/reservoir, cliff/talus slope, developed areas, riparian zone, brush/grass and blowsand.

3.1.3.1 River/Reservoir

This habitat is broadly defined to include all bodies of water, including the river, reservoir, springs and streams. Reservoir habitat extends approximately one and one half miles upstream of the dam. River habitat extends downstream of the dam for approximately 1.1 miles. The principal tributary stream draining into the reservoir is Vinyard Creek, located on the north side of the reservoir approximately one-half mile above the dam. A small unnamed stream enters the Snake River on its south bank approximately 700 feet below the dam. The stream is situated on the downstream side of a finger of rock which extends out from the rim of the canyon. A few other small streams and irrigation inflow occur along the reservoir margin.

3.1.3.2 Existing Features

Existing features include roads, buildings, beaver ponds (commercial) and other manmade features excluding the park. Developments are confined to the immediate vicinity of the dam and a short distance upstream.

3.1.3.3 Cliff/Talus Slope

This habitat type is located throughout the project boundary and constitutes the most visually dominant type. The talus slopes generally support vegetation where soil has accumulated. Talus typically consist of large angular basalt boulders.

3.1.3.4 Developed Areas

The developed areas shown on the exhibit map coincide with the location of the Twin Falls park, operators' village, and other

private land. It is confined to the immediate vicinity of the dam and powerhouse.

3.1.3.5 Riparian Zone

The riparian zone contains two subtypes, herbaceous riparian vegetation and woody riparian vegetation. The subtypes have not been illustrated on the map. The zone extends around the reservoir, along the river channel, and along the channels of springs, creeks, and intermittent irrigation inflow. This type contains the wetlands which are discussed under Section 6.4.

3.1.3.6 Brush/Grass

Brush/grass habitat is found throughout the Snake River Plain. It is the most common vegetation feature found in southern Idaho. It is located within the vicinity of the project above the rim of the canyon and in suitable locations below the canyon walls. Within the project area it generally consists of sagebrush/annual grass/forb-type of cover. Greasewood, shadscale and four-wing salt brush also occur in this type.

3.1.3.7 Blowsand

This designation has been assigned to areas within the project boundary which consist primarily of sparsely vegetated patches of land which are characteristically dominated by bare exposed sand. This type of habitat is located primarily below the dam on the south bank of the river. Blowsand accumulates along the base of the canyon walls and apparently covers talus deposits. Much of the brush/grass habitat occurs on soils which have developed from this process.

3.2 Agencies Recommendations - Fish, Wildlife And Botanical Resources

Agency comments on the existing project and proposed new development are included in the application.

Vinyard Creek, illustrated on Supplemental Figure E-10, is located on the north shore of the project reservoir. In 1979 a minimum stream flow of 17 cfs annually was established on the creek. The purpose for the minimum streamflow is to maintain trout populations as well as trout rearing and spawning habitat over the length of the stream. Preservation of the stream's aesthetic characteristics is also a goal of the flow appropriation.

The Idaho Department of Fish and Game's concerns revolved around the impacts which would occur to Vinyard Creek in the event the height of the dam were to be raised. The U. S. Fish and Wildlife Service and the Bureau of Land Management have not expressed any specific concerns.

3.3 Mitigation - Existing Measures And Applicant's Proposal

The Idaho Department of Fish and Game was granted intervention status in the application for new license for the Twin Falls Project on December 29, 1983. In the applicant's response to agency letters commenting on the application for new license the applicant indicated that through consultation with Idaho Department of Fish and Game, fish and wildlife concerns could be resolved. Such consultation was conducted and resulted in a letter of agreement dated, June 15, 1984, between the Idaho Department of Fish and Game and Idaho Power Company. The letter of agreement was filed with the Commission on June 20, 1984.

The letter of agreement defines the terms, conditions and full extent of adequate mitigation for environmental concerns to be implemented if additional capacity is installed at the project.

3.4 Description Of Continuing Impacts To Fish, Wildlife And Botanical Resources

No long-term adverse impacts are expected.

IV. REPORT ON HISTORICAL AND ARCHAEOLOGICAL RESOURCES

4.1 Prehistoric And Historic Overview

4.1.1 Prehistoric Overview

Historically, there are no reports of native encampments along this part of the Snake River. The nearest encampments were those associated with the fisheries below the 212 foot "fishing falls" (Shoshone Falls), the largest of which were at Salmon Falls near Hagerman, several miles downstream of the project area. Native food resources are extremely sparse. Salmon and other anadromous fishes did not occur this far up the Snake for their ascent was blocked by Shoshone Falls, a few miles downstream from the project, and bison and other large game animals do not appear to have occurred in significant numbers in this locality.

Prehistorically, this particular section of the Snake River is unknown. There are indications that south-central Idaho as a whole may have been occupied as early as 15,000 years ago, probably by hunters of such big game animal forms as elephant, horse, bison, camel and mountain sheep, remains of which are common over much of southern Idaho. Subsequent to this earliest occupation, there is considerable evidence of a classic Early Big-game hunting sequence (Clovis, Folsom, and Plano) followed by a typical Basin Archaic sequence lasting from about 7800 years ago to possibly as late as A.D. 500 (Butler 1978). Between A.D. 500 and the 17th century, evidence of the Fremont culture is found over a large part of the Snake River Plain (Butler 1982). The historic Shoshonean occupants probably began infiltrating the region beginning in the 16th century, but may not have reached their maximum numbers until after the middle 1700s (Butler 1982). This interpretation of the region's prehistory is currently the subject of much debate, largely because so little is actually known.

4.1.2 Historic Overview (1800 - Present)

Euroamericans traversed the Snake River Plain only six years after Meriwether Lewis first crossed the Continental Divide into Idaho in 1805. John Jacob Astor's Pacific Fur Company dispatched Wilson Price Hunt on an ill-fated expedition west to trap the Snake River country, and the party arrived at Fort Henry on Henry's Fork of the Snake River, October 8, 1811. The party generally followed the course of the Snake River downstream. The following year a returning member of the Astorian expedition, Robert Stuwart, retraced Hunt's path up the Snake River.

Fur trappers converged on the Snake River country in search of the great number of beaver reported there. The North West Company dispatched Donald Mackenzie, who established profitable contacts with the Snake River country Shoshoni, initiating a period of active trade between the trappers and Indians, until about 1840, for guns, ammunition, hardware, cloth, beads, paint, and tobacco.

Exploration of the Big Wood River in 1830 by early day fur companies revealed that few beaver remained in the Snake River country.

The near annihilation of beaver in the Pacific Northwest between 1834 and 1839 marked the end of the golden age of fur trapping. Trappers who chose to remain in the West were forced to choose new occupations. The entire trapping period had lasted only 30 years.

The United States Army dispatched John C. Fremont, a subsequent presidential candidate, to survey the Oregon Trail in 1843. Blazed by the fur trappers, the main route of the Oregon Trail followed the south side of the Snake River from Fort Hall to Three Island Crossing near Glenn's Ferry, opening the Oregon country to American occupation.

The first encounter between the Snake River Shoshoni and the United States Army transpired peacefully and inconsequentially. Not

for twelve years would federal troops return to Southwestern Idaho, then to punish Indians responsible for the Ward party massacre on the Boise River. By that time, friction between immigrants and Indians had so escalated that even the British could no longer rely on their traditional friendship with the Indians. With the exception of occasional immigrants passing through on the Oregon Trail, Southwest Idaho was abandoned to the natives until the discovery of gold in Boise Basin in 1862. Although a few years of concerted -- and sometimes muddled -- effort by volunteer and regular army troops resulted in the expulsion of the Boise and Bruneau Shoshoni to Fort Hall in 1869, small bands of Snake River Shoshoni probably continued to hunt the Snake River through the remainder of the century.

With the removal of most of the native population to reservations, occasional immigrants began homesteading the Snake River Canyon.

Gold was discovered at the Twin Falls in 1869 by two unidentified stage drivers. At that time the falls was known as "The Little Falls" to distinguish it from the 212 foot Shoshone Falls located a few miles downstream.

With the discovery of gold and the growth of mining, several small settlements developed along the banks of the river.

The first mining operation began at Dry Creek about thirteen miles upstream of the Twin Falls. The town of Dry Town was located at the mouth of Dry Creek and consisted of several saloons, two stores and other buildings.

The settlement of Springtown was located a few hundred yards below the present site of the Hansen Bridge. A third town named Shoshone was located near the Twin Falls. It also consisted of several saloons, dance halls and two general stores. By 1872 an estimated 3000 miners were working the gravel bars of the Snake River between the present location of Milner Dam and Mud Creek, approximately twenty miles downstream.

File 02-7375

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Additional Information for the Applications for License for

MILNER HYDROELECTRIC PROJECT (2899-003) 01-7011

STAR FALLS HYDROELECTRIC PROJECT (5797-002) 02-7372

TWIN FALLS HYDROELECTRIC PROJECT (18-001) 02-7375

AUGER FALLS HYDROELECTRIC PROJECT (4797-001) 02-7343
02-7386

September, 1987

Prepared and Submitted on Behalf of Applicants by

Ralston & Associates
Route 3
Kuna, Idaho 83634

RECEIVED
APR 19 1993

INTRODUCTION

On June 2, 1987, the Federal Energy Regulatory Commission requested the applicants for hydroelectric projects on the Snake River, specifically Milner, Star Falls, Twin Falls and Auger Falls, to submit additional information for evaluation of the respective license applications. The additional information requested concerned water quality during low-flow conditions and toxic substances in river sediments that may be disturbed during construction. The applicants jointly contracted with Ralston & Associates to obtain and submit the additional information requested. All four projects are located along a 33 mile reach of the Snake River in southcentral Idaho (Figures 1 - 5).

Following consultation with the Idaho Division of Environment and the U.S. Environmental Protection Agency, a study plan was prepared and submitted to the Federal Energy Regulatory Commission. The study plan was accepted in mid-July and was carried out during July 27-30, 1987 and August 24-26, 1987.

During the July sampling period, the weather was dry and hot. Temperatures ranged from 68°F to 95°F. During the August sampling period, temperatures ranged from 50°F to 98°F and the weather was dry and hot. Mornings were generally calm with a light to moderate breeze in mid-afternoon during both sampling periods.

Daily average discharge for the Snake River at Milner and at Kimberly (below Twin Falls) was as follows:

	Milner Gage	Kimberly Gage
July 26	732	1010
27	739	1210
28	684	1120
29	791	1150
30	949	1260
31	628	1320
August 20	325	664
21	339	788
22	36	748
23	36	530
24	35	501
25	35	484
26	297 (see note)	486
27	1194	N.A.

Note: Discharge was maintained at 35 c.f.s. until completion of monitoring at 3 P.M.

APR 19 1993

SAMPLING LOCATIONS AND METHODS

Sediment

River sediment samples were collected from three locations: near the headgate of the Twin Falls Main Canal, 400 meters above the proposed Star Falls damsite, and 200 meters above the existing Twin Falls Dam. The other locations for which sediment data were requested (proposed Auger Falls diversion dam and at the proposed powerhouse sites for all four projects) were all associated with bedrock or large boulders with no sediment. All sediment samples were collected with a Ponar dredge deployed from a boat. Sediment samples were collected on August 26, 1987. Results of analyses are included in Table 1.

Diel Dissolved Oxygen and Temperature

Dissolved oxygen and water temperature were measured before or at sunrise and during mid afternoon in the pool areas above and below the Milner, Star Falls and Twin Falls projects. Measurements were made at the surface and at one meter intervals in the pool areas and at the surface below each of the three projects. Dissolved oxygen and temperature were measured using a YSI Model 54A dissolved oxygen meter equipped with a submersible stirrer. The meter was calibrated at the beginning and end of each sampling period. Diel dissolved oxygen measurements were made during the July and August sample periods. Results are included in Tables 2, 3 and 4.

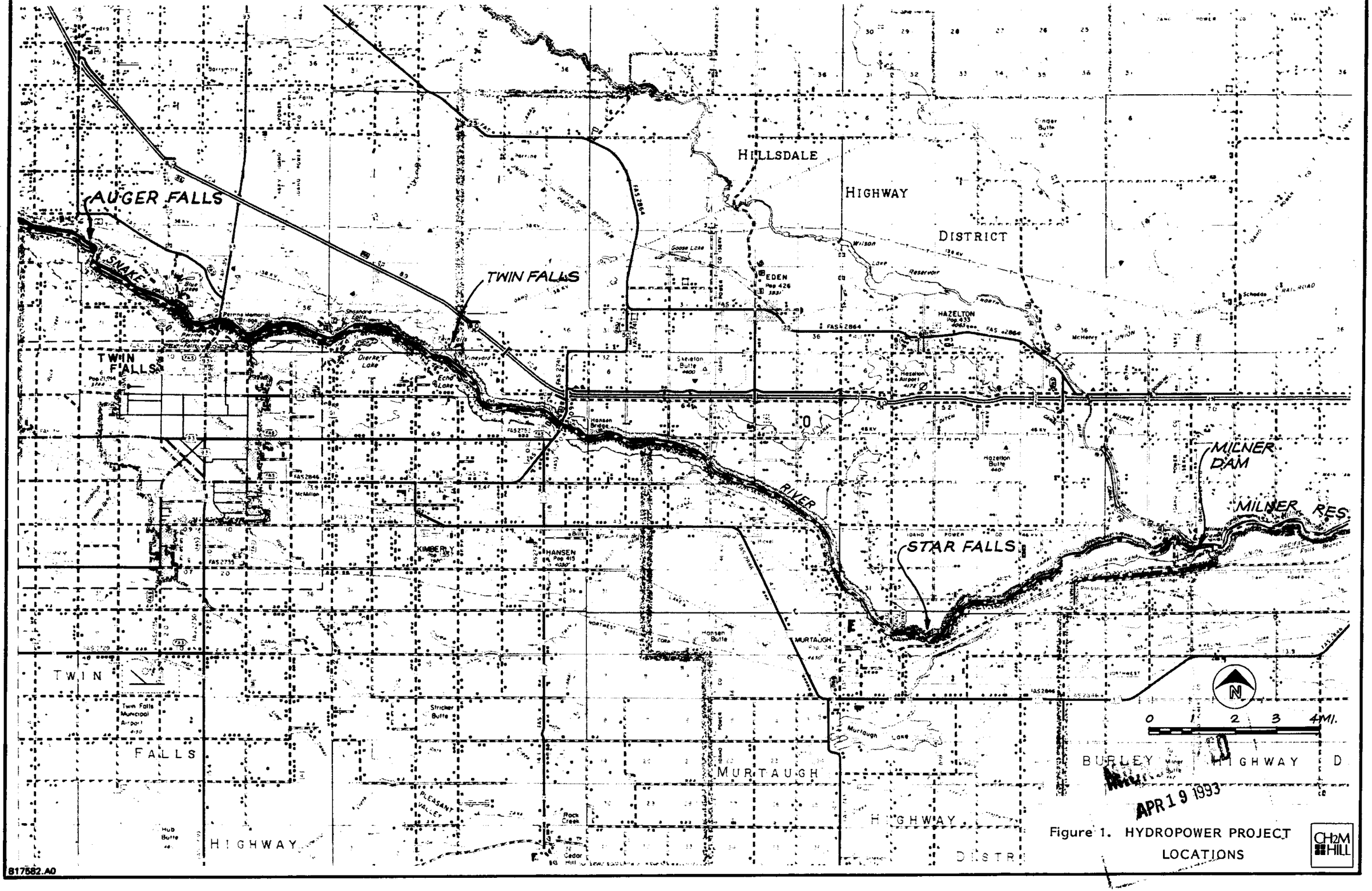
In addition, a recording dissolved oxygen monitor (YSI Model 56) was installed to continously record dissolved oxygen and water temperature above the proposed Auger Falls diversion dam. The monitor operated from 1 PM, August 19 until 4 PM August 26, 1987. Copies of the recorder charts are included in Figures 6-13.

Water Quality Samples

Water samples for selected analyses were collected above and below each project during the July and August sampling periods. In the pool areas above Milner Dam, Star Falls and Twin Falls Dam, and in the pool below Auger Falls, samples were collected from the surface and from 30 cm above the bottom. A surface sample only was collected below Milner Dam, Star Falls, and Twin Falls as well as a surface sample above Auger Falls.

Surface samples were collected by dipping the sample container into the water and samples from near the bottom were collected using a Van Dorn sampling bottle. Water samples were placed in appropriate containers and preserved according to analysis to be performed. All samples were placed on ice for transport to the appropriate analytical laboratory. Results of analyses are included in Tables 5 - 10.

APR 19 1993

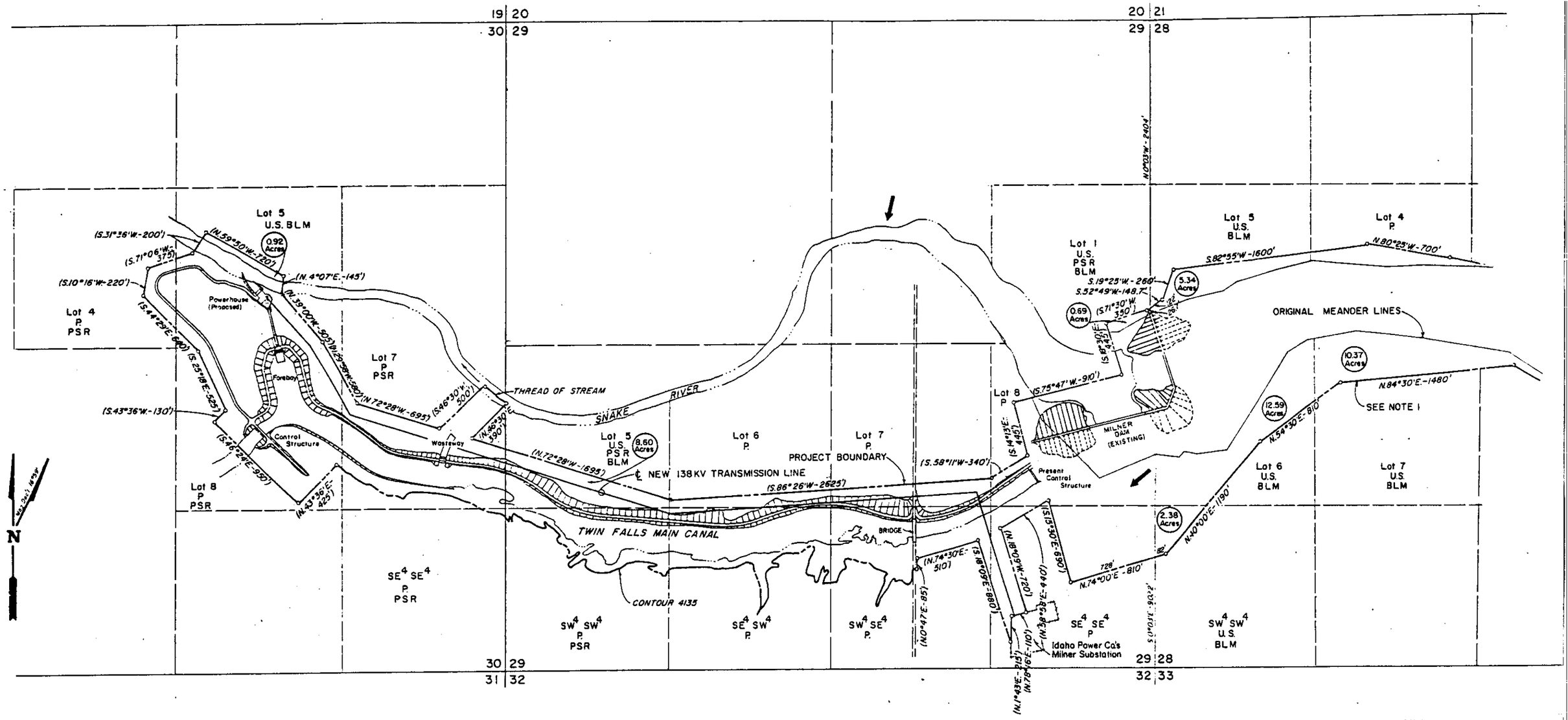


APR 19 1993

Figure 1. HYDROPOWER PROJECT LOCATIONS

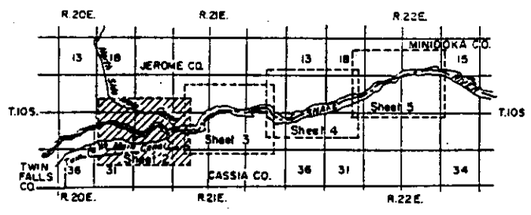
CH2M HILL

817582.A0



T. 10 S., R. 21 E., B.M.

0 400 800 1200 1600 2000 FEET
SCALE



KEY MAP

This drawing is part of the application for license made by the undersigned on this 27th day of July, 1984.

TWIN FALLS CANAL COMPANY
By Maurice Klaas
MAURICE KLAAS
PRESIDENT

NORTH SIDE CANAL COMPANY, LTD.
By C.J. Marshall
C.J. MARSHALL
PRESIDENT

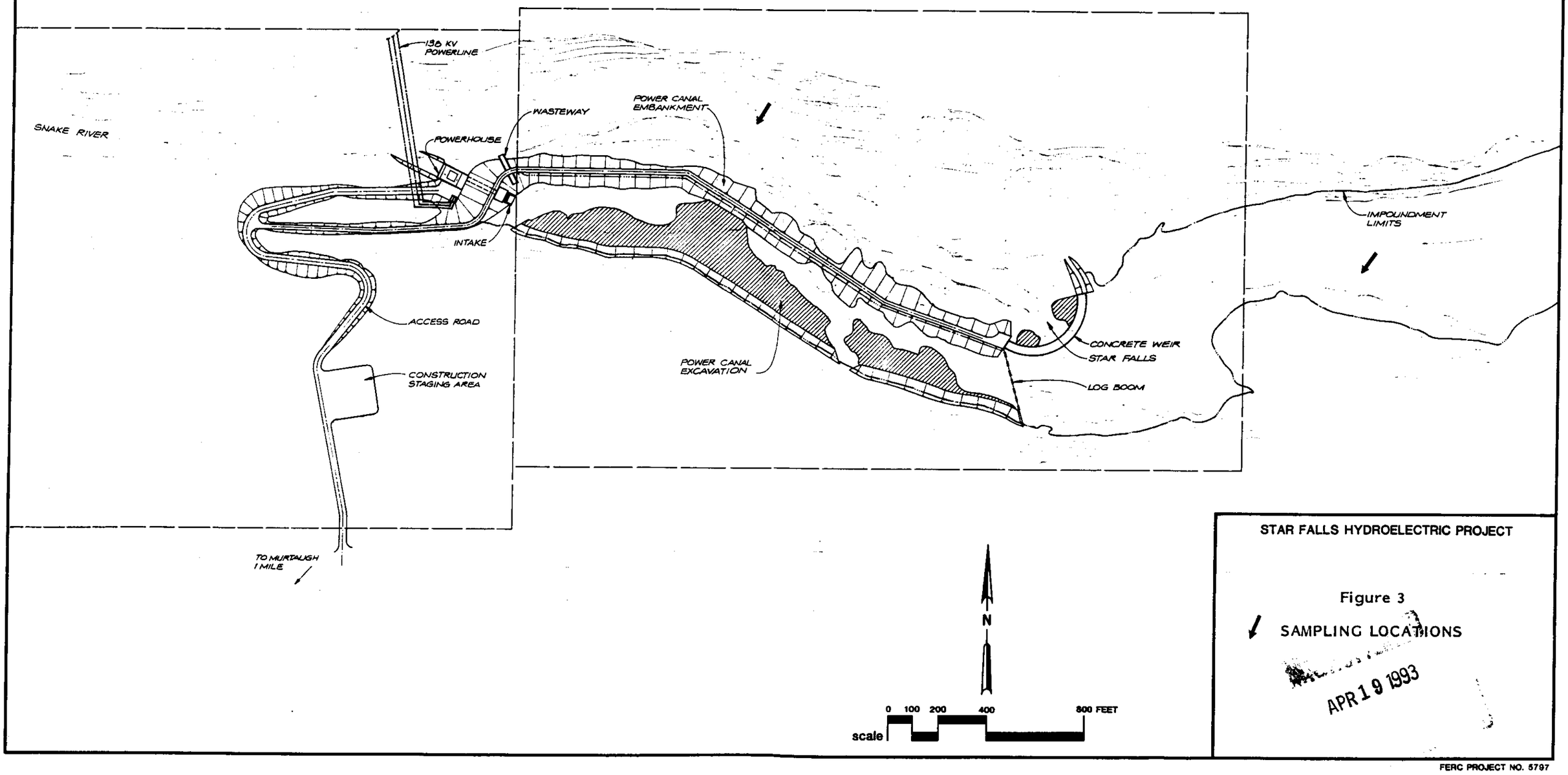
PROJECT NO. 2899
MILNER PROJECT

APR 19 1993
Figure 2

SAMPLING LOCATIONS

REVISED 3-14-85

FERC Nº 2899



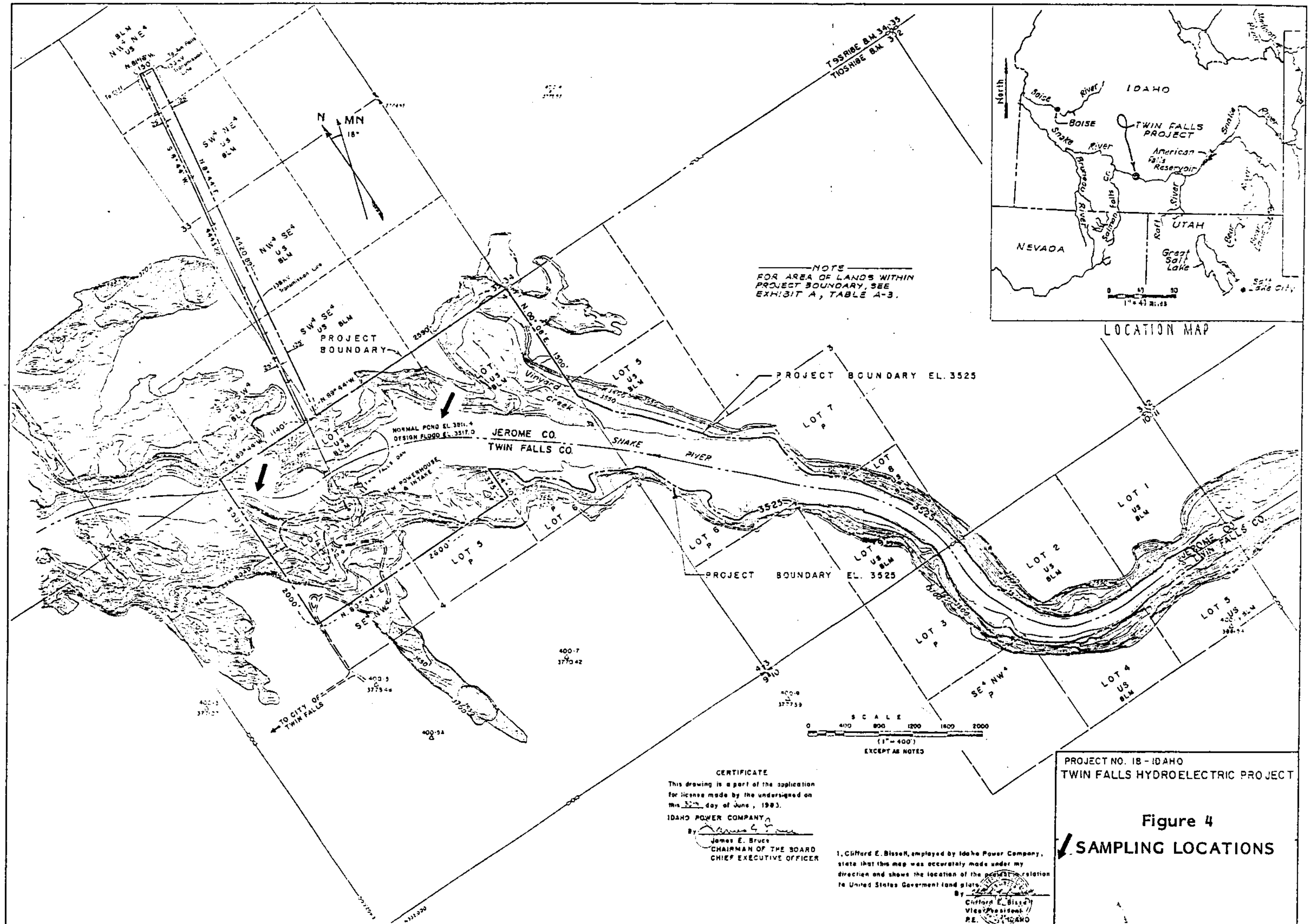
STAR FALLS HYDROELECTRIC PROJECT

Figure 3

SAMPLING LOCATIONS

APR 19 1993

FERC PROJECT NO. 5797



PROJECT NO. 18 - IDAHO
TWIN FALLS HYDROELECTRIC PROJECT

Figure 4

SAMPLING LOCATIONS

1993

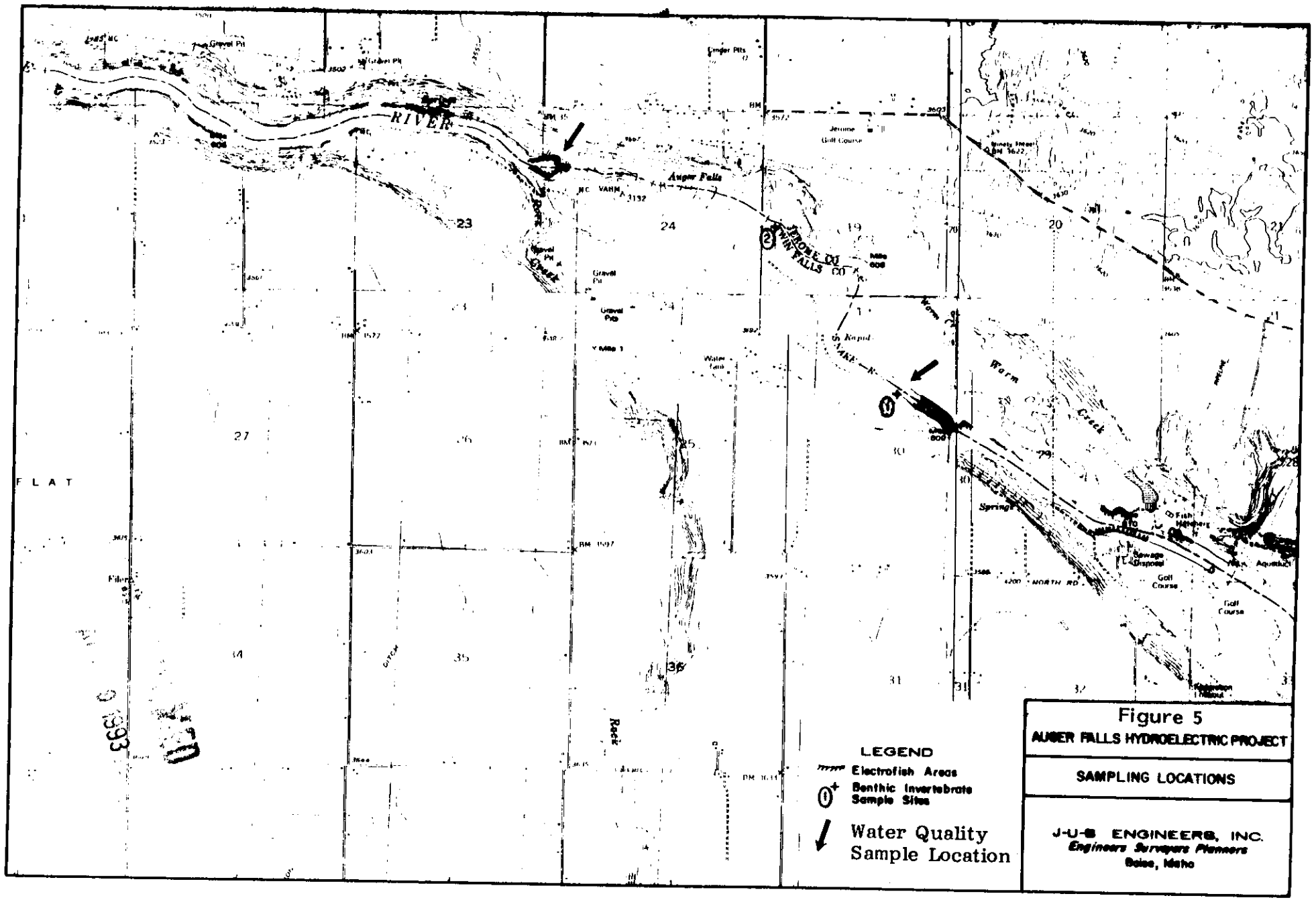


Figure 5

AUGER FALLS HYDROELECTRIC PROJECT

SAMPLING LOCATIONS

J-U-B ENGINEERS, INC.
Engineers Surveyors Planners
Boise, Idaho

Table 1

ANALYSES OF SEDIMENTS RELATED TO PROPOSED SNAKE RIVER HYDROELECTRIC PROJECTS IN THE MAGIC VALLEY

August 26, 1987

Parameter	Above Milner Dam[1]	Above Star Falls[2]	Above Twin Falls[3]
	ug/gm dry weight		
Tot. Phosphate	606	329	785
Tot. Cyanide	<0.05	<0.05	<0.05
Arsenic	1.05	0.421	11.9
Cadmium	0.964	0.660	0.157
Chromium	7.63	3.55	6.71
Copper	7.23	8.12	12.19
Iron	6161	3122	5944
Lead	10.04	6.60	9.75
Tot. Mercury	0.053	0.019	0.053
Nickel	8.43	5.58	8.54
Selenium	0.252	0.306	0.540
Zinc	25.9	13.6	27.3

Organics

Pesticides and PCB's were all less than EP toxicity minimum dectection limits.

[1]Near outlet gate for Twin Falls Main Canal (sample consisted of firmly packed, fine silt)

[2]400 meters above proposed diversion dam (sample consisted of loose, coarse and fine sand with some fine silt)

[3]200 meters above Twin Falls dam (sample consisted of firmly packed, fine silt)

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Table 2

DIEL DISSOLVED OXYGEN AND TEMPERATURE DATA

Above Milner Dam

	6 AM July 29		2 PM July 28	
Depth (m)	D.O.	Temp. (°C)	D.O.	Temp. (°C)
.3	8.2	20	9.2	21.5
1	8.1	20	9.0	21.5
2	8.1	20	9.0	21
3	8.0	20	8.7	21
4	8.0	20	8.7	21
5	8.0	20	8.6	21
6	8.0	20	8.5	21
7	8.0	20	8.5	21
8	8.0	20	8.4	21
9	8.0	20	8.4	21
10	8.0	20	8.4	21
11	7.9	20	8.4	21
12	7.9	20	8.2	21
13	7.9	20	8.1	21
14	7.9	20		

	7 AM August 24		5 PM August 24	
Depth (m)	D.O.	Temp (°C)	D.O.	Temp. (°C)
.3	8.5	19.5	9.2	20
1	8.4	19.5	9.2	20
2	8.4	19.5	9.1	20
3	8.4	19.5	9.1	20
4	8.4	19.5	9.1	20
5	8.4	19.5	9.0	20
6	8.4	19.5	9.0	20
7	8.4	19.5	8.9	20
8	8.4	19.5	8.9	20
9	8.4	19.5	8.8	20
10	8.4	19.5	8.8	20
11	8.4	19.5	8.7	20
12	8.3	19.5	8.6	19.5
13	8.3	19.5	8.6	19.5
14	8.3	19.5	8.5	19.5
15	8.3	19.5	8.4	19.5

Below Milner Dam at USGS Gage

July 29, 28:	7.8	19.5	8.3	21
August 24:	6.6	19	8.6	20

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Table 3

DIEL DISSOLVED OXYGEN DATA

Pool above Star Falls

	6 AM July 27		2:45 PM July 27	
Depth (m)	D.O.	Temp. (°C)	D.O.	Temp. (°C)
.3	8.1	20.5	8.5	23
1	8.1	20.5	8.8	21.5
2	8.0	20.5	8.4	21
3	8.0	20.5	8.1	21
4	8.0	20	8.0	21
5	8.0	20	7.9	21
6	7.9	20	7.9	20.5
7	7.8	20	7.6	20.5

	7 AM August 25		5 PM August 25	
Depth (m)	D.O.	Temp. (°C)	D.O.	Temp. (°C)
.3	9.4	18	12.2	19
1	9.4	18	12.0	19
2	9.4	18	11.8	19
3	9.4	18	11.3	19
4	9.3	18	11.0	18.5
5	9.3	18	10.8	18.5
6	9.3	18	10.5	18.5
7	9.3	18		

Below Star Falls near Powerhouse Site

July 27:	9.1	20	9.2	21.5
August 25:	7.9	18	9.3	18.5

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Table 4

DIEL DISSOLVED OXYGEN AND TEMPERATURE DATA

Above Twin Falls Dam

	6 AM July 28		1 PM July 27	
Depth (m)	D.O.	Temp. (°C)	D.O.	Temp. (°C)
.3	8.5	19.5	8.7	21
1	8.5	19.5	8.9	20
2	8.4	19.5	8.7	19
3	8.3	19.5	8.7	19
4	8.3	19.5	8.4	19
5	8.2	19	8.3	18.5
6	5.5	18	5.6	18

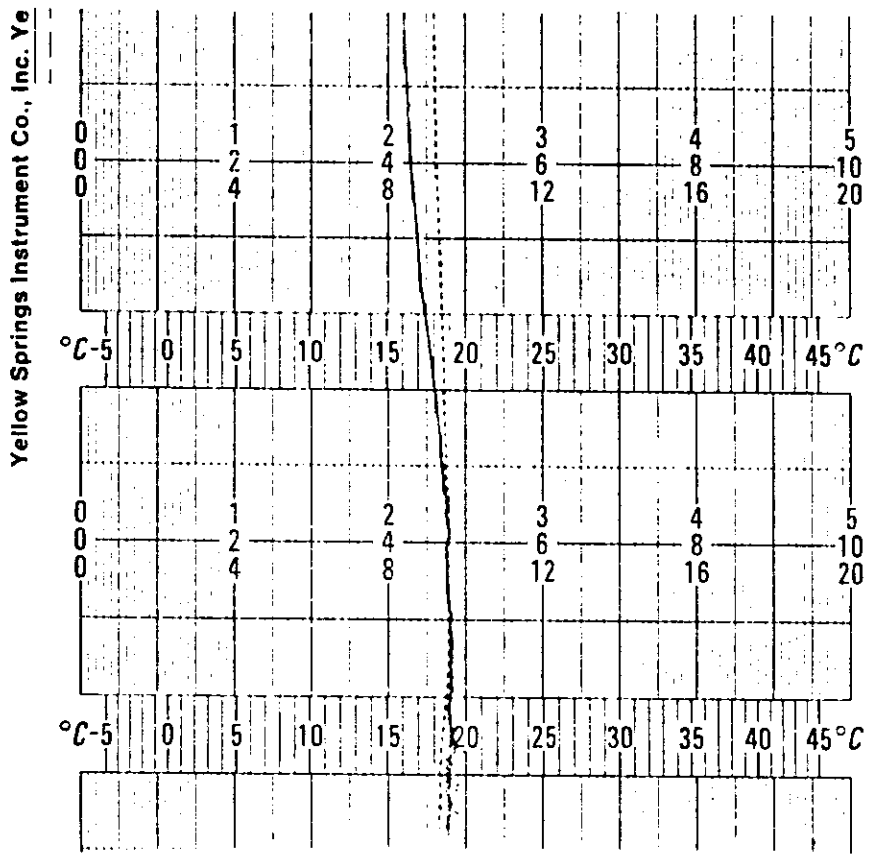
	7 AM August 26		3 PM August 25	
Depth (m)	D.O.	Temp. (°C)	D.O.	Temp. (°C)
.3	9.1	17.5	9.0	18
1	9.1	17.5	9.0	18
2	9.1	17.5	8.7	18
3	9.1	17.5	7.9	17.5
4	9.1	17.5	7.9	17
5	9.0	17.5	8.1	17
6	8.7	17	7.9	17
7	5.8	17	7.3	17

Below Twin Falls near USGS Gage

July 28, 27:	8.3	19.5	8.8	19.5
August 26, 25:	8.9	17.5	9.9	18

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D.O. mg/l (0-20 scale) Temp. °C

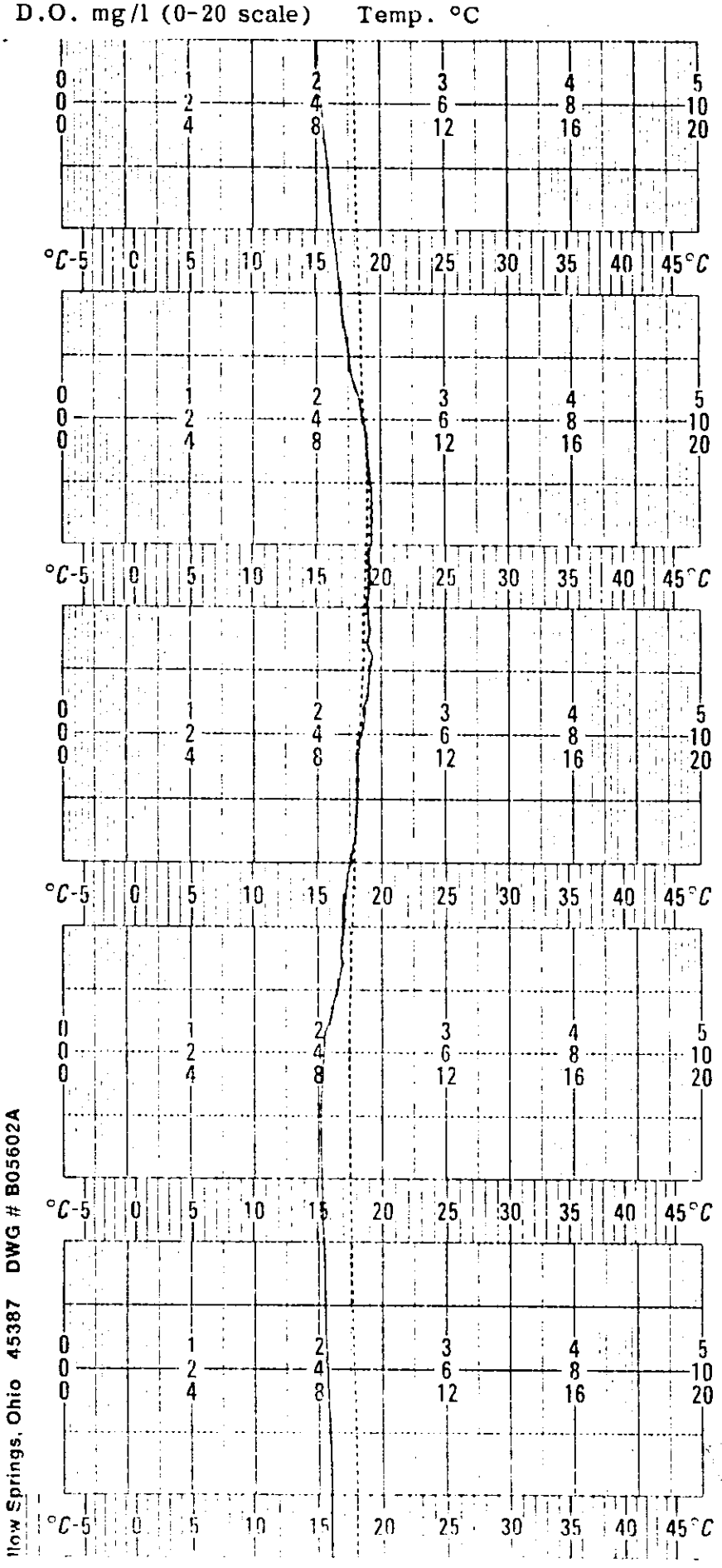


2400 hours

1300 hours

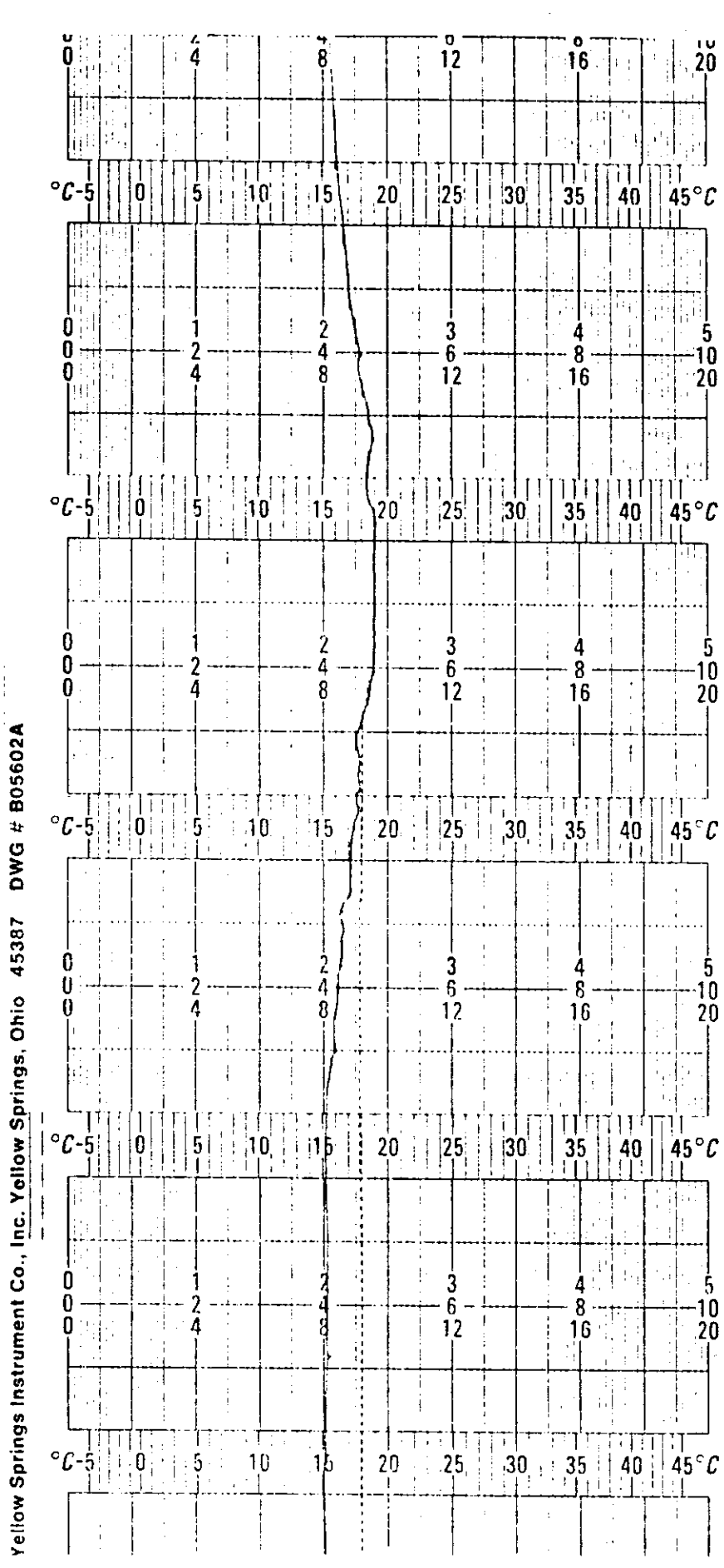
Figure 6.
Snake River above Auger Falls D.O./Temp. Monitor data for August 19, 1987

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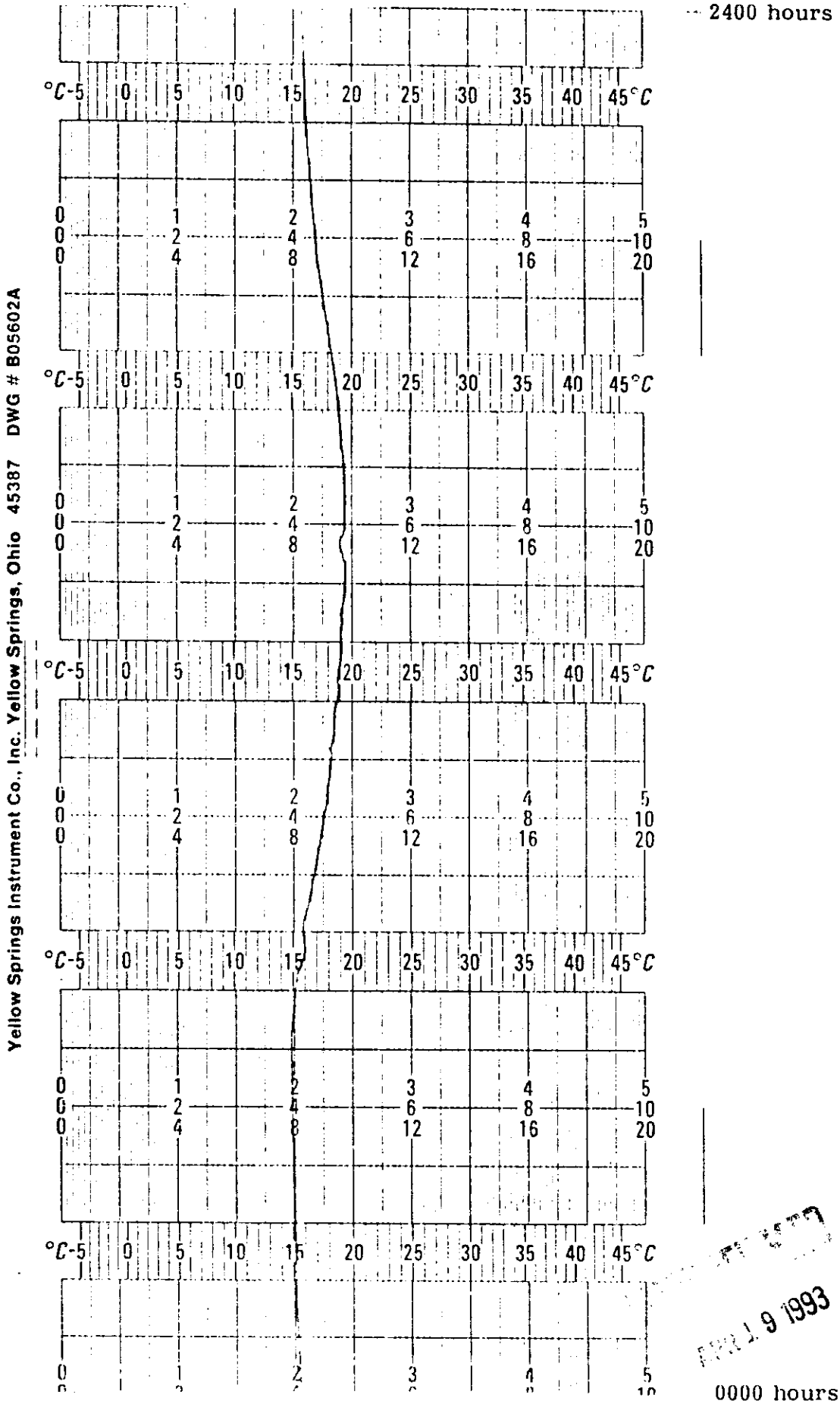
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Figure 7.
Snake River above Auger Falls D.O./Temp. Monitor data for August 20, 1987



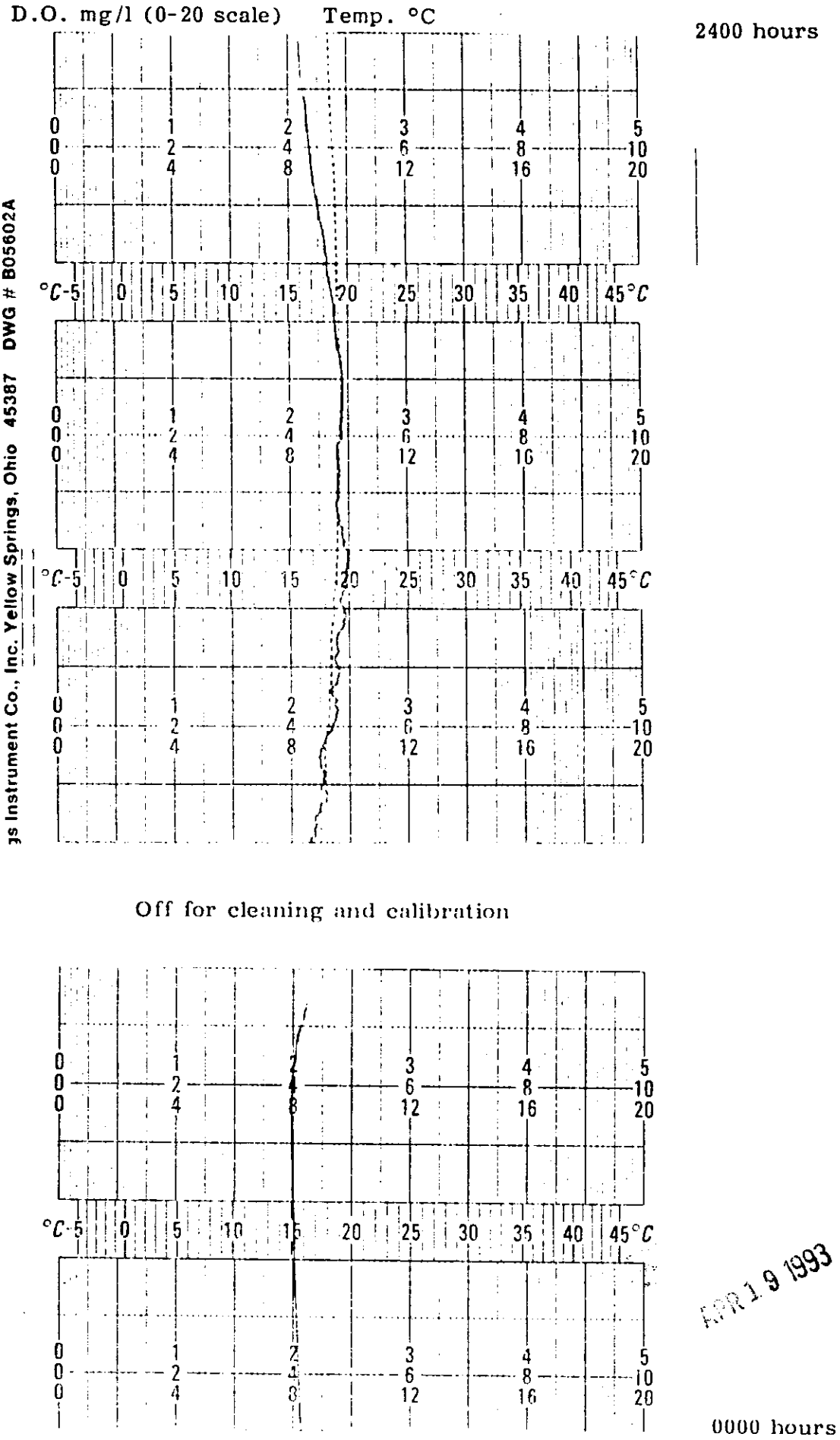
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Figure 8.
Snake River above Auger Falls D.O./Temp. Monitor data for August 21, 1987



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Figure 9.
Snake River above Auger Falls D.O./Temp. Monitor data for August 22, 1987



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Figure 10.
Snake River above Auger Falls D.O./Temp. Monitor data for August 23, 1987

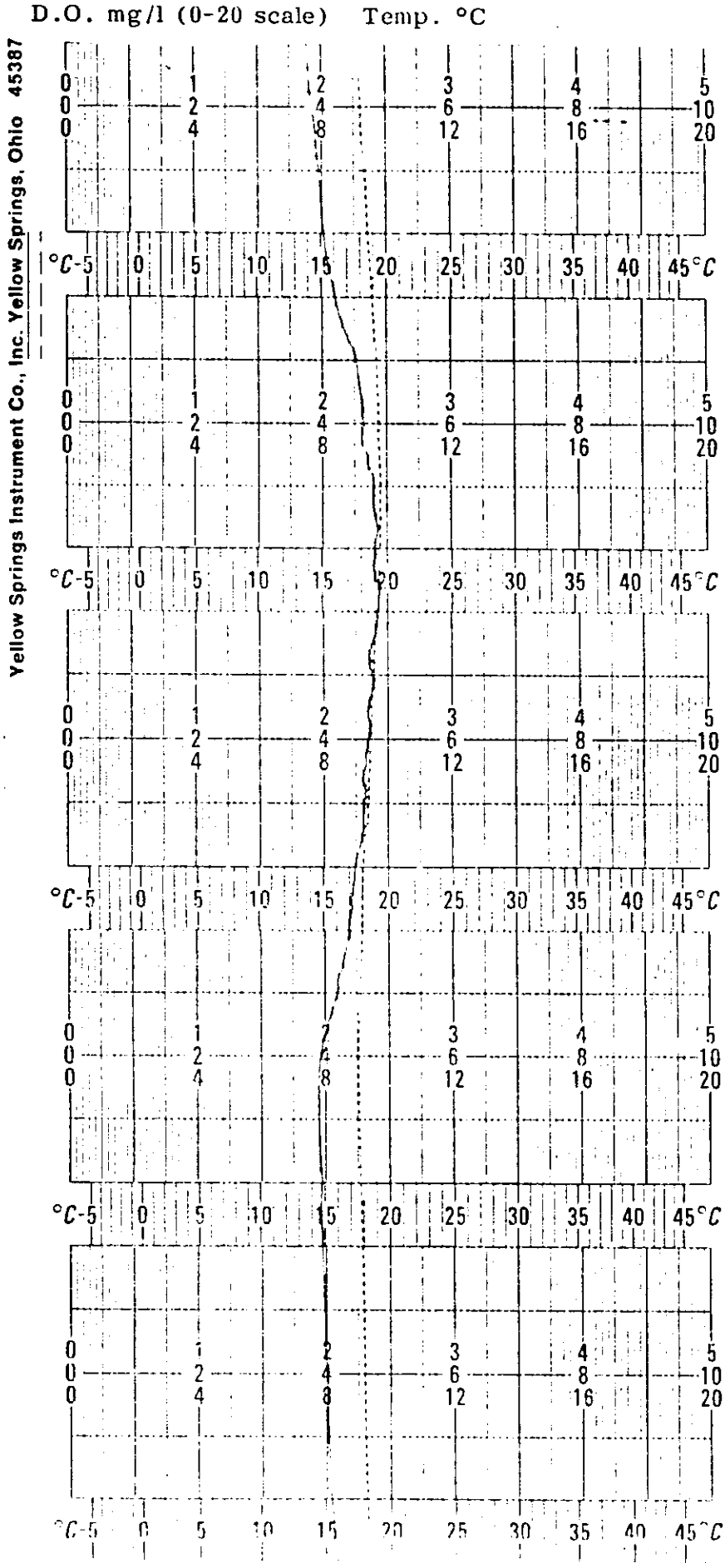
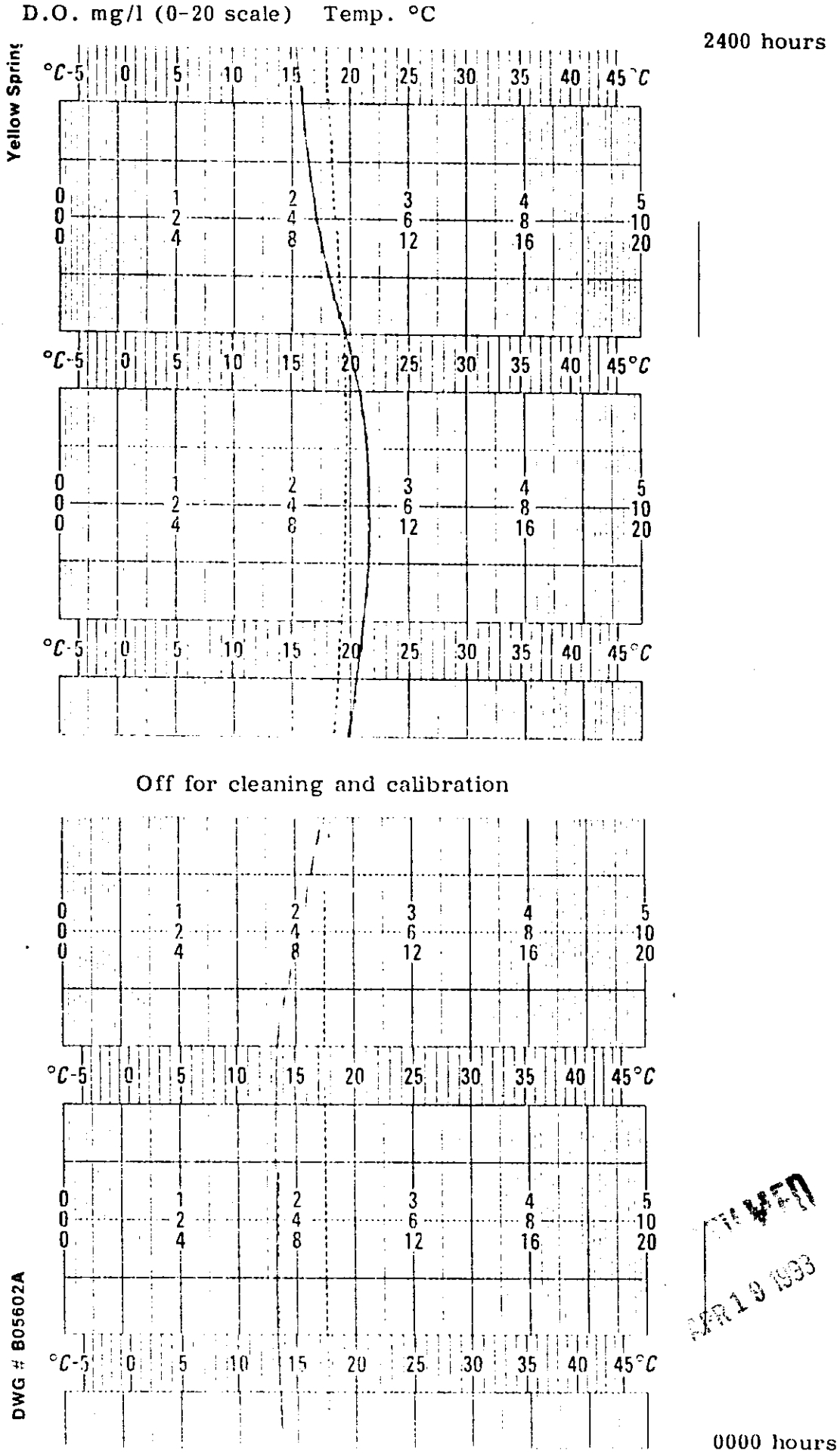


Figure 11.
Snake River above Auger Falls D.O./Temp. Monitor data for August 24, 1987



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Figure 12.
Snake River above Auger Falls D.O./Temp. Monitor data for August 25, 1987

Note: Actual D.O. at 1600 hours was 11.4 mg/l

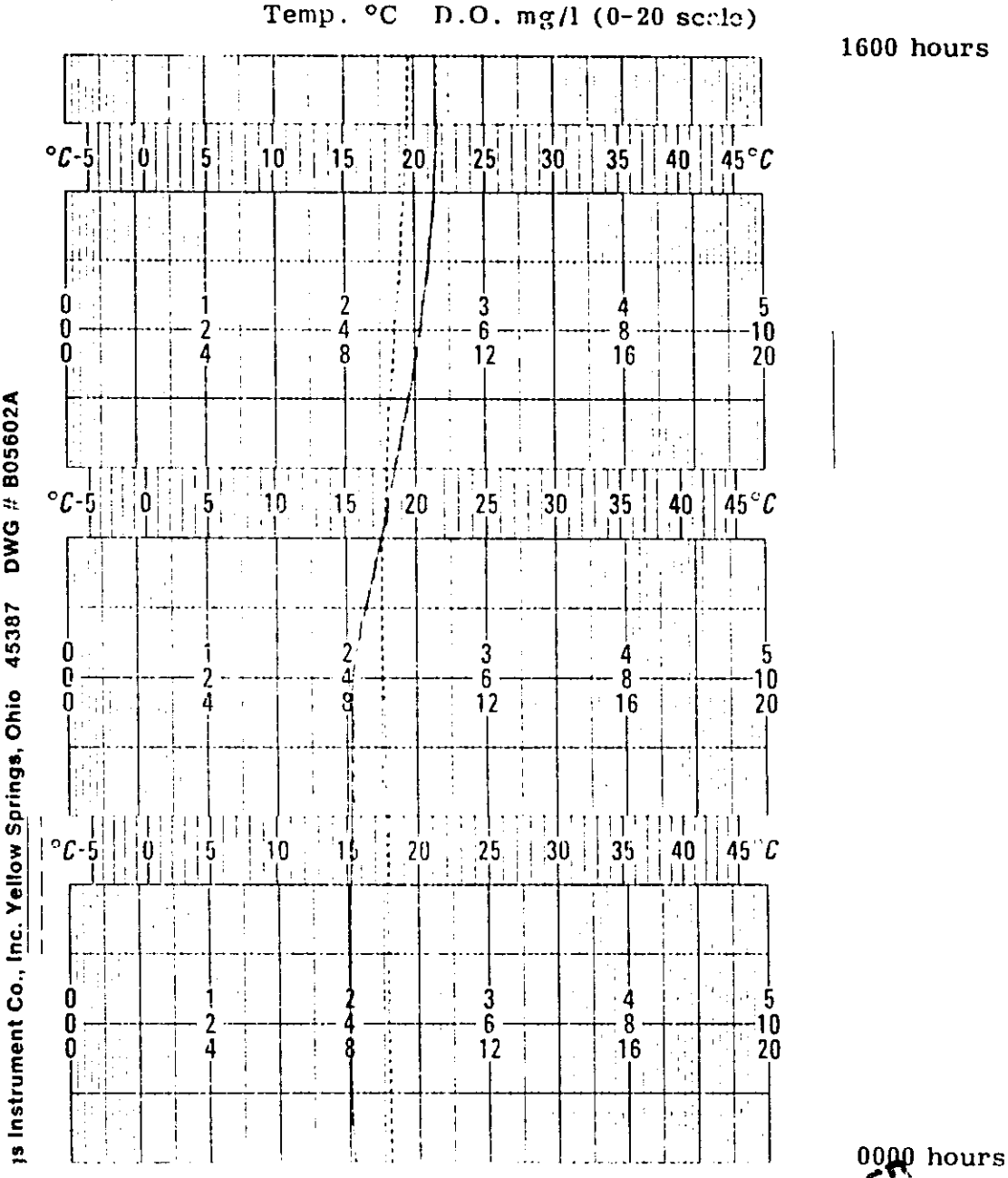


Figure 13.
Snake River above Auger Falls D.O./Temp. Monitor data for August 26, 1987

Table 5

WATER QUALITY DATA

Milner Hydroelectric Project

July 30, 1987

Parameter (mg/l unless noted)	Above Milner Dam Surface	Above Milner Dam Bottom	Below Milner Dam Surface
Temperature (^{o}C)	19.5	19.5	19.5
D.O.	8.2	8.2	8.0
Spec. Conductance	478	478	485
Alkalinity	150	136	137
pH (SU)	8.7	8.7	8.7
Hardness	176	177	177
Tot. Org. Carbon	8.28	9.11	5.59
Diss. Org. Carbon	8.20	8.70	5.37
$NO_2 + NO_3$	<0.05	<0.05	<0.05
Ammonia	0.10	0.12	0.18
Tot. PO_4	0.10	0.15	0.08
Ortho PO_4	<0.05	0.06	<0.05
Turbidity (NTU)	1.4	25.0	2.9
Suspended Solids	4	70	11
Tot. Diss. Solids	290	275	280
BOD_5	<2	<2	<2
Coliform (/ 100 ml)	30	10	70
Arsenic	0.012	0.009	0.008
Cadmium	<0.005	<0.005	<0.005
Chromium	<0.05	<0.05	<0.05
Copper	<0.01	<0.01	<0.01
Cyanide	<0.005	<0.005	<0.005
Iron	0.14	0.46	0.15
Lead	<0.05	<0.05	<0.05
Total Mercury	<0.0005	0.0013	<0.0005
Organic Mercury	<0.0005	<0.0005	<0.0005
Nickel	<0.05	<0.05	<0.05
Selenium	<0.005	<0.005	<0.005
Zinc	0.003	0.005	0.006

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Table 6

WATER QUALITY DATA

Milner Hydroelectric Project

August 26, 1987

Parameter (mg/l unless noted)	Above Milner Dam Surface	Above Milner Dam Bottom	Below Milner Dam Surface
Temperature (^{o}C)	18.5	18.5	18
D.O.	8.7	8.7	7.9
Spec. Conductance	449	455	457
Alkalinity	163	162	163
pH (SU)	8.5	8.6	8.3
Hardness	176	177	172
Tot. Org. Carbon	9.59	9.29	8.15
Diss. Org. Carbon	6.84	5.79	6.10
$NO_2 + NO_3$	0.12	0.10	0.26
Ammonia	0.06	0.07	0.11
Tot. PO_4	0.19	0.10	0.08
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	8.4	9.2	3.4
Suspended Solids	26	28	16
Tot. Diss. Solids	280	260	280
BOD_5	4	5	5
Coliform (/ 100 ml)	120	190	180
Arsenic	0.012	0.008	0.008
Cadmium	<0.005	<0.005	<0.005
Chromium	<0.05	<0.05	<0.05
Copper	<0.01	<0.01	<0.01
Cyanide	<0.005	<0.005	<0.005
Iron	0.33	0.27	0.15
Lead	<0.05	<0.05	<0.05
Total Mercury	0.0005	0.0025	0.0005
Organic Mercury	<0.0005	<0.0005	<0.0005
Nickel	<0.05	<0.05	<0.05
Selenium	<0.005	<0.005	<0.005
Zinc	0.006	0.005	0.032

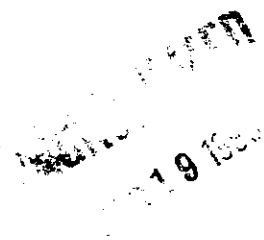


Table 7

WATER QUALITY DATA

Star Falls Hydroelectric Project

July 30, 1987

Parameter (mg/l unless noted)	Above Star Falls Surface	Above Star Falls Bottom	Below Star Falls Surface
Temperature (°C)	20	20	20
D.O.	7.9	7.7	9.0
Spec. Conductance	501	478	467
Alkalinity	149	147	151
pH (SU)	8.5	8.5	8.5
Hardness	175	174	175
Tot. Org. Carbon	5.80	9.18	7.60
Diss. Org. Carbon	5.80	4.66	4.78
NO_2 + NO_3	<0.05	0.05	0.07
Ammonia	0.13	0.16	0.13
Tot. PO_4	0.07	0.08	0.07
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	2.4	1.5	1.7
Suspended Solids	6	3	7
Tot. Diss. Solids	290	270	280
BOD_5	<2	<2	<2
Coliform (/ 100 ml)	30	10	20

August 26, 1987

Parameter (mg/l unless noted)	Surface	Bottom	Surface
Temperature (°C)	18.5	17	17.5
D.O.	11.7	10.3	9.6
Spec. Conductance	460	471	472
Alkalinity	162	165	167
pH (SU)	8.44	8.3	8.4
Hardness	168	168	168
Tot. Org. Carbon	9.59	11.8	8.00
Diss. Org. Carbon	5.27	9.08	6.89
NO_2 + NO_3	0.46	.023	0.25
Ammonia	0.09	0.11	0.11
Tot. PO_4	0.06	0.08	0.07
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	3.9	5.9	4.5
Suspended Solids	20	29	13
Tot. Diss. Solids	300	295	300
BOD_5	5	4	5
Coliform (/ 100 ml)	15	7	14

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Table 8

WATER QUALITY DATA

Twin Falls Hydroelectric Project

July 30, 1987

Parameter (mg/l unless noted)	Above Twin Falls Surface	Above Twin Falls Bottom	Below Twin Falls Surface
Temperature (°C)	19	18	19
D.O.	8.6	5.2	8.6
Spec. Conductance	540	473	461
Alkalinity	161	164	166
pH (SU)	8.4	8.3	8.3
Hardness	188	191	188
Tot. Org. Carbon	9.82	10.10	6.30
Diss. Org. Carbon	4.89	8.00	4.41
NO_2 + NO_3	0.63	0.89	1.01
Ammonia	0.16	0.15	0.15
Tot. PO_4	0.06	0.10	0.06
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	3.9	3.7	4.8
Suspended Solids	5	8	4
Tot. Diss. Solids	320	320	280
BOD_5	<2	<2	<2
Coliform (/ 100 ml)	50	60	120

August 26, 1987

Parameter (mg/l unless noted)	Surface	Bottom	Surface
Temperature (°C)	17.5	17	17.5
D.O.	9.1	5.8	8.9
Spec. Conductance	603	613	593
Alkalinity	196	206	195
pH (SU)	8.2	8.2	8.2
Hardness	205	205	198
Tot. Org. Carbon	6.99	8.37	8.25
Diss. Org. Carbon	6.91	5.02	5.94
NO_2 + NO_3	1.26	1.82	1.40
Ammonia	0.11	0.21	0.12
Tot. PO_4	<0.05	0.11	0.07
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	2.4	19.0	4.7
Suspended Solids	7	59	9
Tot. Diss. Solids	400	400	360
BOD_5	5	4	5
Coliform (/ 100 ml)	27	60	100

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Table 9

WATER QUALITY DATA

Auger Falls Hydroelectric Project

July 30, 1987

Parameter (mg/l unless noted)	Above Auger Falls Surface	Below Auger Falls Surface	Below Auger Falls Bottom
Temperature (^{o}C)	20	19.5	19.5
D.O.	9.2	8.5	8.6
Spec. Conductance	604	558	592
Alkalinity	171	171	171
pH (SU)	8.3	8.45	8.3
Hardness	201	202	197
Tot. Org. Carbon	5.18	4.77	6.39
Diss. Org. Carbon	4.92	4.80	5.57
$NO_2 + NO_3$	0.95	1.00	1.29
Ammonia	0.18	0.23	0.17
Tot. PO_4	0.12	0.11	0.10
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	7.0	4.2	5.6
Suspended Solids	16	18	14
Tot. Diss. Solids	355	365	355
BOD_5	<2	<2	<2
Coliform (/ 100 ml)	>2000	>2000	850
Arsenic		0.0085	0.009
Cadmium		<0.005	<0.005
Chromium		<0.05	<0.05
Copper		<0.01	<0.01
Cyanide		<0.005	<0.005
Iron		0.22	0.17
Lead		<0.05	<0.05
Total Mercury		<0.0005	.0012
Organic Mercury		<0.0005	<0.0005
Nickel		<0.05	<0.05
Selenium		<0.005	<0.005
Zinc		0.004	0.005

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Table 10

WATER QUALITY DATA

Auger Falls Hydroelectric Project

August 26, 1987

Parameter (mg/l unless noted)	Above Auger Falls Surface	Below Auger Falls Surface	Below Auger Falls Bottom
Temperature (^{o}C)	19.5	18.5	18.0
D.O.	11.6	9.0	8.5
Spec. Conductance	603	613	613
Alkalinity	187	187	190
pH (SU)	8.5	8.4	8.3
Hardness	200	196	199
Tot. Org. Carbon	13.1	11.4	11.0
Diss. Org. Carbon	5.84	6.46	6.10
$NO_2 + NO_3$	1.08	1.12	1.14
Ammonia	0.21	0.23	0.26
Tot. PO_4	0.13	0.16	0.13
Ortho PO_4	<0.05	<0.05	<0.05
Turbidity (NTU)	8.3	7.3	7.2
Suspended Solids	19	19	17
Tot. Diss. Solids	355	355	375
BOD_5	5	6	6
Coliform (/ 100 ml)	5000	3800	1200
Arsenic		0.007	0.007
Cadmium		<0.005	<0.005
Chromium		<0.05	<0.05
Copper		0.01	<0.01
Cyanide		<0.005	<0.005
Iron		0.26	0.27
Lead		<0.05	<0.05
Total Mercury		<0.0005	0.0015
Organic Mercury		<0.0005	<0.0005
Nickel		<0.05	<0.05
Selenium		<0.005	<0.005
Zinc		0.016	0.006

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FERC/DEIS-0048

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING

DRAFT ENVIRONMENTAL IMPACT STATEMENT

THE TWIN FALLS (FERC NO. 18), MILNER (FERC NO. 2899), AUGER FALLS (FERC NO. 4797), and STAR FALLS (FERC NO. 5797) HYDROELECTRIC PROJECTS ON THE MAINSTEM OF THE SNAKE RIVER, IDAHO

Applicants:

Idaho Power Company
1220 Idaho Street
P.O. Box 70
Boise, ID 83707

J-U-B Engineers, Inc.
250 South Beechwood Avenue
Boise, ID 83709

B & C Energy, Inc.
P.O. Box 34
Twin Falls, ID 83301

Twin Falls Canal Company and
the North Side Canal Company, Ltd.
P.O. Box 1906
Twin Falls, ID 83303-1906

Additional copies of the Draft EIS are available from:

Division of Public Information
Federal Energy Regulatory Commission
825 North Capitol Steet, N.E.
Washington, D.C. 20426

November 1987

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Department of Water Resources
Southern Region Office

COVER SHEET

a. Title: The Twin Falls (FERC No. 18), Milner (FERC No. 2899), Auger Falls (FERC No. 4797), and Star Falls (FERC No. 5797) Hydroelectric Projects on the Mainstem of the Snake River, Idaho.

Applications for FERC licenses to construct, operate, and maintain 4 proposed hydropower projects on the mainstem of the Snake River in the Upper Snake River Basin, Idaho.

b. Draft Environmental Impact Statement

c. Lead Agency: Federal Energy Regulatory Commission

d. Four hydroelectric projects that would produce an annual total of 510 gigawatthours (GWh) of electric power and would be sited on the mainstem of the Snake River, in the Upper Snake River Basin, near Twin Falls, Idaho, have been evaluated for their environmental effects, including cumulative effects, and economic feasibility. Three alternative designs, a coal-fueled, steam-electric plant, conservation, and no action were evaluated as alternatives. The four proposed projects and the three design alternatives were evaluated with and without the staff-recommended mitigation. Based on its economic analyses and environmental evaluations of the site-specific and cumulative impacts of the proposed projects and design alternatives, the staff selected as its preferred action the development of the Milner Design Alternative No. 1 and the Auger Falls Project. The preferred action would have insignificant project-specific impacts and minor to moderate cumulative impacts and would be economically feasible. The alternative of licensing the Auger Falls Project and the Milner Design Alternative No. 1, would produce 202.1 GWh of electric power per year.

e. Contact: Lee Emery
Federal Energy Regulatory Commission
Office of Hydropower Licensing
825 North Capitol Street, NE
Washington, D.C. 20426
Telephone (202) 376-1955

f. Transmittal: This Draft Environmental Impact Statement, prepared by the Commission's staff in connection with applications filed by the Idaho Power Company for proposed Project No. 18; the Twin Falls Canal Company and the North Side Canal Company, Ltd., for Project No. 2899; J-U-B Engineers, Inc., for proposed Project No. 4797, and B&C Energy, Inc., for proposed Project No. 5797 is being transmitted for your information on or about November 24, 1987, as required by the National Environmental Policy Act of 1969 and the Commission's Statement of General Policy to Implement Procedures for Compliance with the National Environmental Policy Act of 1969 (18 CFR 2.80, 2.81, and 2.82).

FOREWORD

FERC, pursuant to the Federal Power Act (FP Act)* and the Department of Energy (DOE) Organization Act,+ is authorized to issue licenses for terms up to 50 years for the construction and operation of nonfederal hydroelectric developments subject to its jurisdiction, on the necessary condition:

> (T)hat the project adopted ... shall be such as in the judgement of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e)...§

The Commission may require such other conditions not inconsistent with the provisions of the FP Act as may be found necessary to provide for the various public interests to be served by the project.** Compliance with such conditions during the license period is required. Section 385.206 (1987) of the Commission's Rules of Practice and Procedure allows any person objecting to a licensee's compliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.++

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*16 U.S.C. §§791(a) - 825(r), as amended by the Electric Consumers Protection Act of 1986, 100 Stat. 1243 (1986).

+Public Law 95-91, 91 Stat. 556 (1977).

§16 U.S.C. §803(a).

**16 U.S.C. §803(g).

++C.F.R.§385.206 (1987).

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PREFACE

The Commission announced that the staff would prepare this environmental impact statement (EIS) on November 3, 1986, when the public notice appeared in the Federal Register. The notice stated that the staff had determined that the issuance of licenses for four proposed hydropower projects, the Milner Project (FERC no. 2899), the Auger Falls Project (FERC no. 4797), the Star Falls Project (FERC no. 5797), and the Royal Catfish Project (FERC no. 8795), would constitute a major federal action significantly affecting the quality of the human environment.

To determine the scope of the issues in this EIS, the staff conducted a scoping session and a public meeting in Twin Falls, Idaho, on December 10, 1986. Based on information developed from these meetings, the staff added to the EIS an evaluation of the proposed relicensing and additional generating capacity of the Twin Falls Project (FERC no. 18); this raised to five the number of projects under consideration for a 32-mile-long segment of the Snake River near Twin Falls.

Midway through the evaluation of the five proposed projects, the staff recognized that there were severe data gaps in the existing environmental information provided by the applicant for the proposed Royal Catfish Project. The staff made rigorous efforts to get the necessary information, but the applicant failed to provide the information, and the Royal Catfish application was dismissed by the Commission on June 25, 1987.

Four hydropower projects are proposed for development in a 32-mile-long stretch of the Snake River near Twin Falls, Idaho. The four, the Milner, Star Falls, Twin Falls, and Auger Falls Projects, if constructed as proposed, would produce an estimated 510 GWh of energy per year. The staff's analysis shows that economic benefits are possible through development of the projects, and that the proposed projects and design alternatives would be useful in meeting the projected need for power in the region. The staff analyzed alternatives to the proposed projects, including conservation, a coal-fueled, steam-electric alternative, and a no-action alternative. Of all of the power conservation and generation resources considered, the staff determined that only the coal-fueled, steam-electric generating option, which is the major planned regional resource of the future, would be deferred by development of the proposed projects or design alternatives. All of the other resources, including the proposed projects, would contribute to delaying the need for the coal alternative, if they are environmentally acceptable and, in the long-term, would cost less than coal-fueled generation.

The Upper Snake River Basin is a large, sparsely populated, diverse area that includes most of south-central Idaho. The basin is diverse in natural resources. Among the spectacular natural landforms are these: forested mountainous regions, such as the Sawtooth National Forest and Sun Valley; Shoshone Falls and Twin Falls; thousands of large natural springs that drain the Snake River Plain aquifer; aquaculture facilities that produce most of the rainbow trout consumed in the United States; arid, grassy plateau regions, including the Craters of the Moon National Monument; and an extensively irrigated, agricultural region around Twin Falls, Idaho. The study reach has impressive waterfalls, whitewater areas that are unique to Idaho, and a deep canyon that has been cut by the Snake River into the Snake River Plain over the centuries.

The natural landforms of springs, hanging waterfalls, and steep topography have created numerous streams that have been harnessed for hydroelectric production. This development has been extensive; over 130 hydropower projects in the basin are under license (106 projects) by the Commission or are proposed for licensing (24 projects). Nine hydropower projects have been erected on the mainstem of the Snake River; licensing the four proposed projects would raise the number of projects on the mainstem Snake River to 13. Over 50 percent of the free-flowing portions of the Snake River have been eliminated and the proposed projects would cause an additional loss of approximately one-fifth of the remaining free-flowing river sections.

The four proposed projects would cause significant site-specific and cumulative adverse impacts to some environmental resources in the basin. With mitigative measures proposed by

the applicants and recommended by the staff, some of the significant effects on environmental resources of the basin could be reduced to moderate or minor levels. The staff's recommended mitigative measures to protect the target resources make two of the proposed projects, Twin Falls and Star Falls, and two of the design alternatives, Star Falls Design Alternative and Milner Design Alternative no. 2, economically infeasible as they are presently proposed.

The staff scrutinized the four proposed projects and design alternatives closely to determine how they might contribute to cumulative adverse impacts to target resources identified for the basin. The staff was particularly concerned about how the four projects might affect two waterfalls, Star Falls and Auger Falls, the last two waterfalls on the mainstem of the Snake River that are undeveloped; the staff is also concerned about how the four projects would affect the use and distribution of water, which is extensively managed for agricultural purposes, at the expense of degrading the habitat for fish and wildlife resources in the study reach.

Based on the environmental analysis (section 4) and the economic analysis (section 5), the staff's preferred array of projects acceptable for licensing includes the Milner Design Alternative no. 1 and the Auger Falls Project.

The economic analysis shows that the Twin Falls and Star Falls Projects, and the Milner Design Alternative no. 2 and Star Falls Design Alternative, are uneconomical with the staff's proposed mitigative measures, and that the Milner and Star Falls Projects and Star Falls Design Alternative, would cause significant individual and cumulative adverse impacts to the environment, even with the staff-recommended mitigative measures.

The staff concludes that the Milner Design Alternative no. 1 and the Auger Falls Project, with the addition of the staff's recommended mitigative measures, would be economical and would not significantly harm the target resources and the natural environment of the Upper Snake River Basin.

The staff determines that the Milner Design Alternative no. 1 and the Auger Falls Project would be environmentally acceptable and would be more economical than a generic coal-fueled regional resource alternative. To help defer the future development of coal plants in the region, the staff recommends development of the the Auger Falls Project and the Milner Design Alternative no. 1.

1 PURPOSE OF AND NEED FOR ACTION

1.1 PURPOSE OF PROPOSED ACTION

The purpose of the proposed action is to meet the Commission's responsibilities under the Federal Power Act. The proposed action is the licensing or relicensing of four hydropower projects in the Snake River Basin. A license would allow a nonutility licensee to construct its proposed project after securing a contract for the sale of power from, and after securing financing for, its proposed project. The issuance of a license does not guarantee that a proposed project will be constructed. If a licensee cannot secure financing for its project because of power market conditions, the licensee may surrender its license without developing the project.

1.2 NEED FOR POWER

The need for power from the proposed projects is one of the factors the Commission considers in deciding whether to license a project.

1.2.1 Reliability of Power Supply and Other Considerations

Available data show that because of population growth and because of a continuing demand for additional amenities, growth in the demand for electric power and energy will continue. With this positive load growth and an existing generating resource base, a need for additional resources can be projected to exist in the future for any power system. Additional resources will have to be obtained at some time for any system in order to meet projected additional load requirements with the same degree of reliability required by an existing criterion for the system. The timing of the need would vary in different systems, depending upon such factors as rates of load growth, load characteristics, available existing power resources, and the reliability criteria established for each system.

Early installation of a power-generating resource before the existence of a generating resource deficit can be justified. To justify early installation, a power-generating resource must provide benefits over its operating life, compared to benefits from operating a system using the next most likely alternative resource that would be proposed for installation to meet a generating resource deficit when it occurs.

1.2.2 Projected Power Requirements and Resource Deficits

Under the Pacific Northwest Electric Power Planning and Conservation Act (the Act), the Bonneville Power Administration (BPA) is required to meet the net firm power requirements of each requesting Pacific Northwest utility, plus the additional requirements of existing BPA direct-service industrial customers.

Under the Act, BPA is constrained from owning or constructing generating resources, but is required to purchase, on a long-term basis, the power capabilities of resources sponsored by others, to the degree that such resources are required for BPA to meet its responsibilities. The Act provides authority for BPA to restrict its power sales obligations, if it is unable to acquire sufficient resources to meet its responsibilities.

The Act also established the Northwest Power Planning Council (Council) charging it with the responsibility of assuring an adequate, efficient, economical, and reliable power supply in the Northwest region. In response to the Act's directives, the Council published a draft Northwest Conservation and Electric Power Plan in April 1983 and published a final plan (Plan) in March 1986 (Northwest Power Planning Council, 1986). The 1986 Plan develops the regional need for new resources by subtracting the existing regional generating resources from each of four loadgrowth scenarios (low, medium-low, medium-high, and high) that the Council defined for the region.

There is a need for additional resources in 1992 in the medium-high and in 1996 in the medium-low scenarios (figure 1-1). In accordance with the Act, the Council developed cost-effective resource portfolios to meet the requirements of each of the load scenarios. The four resource portfolios developed are depicted in figure 1-2. To analyze alternative resources porfolios, the Council used a trapezoidal distribution of probability (figure 1-3). This distribution assumes that the high and low scenarios bound the scope of the Plan; loads outside the high and low forecasts are considered too unlikely to justify actions at this time. Demands between the medium-high and medium-low forecasts are most likely, and are considered equally probable. In figure 1-3, the probability of loads between the high and medium-high is 27 percent; between the medium-high and medium-low, the probability is 42 percent; and between the medium-low and low, the probability is 31 percent. These data indicate a probability of 69 percent that the load would equal or exceed the medium-low forecast.

In the medium-low and medium-high scenarios, a need for additional hydroelectric resources is shown by the years 2003 and 1998, respectively. The medium-low scenario also shows the additional need for thermal resources to firm up secondary energy in 2003; the medium-high scenario shows the addition of resources to firm up secondary energy in 1997, cogeneration resources in 2000, and additional thermal (coal) resources in 2001.

To determine the perceptions of other planning bodies in the region about load projections and the need for additional resources, the staff examined the latest load projections and needs analyses of the BPA and the Pacific Northwest Utilities Conference Committee (PNUCC), made in 1986. The BPA projections

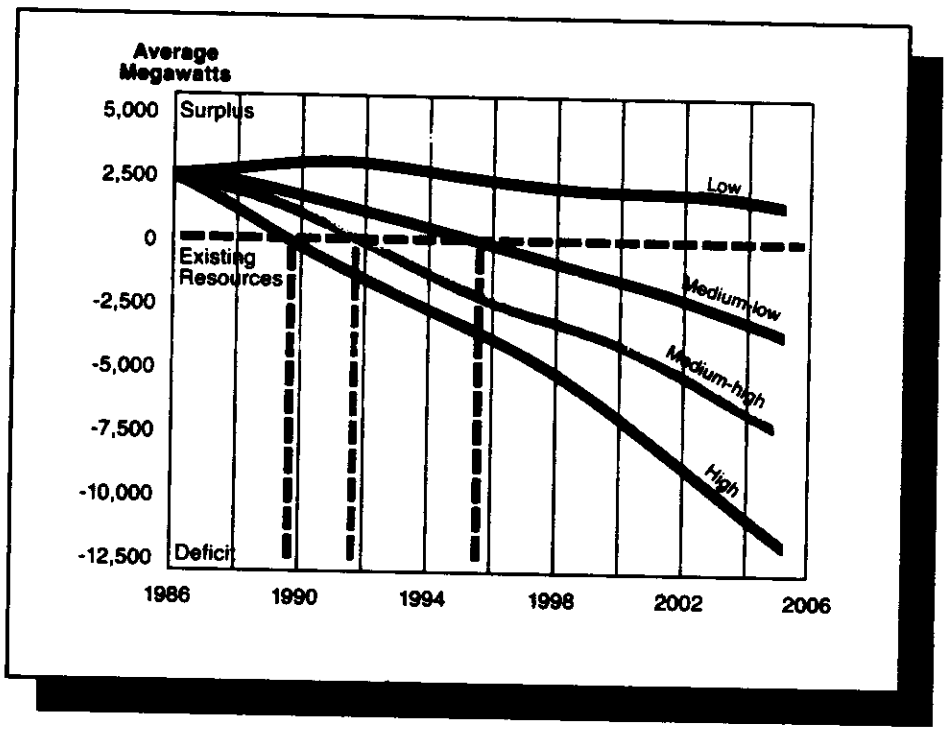


Figure 1-1. Regional surplus and deficit of electrical energy (Source: Northwest Power Planning Council, 1986).

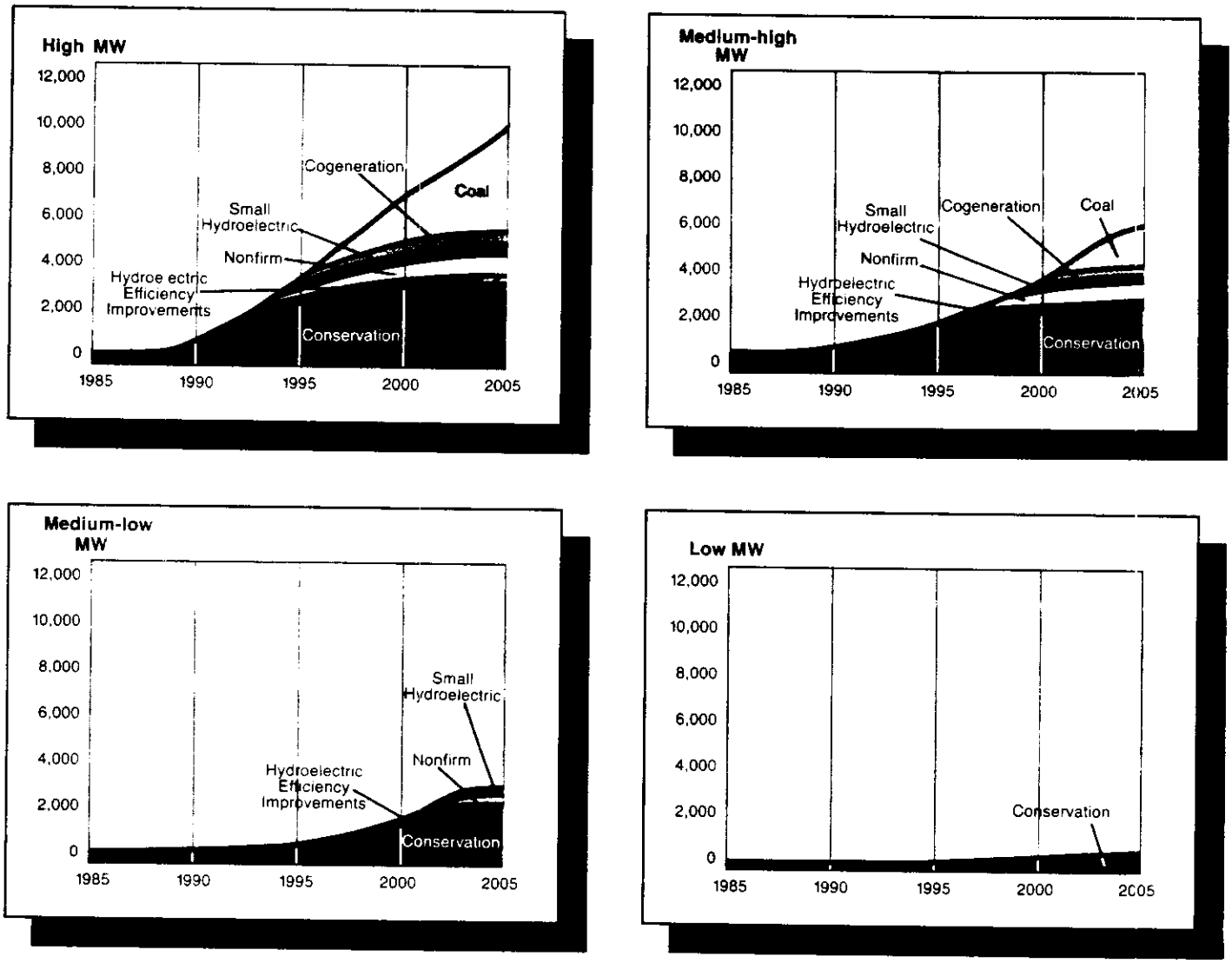


Figure 1-2. Regional schedule of electrical resource development (Source: Northwest Power Planning Council, 1986).

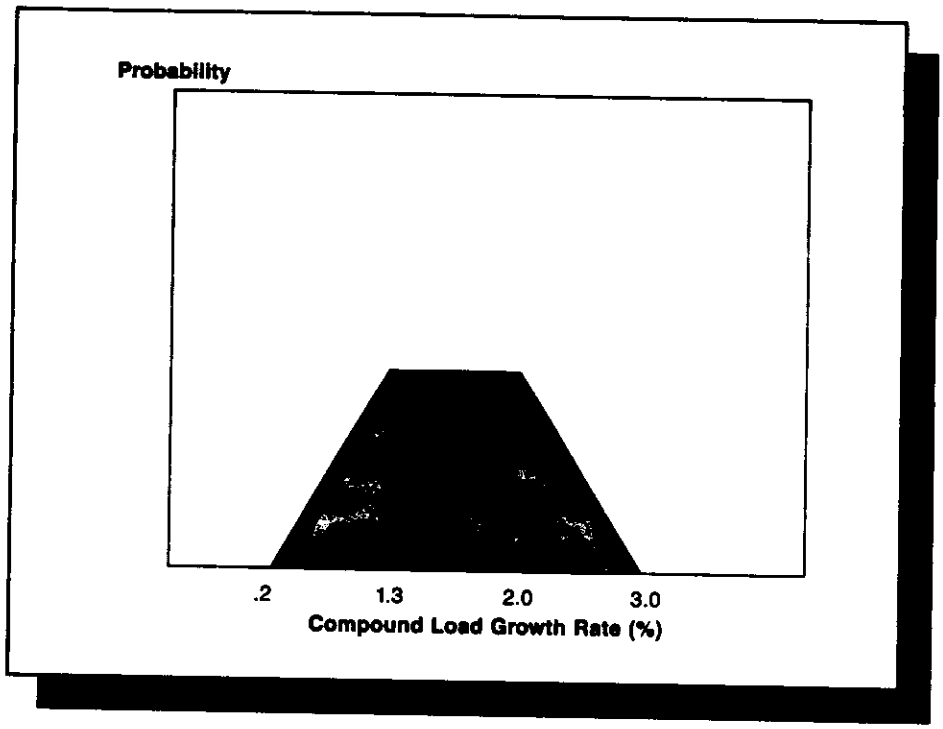


Figure 1-3. Probabilities of 20-year growth in energy requirements (Source: Northwest Power Planning Council, 1986).

of regional firm power deficits show that additional resources would be needed in the region by 1994 to meet the BPA medium-load forecast. The PNUCC projections of regional firm energy loads and resources show a need for additional resources to meet firm energy requirements in 1993.

The Council, and PNUCC also include resource deficits that are projected by private utility systems in the region. The PNUCC projection for the private utilities in table 1-1 shows a deficit as early as 1991.

The individual sizes and even the collective capabilities of the proposed Snake River projects are small in relation to the degree of uncertainty inherent in forecasting load requirements for the Northwest region 1/. Therefore, the traditional approach of linking project development with a forecasted need for a specific project is inapplicable to assessing the need for the proposed Snake River projects, either individually or collectively.

The staff's analyses show that power from these proposed projects could be used to off-load fossil-fueled, steam-electric plants in the Northwest or to displace oil- and gas-fired generation in California until the power could be used to serve system load requirements in the Northwest directly. These uses, both short and long-term, would conserve nonrenewable fossil fuels and would reduce noxious emissions resulting from the use of these fuels.

In summary, the staff concludes that the power from the four proposed Snake River Projects would be useful in meeting the need for power forecast by the NPPC.

1/ The difference between the NPPC's 1986 high and low forecast for 1990 energy requirements is 4,347 average megawatts. The average annual energy in megawatthours (MWh), or MWa, is determined by dividing the total number of MWh per year by 8,760 hours per year; whereas the estimated total annual capability of Northwest hydropower projects of less than 80 MW now before the Commission for licensing and exemption from licensing is only 340 average MW. All proposed Northwest hydropower projects, both large and small, total 940 average MW.

Table 1-1. Northwest regional forecast of energy requirements and resources for private utilities in average annual megawatts (MWa) (Source: Pacific Northwest Utilities Conference Committee, 1987).

ENERGY-MWa 1/	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
Total Requirements	8,501	8,551	8,703	8,844	8,940	9,086	9,245	9,379	9,485	9,749
Total Resources	9,259	9,150	9,106	9,056	9,019	8,961	8,855	8,778	8,778	8,510
Surplus (Deficit)	758	599	403	212	79	(125)	(390)	(601)	(745)	(1,239)
Purchase from BPA	56	51	76	123	153	203	0	0	0	0
Surplus (Deficit) with Purchase	814	650	479	335	232	78	(390)	(601)	(745)	(1,239)

	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Total Requirements	9,920	10,072	10,210	10,372	10,550	10,726	10,884	11,056	11,228	11,400
Total Resources	8,434	8,383	8,349	8,282	8,272	8,265	8,158	8,143	8,038	7,938
Surplus (Deficit)	(1,486)	(1,689)	(1,861)	(2,090)	(2,278)	(2,462)	(2,726)	(2,913)	(3,190)	(3,463)
Purchase from BPA	0	0	0	0	0	0	0	0	0	0
Surplus (Deficit) with Purchase	(1,486)	(1,689)	(1,861)	(2,090)	(2,278)	(2,462)	(2,726)	(2,913)	(3,190)	(3,463)

1/ Energy data are given in annual average megawatts (MWa), which is determined by the following equation:

$$\text{MWa} = \frac{\text{Megawatthours per year}}{\text{8,760 hours per year.}}$$

2 PROPOSED ACTIONS

2.1 PROPOSED PROJECTS

2.1.1 Location

The four proposed projects would be located in south-central Idaho, along the Snake River, close to the city of Twin Falls (figure 2-1.). The proposed locations, from upstream to downstream, are as follows: the Milner Project would be built on the Snake River, about 11 miles downstream from Burley, Idaho; the Star Falls Project would be built on the Snake River, approximately 8 miles downstream from Milner dam and 18 miles southeast of Twin Falls, Idaho; the existing Twin Falls Project is approximately 3 miles upstream from the city of Twin Falls, Idaho; and the proposed Auger Falls Project would be built about 3 miles northwest of the city of Twin Falls.

2.1.2 Project Facilities

2.1.2.1 Milner Project

The proposed project (figure 2-2) would include an existing dam on the Snake River, consisting of three embankments (north, middle, south), constructed with a trapezoidal-shaped rockfill section at elevation 4,138 feet. The north embankment has a crest length of 480 feet and a 290-foot-long ungated spillway, the middle embankment a crest length of 404 feet and an ungated spillway, and the south embankment a crest length of 462 feet. The applicant, the Twin Falls Canal Company and the North Side Canal Company, Ltd. (CC), propose to modify the dam by placing 15-foot-wide rockfill berms at the dam, and by replacing the existing gated spillway with a new spillway, having eleven 12-foot-high, 30-foot-wide radial gates.

The project also would consist of the following: (1) an existing 1,100-acre reservoir with a gross storage capacity of 26,000 acre-feet at an elevation of 4,130.05 feet; (2) a canal control structure, consisting of six manually operated gates, 12 feet wide by 15 feet high and one hydraulically operated bascule gate, 24 feet long by 11 feet high; (3) new stoplog slots, replacing the existing headworks; (4) a 6,500-foot-long, earth and riprap-lined, excavated rock canal, modified to increase the canal capacity from 3,200 cubic feet per second (cfs) to 7,000 cfs; (5) an existing bridge on the Twin Falls Main Canal, raised to an elevation of 4,137.5 feet and lengthened by 60 feet; (6) a new concrete wasteway, providing a water passageway through the right canal embankment of the Twin Falls Main Canal, having a 39-footlong, 10.5-foot-high, hydraulically operated bascule gate; (7) a forebay, having a maximum capacity of 4,000 cfs; (8) an intake structure at the

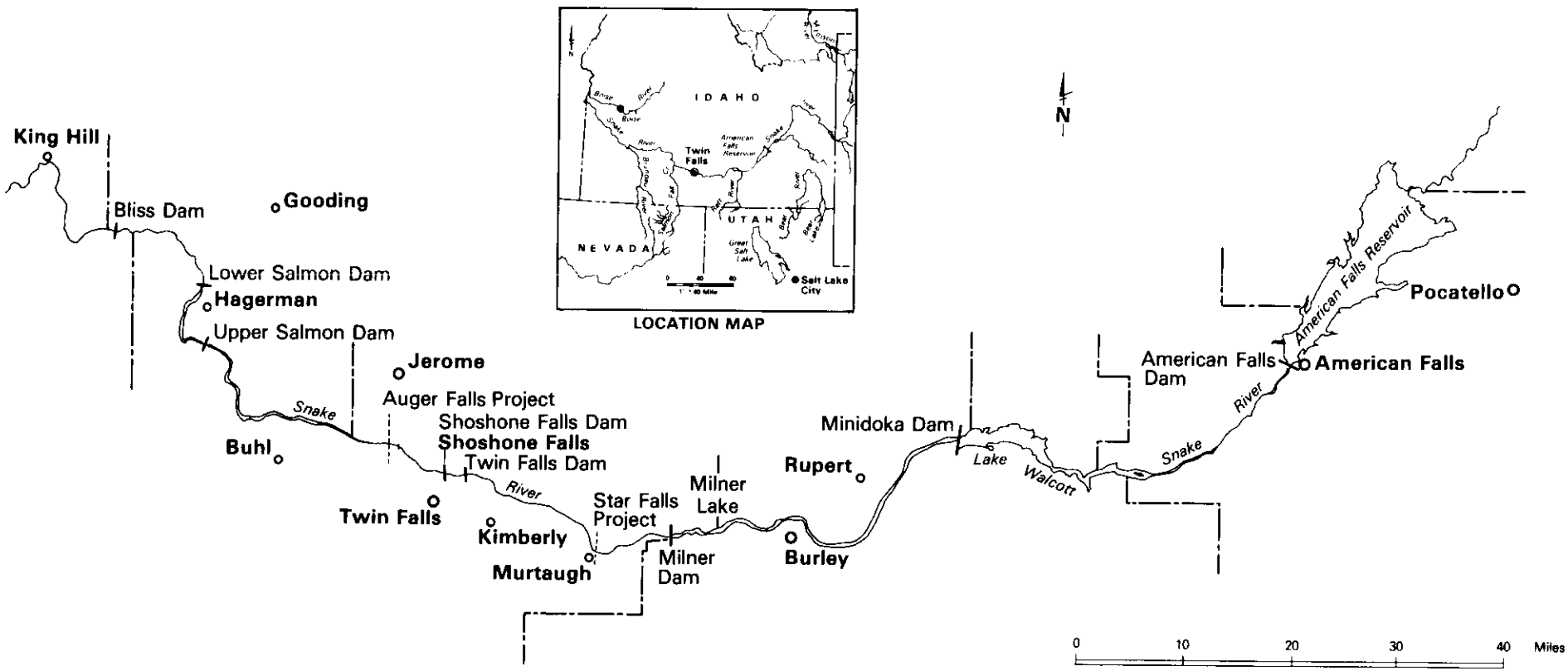


Figure 2-1. A portion of the upper Snake River between King Hill and Pocatello, Idaho, showing existing dams and the sites of the proposed Milner, Star Falls, Twin Falls, and Auger Falls Projects (Source: the staff).

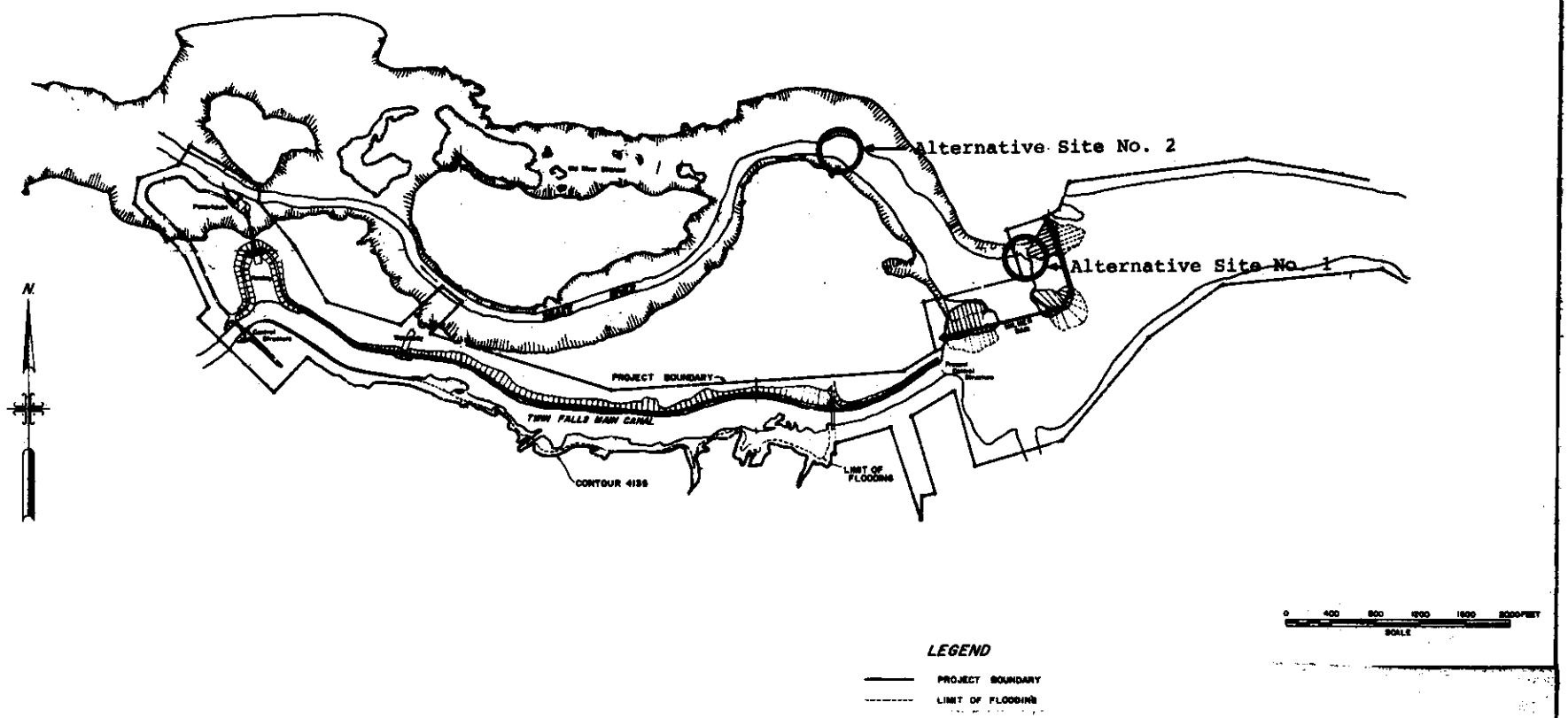


Figure 2-2. The project features of the proposed Milner Project with the two proposed alternative design sites (Source: the staff, modified from the Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

end of the forebay, consisting of steel trashracks and a 14-foot-wide, 17-foot-high, cable-operated, fixed-wheel gate; (9) a 17-foot-diameter, 385-foot-long steel penstock; (10) an 89-foot-long, 56-foot-wide, 83-foot-deep, semi-outdoor, reinforced concrete powerhouse, containing a single generating unit with a rated capacity of 43.65 megawatts (MW), operating under a head of 151.6 feet; (11) a 170-foot-long tailrace; (12) a 2,300-foot-long access road; (13) a 1.4-mile-long, 138-kilovolt (kV) transmission line, tying into the existing Milner substation; and (14) 600 feet of river bottom excavation to improve hydraulic flow conditions. The estimated cost of the project would be $39,540,000 in 1984 dollars.

2.1.2.2 Star Falls Project

The applicant, B&C Energy, Inc. (B&C), proposes a project (figure 2-3) that would consist of the following: (1) a 20-foot-high, 500-foot-long, gravity arch concrete dam on the Snake River with a crest elevation of 3,930 feet, creating an impoundment with a 161-acre normal maximum water surface area and a 2,780-acre-foot gross storage capacity; (2) a 2,200-foot-long power canal; (3) an enclosed penstock intake; (4) a 21-foot-diameter, 190-foot-long buried steel penstock; (5) a 66-foot-wide, 114-foot-long, 95-foot-high powerhouse, containing a generating unit rated at 29.7 MW; (6) a 200-foot-long tailrace with normal tailwater elevation of 3,853 feet, requiring the excavation of 20,900 cubic yards of rock; (7) a 138-kV, 4.75-mile-long transmission line; and (8) a 2,500-foot-long access road from the south canyon rim to the powerhouse and a roadway along the power canal embankment.

2.1.2.3 Twin Falls Project

The applicant, Idaho Power Company (IPC), proposes to add new capacity to the application to relicense the Twin Falls Project, FERC No. 18 (figure 2-4). The existing Twin Falls facilities include the following: (1) the Twin Falls dam on the Snake River, which has three sections, a concrete arch dam across the north falls, with a 474-foot-long overflow crest at elevation 3,508 feet, (3,511.4 feet with flashboards), a nonoverflow concrete gravity dam across the south falls with a 203-foot-long crest at elevation 3,520 feet, and a concrete dike across the island between the north and south falls in two sections, one 108-foot-long section with a crest at elevation 3,516 feet and the other 207-foot-long section with a crest at elevation 3,509 feet (3,512 feet with flashboards); (2) the Twin Falls reservoir, which has a storage capacity of about 1,000 acre-feet at normal pool elevation of 3,511.4 feet; (3) a gated intake structure in the nonoverflow gravity section; (4) a 10-foot-diameter, 40-foot-long, 37-foot-wide, and 50-foot-wide, concrete powerhouse, containing a generating unit with a rated capacity of 9 MW located near the base of the South Falls; and (6) a 1-mile-long, 138-kV transmission line connecting to the IPC's distribution system.

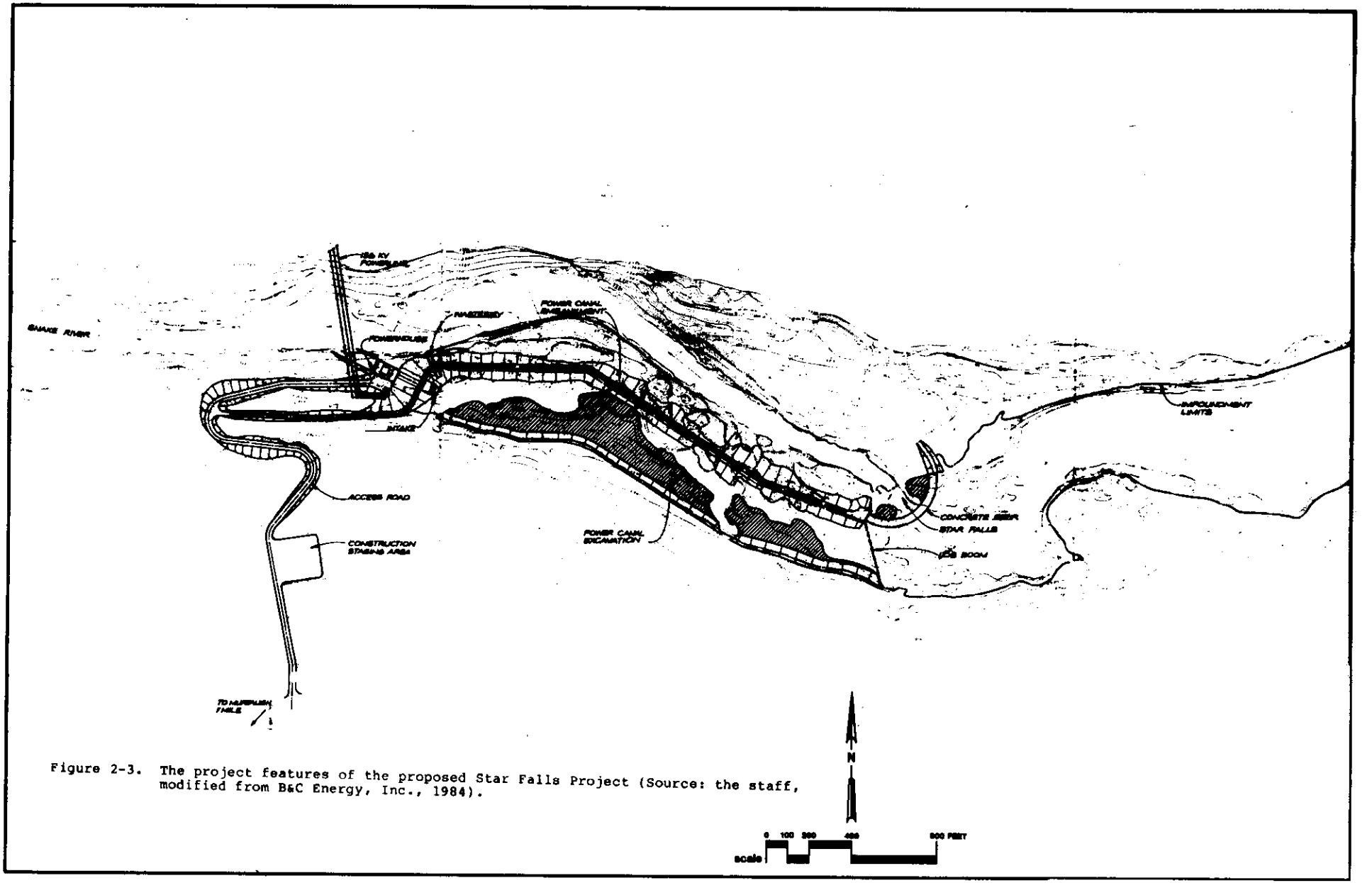


Figure 2-3. The project features of the proposed Star Falls Project (Source: the staff, modified from B&C Energy, Inc., 1984).

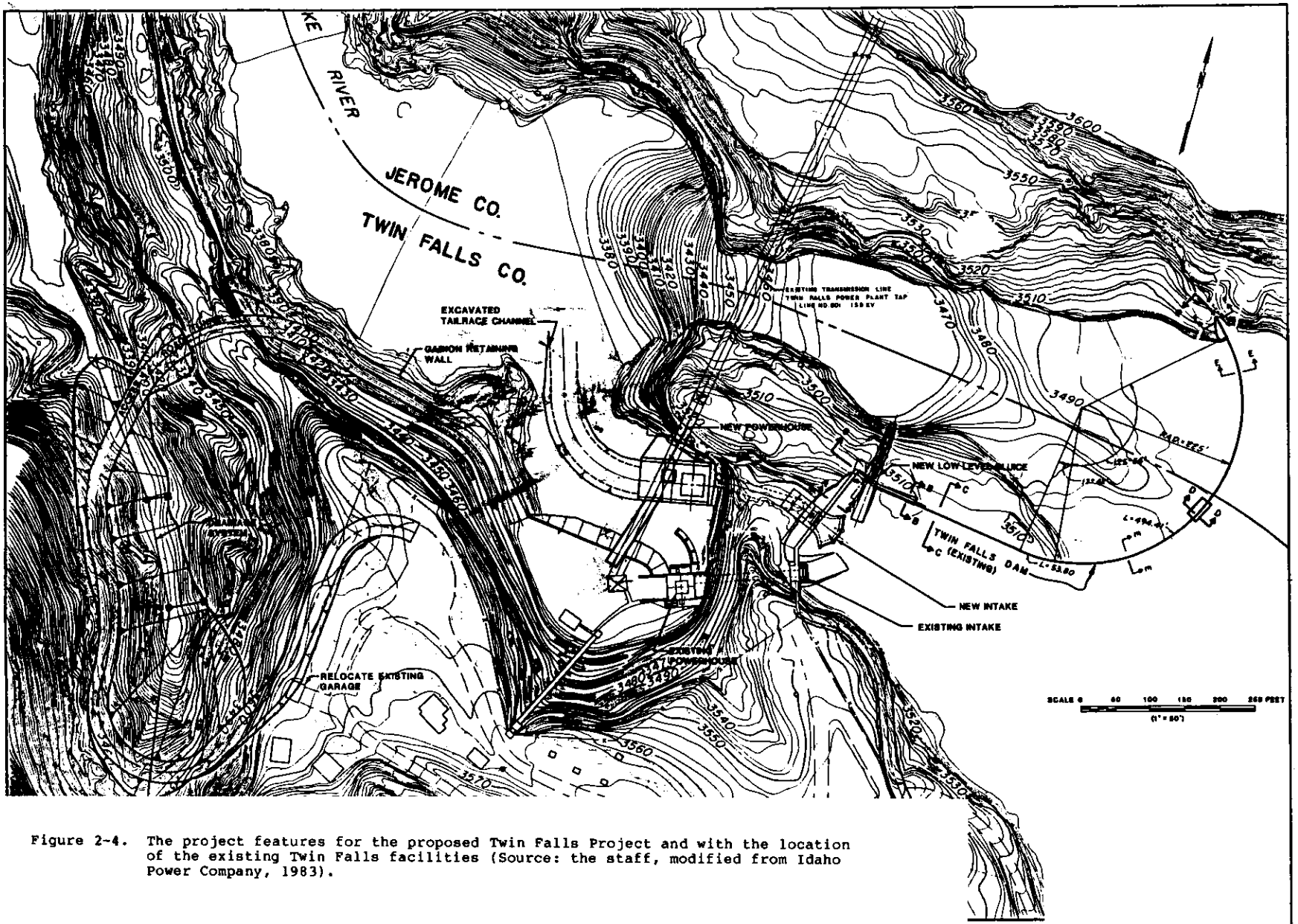


Figure 2-4. The project features for the proposed Twin Falls Project and with the location of the existing Twin Falls facilities (Source: the staff, modified from Idaho Power Company, 1983).

The proposed facilities would include the following: (1) a gated intake structure at the existing low-level sluice in the nonoverflow gravity dam; (2) an 18-foot-diameter water conductor, consisting of a 120-foot-deep vertical shaft and a 93-foot-long horizontal tunnel; (3) a 63-foot-wide, 100-foot-long, concrete powerhouse, at the downstream toe of the nonoverflow portion of the dam, containing a generating unit with a rated capacity of 42 MW; and (4) a 138-kV transmission line, connecting to the line from the existing powerhouse in a switchyard adjacent to that powerhouse; (5) a new tailrace channel requiring 3,500 cubic yards of excavation; and (6) a 110-foot-long, 18-foot-wide, concrete and steel access bridge between the powerhouses. The estimated cost of the new development is $32,060,138 in 1986 dollars.

2.1.2.4 Auger Falls Project

The applicant, Cogeneration, Inc. (COG), proposes a project (figure 2-5) that would consist of the following: (1) a 340-foot-long, and 18-foot-high concrete diversion dam overflow weir on the Snake River with two 20-foot-high radial gates; (2) a fish ladder; (3) a 9,000-foot-long, concrete-lined power canal, 85 feet wide at top and 15 feet wide at bottom; (4) a 1,550-foot-long overflow weir, with top elevation 3,115 feet mean sea level along the north side of the power canal; (5) a canal intake structure, 53 foot long, 80 foot wide, and 29 foot high; (6) three steel penstocks, each 225 feet long and each having a diameter varying from 156 inches to 228 inches; (7) a 110-foot-long by 38-foot-wide concrete powerhouse, containing three generating units with a total installed capacity of 43.6 MW; (8) a switchyard; and (9) a 0.75-mile-long, 138-kV transmission line, connecting to an existing transmission line. The total cost to construct the project is estimated to be approximately $59 million dollars in 1985 dollars.

2.1.3 Construction and Operation

2.1.3.1 Construction Schedule

CC estimates that construction of the Milner Project would require 2 years and that 39 months would separate the issuance of a license and project operation. B & C estimates a construction period of 19 months for the Star Falls Project. IPC estimates a construction period of approximately 3 years for the Twin Falls project, starting 1 year after the issuance of a license. COG estimates a design and construction period of 157 weeks for the Auger Falls Project.

2.1.3.2 Operation

Table 2-1 lists the mininum and maximum hydraulic capacities of the four proposed projects' generating units. The specific details for each project follow.

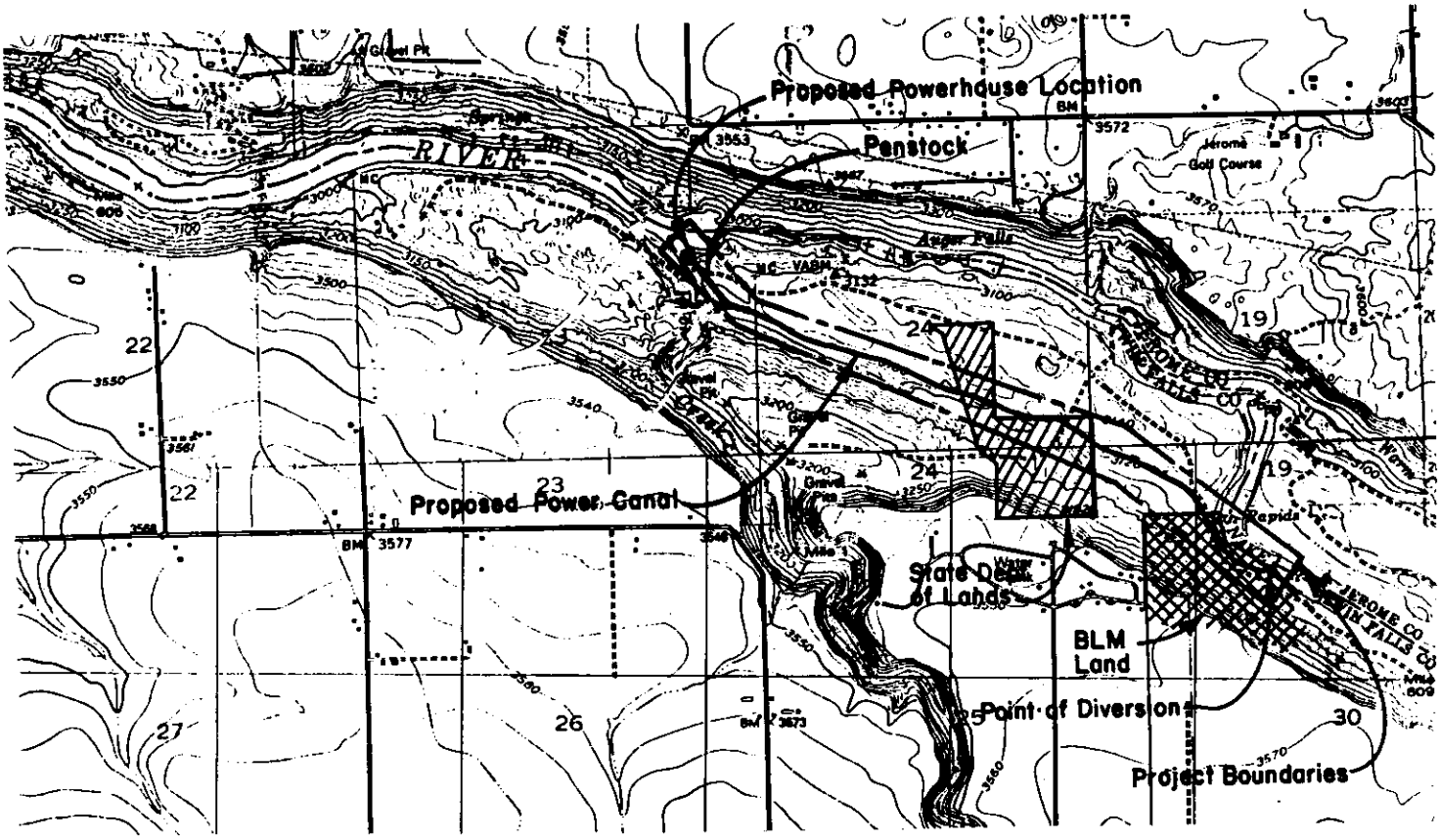


Figure 2-5. The project features for the proposed Auger Falls Project with location of nearby public lands (Source: the staff, modified from Cogeneration, Inc., 1981).

Table 2-1. Minimum and maximum hydraulic capacity, in flows per cubic feet per second (cfs), useable by the proposed Milner, Star Falls, Twin Falls, and Auger Falls Projects on the Snake River, Idaho (Source: the staff).

Project name	Maximum capacity (cfs)	Minimum capacity (cfs)	Number of generating units
Milner	4,000	900	1
Star Falls	5,500	1,600	1
Twin Falls			
(existing)	960	380	1
(new)	4,000	1,000	1
Auger Falls	5,000	200	3

2.1.3.2.1 Milner Project

The project would operate run-of-river and would generate an estimated 142 GWh annually. The Milner dam was constructed to provide irrigation flows for the North Side Main Canal, the Milner Gooding Canal, and the Twin Falls Main Canal; two other smaller canals remove water from Milner reservoir. The project would use Snake River flows that currently pass through the Milner dam spillway. These flows occur during the nonirrigation season and at times during the irrigation season, when there are flows in excess of irrigation diversions. Diverted flows would pass through an enlarged Twin Falls Main Canal, intake structure, penstock, and powerhouse, before returning through the tailrace to the Snake River, 1.6 miles below Milner dam. Project hydraulic head would be obtained from the difference in elevation between the Twin Falls Main Canal and the Snake River at the tailrace. The proposed project's hydraulic capacity of 4,000 cfs corresponds to flows having the probability of being exceeded 25 percent of the time. The project's design includes a sluiceway for operation during times of ice build-up in the canal.

The estimated 142 GWh annual generation is based on CC's estimated available flows and includes the following operational constraints.

(1) CC proposes to release 58 cfs at the dam. The 58 cfs was estimated to be the amount that currently leaks through the dam; proposed improvements to the dam's embankments would reduce the leakage.

(2) The proposed Kaplan turbine would operate when available flows are between 900 cfs and 4,000 cfs.

(3) Irrigation requirements will be satisfied before water is used for generation.

(4) The proposed power and irrigation canal would have a combined hydraulic capacity of approximately 7,000 cfs.

2.1.3.2.2 Star Falls Project

The project would operate run-of-river utilizing flows of the Snake River and would generate an estimated 90.4 GWh annually. The project would use a vertical Kaplan turbine with a minimum hydraulic capacity of 1,600 cfs and a maximum hydraulic capacity of 5,500 cfs. The project's operating head would vary between 82.5 feet and 74.2 feet. The proposed plant would be automated and might be remotely monitored, with control accomplished through a radio link. B&C's estimate of annual generation and of a 35-percent plant factor is based on anticipated available flows, and includes an allowance for the proposed 160-cfs bypassed minimum flow.

2.1.3.2.3 Twin Falls Project

The project would operate run-of-river. IPC proposes to increase the capacity of the existing project from 9 MW to 51 MW. The increase in project capacity would raise the annual generation from 60 GWh to approximately 186 GWh. The hydraulic capacity of the proposed project would be 4,960 cfs (960 cfs capacity for the existing Francis turbine and 4,000 cfs for the proposed Kaplan unit). The minimum discharge of the turbines would be 380 cfs, the same as the minimum discharge of the existing unit. When the available flows in the river are less than 380 cfs, all flows would pass over the falls. Depending on stream conditions, the plant would be operated as follows. If streamflow is less than 1,000 cfs but greater than 380 cfs, only the existing unit would be operated; if streamflow is greater than 1,000 cfs but less than 4,380 cfs, only the new unit would be operated; and if streamflow is greater than 4,380 cfs, both units will be operated.

2.1.3.2.4 Auger Falls Project

The project would operate run-of-river, using flows of the Snake River, and would generate an estimated 157.6 GWh annually. The project configuration would utilize three Kaplan or Francis turbines, allowing a hydraulic operating range of 200 cfs to 5,000 cfs. An automatic control system would provide for unattended operation of the facility. COG's estimate of

annual generation and of a 42-percent plant factor is based on anticipated available flows and on the following instream maintenance flows at the point of diversion:

Oct. 1-Nov. 15	--	60 percent of the flow of the Snake or a straight line increase from 350 cfs to 1,200 cfs, whichever is less.
Nov. 16-Feb. 15	--	60 percent of the flow of the Snake or 1,200 cfs, whichever is less.
Feb. 16-Mar. 31	--	60 percent of the flow of the Snake or a straight line decrease from 1,200 cfs to 350 cfs, whichever is less.
Apr. 1-Jun. 30	--	350 cfs.
Jul. 1-Sept. 15	--	670 cfs.
Sept. 16-Sept. 30	--	350 cfs.

2.1.4 Safety

Before licensing, the staff studies the adequacy of proposed project structures. Appropriate special articles are selected from those listed in appendix A for inclusion in any license.

The proposed project, if licensed, would be inspected by the staff, both during and after construction. The inspection during construction would concentrate on adherence to project construction plans and specifications, compliance with special license articles relating to construction, and observance of accepted engineering practices and procedures for construction.

Operational inspections are made to see that the project is being properly maintained to ensure the continued safety of the structures, that no unauthorized modifications have been made to the project, and that the project is being operated efficiently, safely, and in compliance with the terms of the license. All constructed projects for which a license has been issued are subject to inspection. In addition, any nonfederal dam exceeding 32.5 feet in height, or having a reservoir with a gross storage in excess of 2,000-acre-feet, or having a high hazard potential (as determined by the Commission's Regional Director) would be inspected and evaluated every 5 years by an independent consultant experienced in the design and construction of hydroelectric projects. The consultant's report, which would be limited to the safety of the project, would be submitted to the staff for review.

2.1.5 Mitigative Measures Proposed by Applicants

2.1.5.1 Land Features and Geology

2.1.5.1.1 Milner Project

CC would do the following:

- reduce erosion by using cofferdams to divert water away from excavation activities;
- schedule placement of cofferdams and excavation activities during low-flow periods; and
- reseed vegetative areas disturbed by construction activities.

2.1.5.1.2 Star Falls Project

B&C would do the following:

- use cofferdams to isolate construction areas from river flows;
- schedule instream construction activities during periods of low flow;
- use check dams and sediment ponds to control erosion and siltation;
- minimize erosion and siltation by diverting surface water runoff and groundwater discharge from areas that require dewatering;
- gradually flush sediments from the new power canal during startup and turbine testing;
- grade and seed borrow areas to reduce erosion and sedimentation;
- mitigate lose of riparian habitat by using excess soil and rock materials to construct islands in the river;
- If needed, obtain additional soils to support vegetation that would be planted on the proposed islands;
- riprap proposed islands to protect them from scour and erosion; and
- remove or stabilize small slumps above the proposed diversion site, if it is determined that these areas are a hazard to the project.

2.1.5.1.3 Twin Falls Project

IPC would do the following:

- if necessary, use settling ponds to filter excess water pumped from construction sites protected by cofferdams through settlement ponds, before returning the water to the river; and
- use rock bolts to stabilize the rock cliff above the proposed powerhouse.

2.1.5.1.4 Auger Falls Project

COG would do the following:

- minimize erosion by stabilizing and lining the power canal before diverting water through the canal;
- minimize erosion and turbidity by using cofferdams during construction of the diversion;
- schedule instream construction activities during periods of low flow;
- seed the banks of the power canal and ponds to prevent erosion;
- construct lined surface drainage swales on each side of and parallel to the proposed power canal to collect surface runoff and to divert it away from the canal and the canal embankment; and
- dispose of excess spoil by using it for building material in areas around proposed wildlife ponds.

2.1.5.2 Terrestrial Environment

2.1.5.2.1 Milner Project

CC would do the following:

- create 18.2 acres of wetland habitat at four different sites along the rebuilt Twin Falls Main Canal (figure 2-6);
- reseed shrub and grassy areas disturbed by construction activities with a mixture of grass species and native brush species;
- construct two osprey (Pandion haliaetus) nesting platforms in Milner reservoir to increase osprey use of the area;

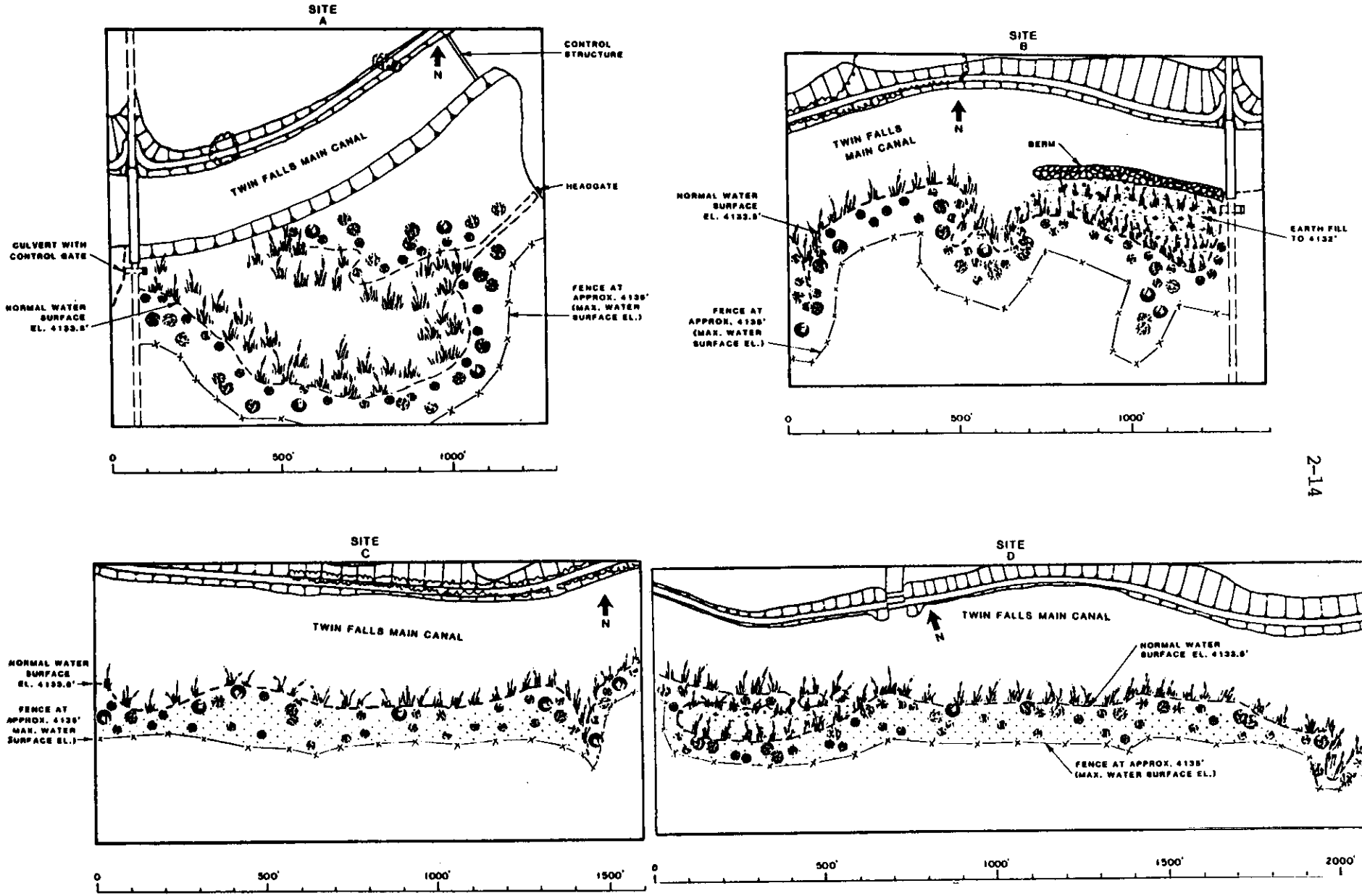


Figure 2-6. Wetland mitigation sites located along the Twin Falls Main Canal (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1986).

- develop artificial burrows for use by burrowing owls (Athene cunicularia);
- construct an unspecified number of structures for goose nesting in the project vicinity;
- prevent cattle from entering the land tract and mitigate disruption of the existing fence line by extending the fencing at the southeast corner of the Bureau of Land Management's (BLM) isolated tract no. 23 to the existing gate; and
- use a transmission line design that would prevent the electrocution of large raptors.

2.1.5.2.2 Star Falls Project

B&C would do the following:

- enlarge the existing wetland located upstream from the proposed dam by 3/10 of an acre;
- plant 8.3 acres of riparian vegetation at three permanently irrigated sites on both sides of the river near the proposed dam;
- develop 15 acres of wetland habitat at a 20-acre site along the rim of the Snake River Canyon, about 4 miles upriver from the Perrine Memorial Bridge (figure 2-7);
- construct 10 to 15 islands and a backwater area, with all features totalling 3.4 acres, along the south bank of the river, immediately upstream from the dam;
- place structures for goose nesting on each of the islands created in the reservoir immediately upstream of the dam;
- investigate the need for a goose stocking plan to mitigate the project's impacts on the goose populations using the area
- retain woody vegetation in the project reservoir area for wildlife use;
- employ a transmission line design that would prevent the electrocution of large raptors; and
- have a qualified biologist monitor the proposed mitigation program for 5 years.

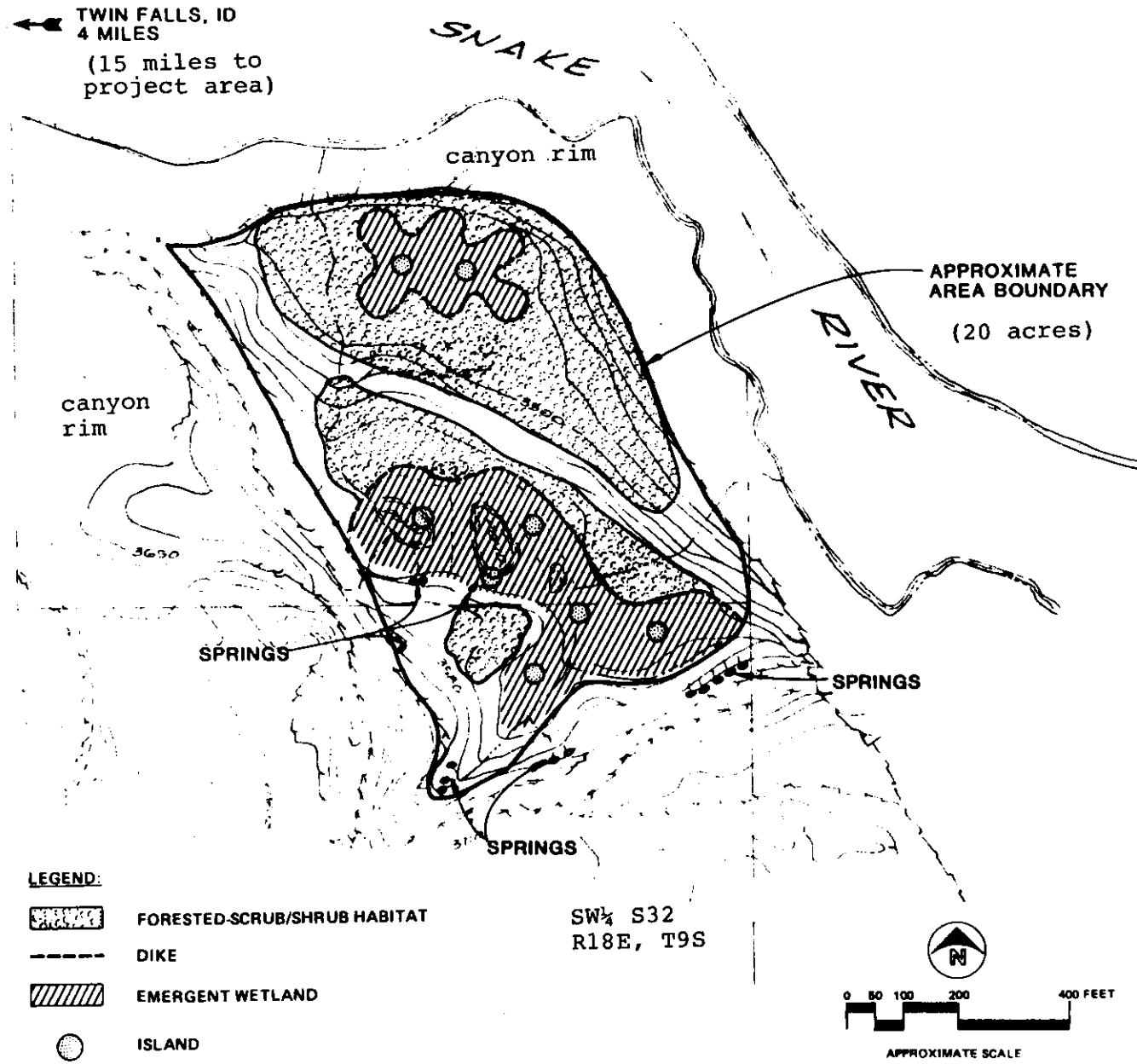


Figure 2-7. Conceptual development plan for the off-site wetlands mitigation area for the Star Falls Project (Source: CH_2M Hill, 1985).

2.1.5.2.3 Twin Falls Project

IPC would develop an unspecified amount of riparian vegetation near Vinyard Creek.

2.1.5.2.4 Auger Falls Project

COG would do the following:

- construct two wildlife ponds next to the power canal, each pond having 2 surface acres and a depth of 10 to 12 feet;
- to ensure that the wildlife ponds remain ice-free during the winter and provide resting areas for waterfowl, construct and install in the ponds an aeration system, consisting of an air compressor and air hoses arranged in a grid system;
- construct an island and a goose-nesting structure in each of the wildlife ponds;
- employ a transmission line design that would prevent the electrocution of large raptors; and
- minimize avian collisions with the transmission line by using fluorescent aviation markers.

2.1.5.3 Threatened and Endangered Species and Socioeconomic Factors

The four applicants proposed no mitigation.

2.1.5.4 Land Use and Recreational Resources

2.1.5.4.1 Milner Project

CC would do the following:

- enhance public access to the river downstream from the powerhouse by constructing a float boat-launching site at the river and a four-vehicle parking area on the canyon rim;
- restrict public access near the powerhouse;
- give anglers access to the project area by constructing a 10-vehicle parking lot near a bridge crossing, immediately below Milner dam, on county road 1300S; and
- construct a boat dock on Milner reservoir that would augment existing boat launching facilities at the BLM Bicentennial site and would become the property of BLM.

2.1.5.4.2 Star Falls Project

B&C would do the following:

- provide funds to BLM for improving and maintaining the access route from the north canyon rim to Star Falls;
- construct, operate, and maintain a day-use area at Star Falls, in conjunction with improving the north-side access road to the site, and provide a parking area for four vehicles or trailers, a natural surface boat-launching area and dock on the impoundment, a picnic area, and restroom facilities that accommodate disabled persons
- construct an interpretive area with signs describing the historic, archeological, and natural features at the project site;
- erect markers and warning signs upstream from the dam to alert river recreationists to dangers ahead;
- install a safety boom across the river, upstream from the dam, to prevent recreationists from being drawn over Star Falls or into the project intake;
- provide a parking area for three vehicles or trailers and a small picnic area on the south side of the river, at the construction staging site;
- construct an angler and boater access point on the south shore of the river, immediately below the powerhouse;
- provide funds to improve BLM's boater put-in site next to Murtaugh Bridge, downstream from the powerhouse, by adding a vault toilet, road improvements, and a natural surface boat launching ramp;
- allow river recreationists entering the project area from upstream to exit at the proposed boat-launching facilities on the north side of the river and drive downstream to the Murtaugh Bridge put-in site; and
- after temporarily removing the log boom from the power canal intake,allow river recreationists to take out boats and to portage along the power canal to the boater-access point on the south shore of the river,immediately downstream from the powerhouse.

2.1.5.4.3 Twin Falls Project

IPC proposed no mitigative measuress.

2.1.5.4.4 Auger Falls Project

COG would do the following:

- construct two wildlife ponds, next to the power canal, each pond having 2 surface acres and a depth of 10 to 12 feet;
- stock the wildlife ponds with warmwater fish species to provide warmwater fishing opportunities;
- use an aeration system to keep the wildlife ponds ice-free during the winter months and to provide resting areas for waterfowl; and
- construct a 6,850-foot-long hiking trail and angler access route, extending from a small parking area at the eastern edge of the project boundary to the ponds.

2.1.5.5 Water Quality and Quantity

2.1.5.5.1 Milner Project

CC would do the following:

- construct a temporary rockfilled cofferdam to reduce erosion, sedimentation, and turbidity;
- construct a permanent concrete cofferdam and training wall near the tailrace to reduce erosion, sedimentation, and turbidity; and
- limit the use of chemicals for controlling aquatic plant growth in the intake canal to the part of the canal below the point where water is diverted to the powerhouse.

2.1.5.5.2 Star Falls Project

B&C would do the following:

- construct check dams and sediment ponds to control erosion and sedimentation during construction;
- schedule most construction activities during the low-flow period;
- maintain a minimum bypass flow of 160 cfs in the Snake River at the project site during project operations; and
- when not operating, release all inflow to the impoundment, except 12 cfs passed through the power canal, past the project into the bypassed reach.

2.1.5.5.3 Twin Falls Project

IPC would dedicate funds from the new project to provide a one-time $50,000 payment to IDFG to protect and enhance fishery resources of Vinyard Creek. An agreement between IPC and IDFG stated that funds would be provided to IDFG only after a license was granted for the project, and would be considered full and complete settlement and satisfaction of the following four issues identified as areas of concern: (1) fish mortalities and the necessity of hatchery fish plantings, (2) flow fluctuations, (3) experimental vegetative plantings near Vinyard Creek, and (4) sedimentation in Vinyard Creek (letter from Logan E. Lanham, Senior Vice-president, Idaho Power Company, Boise, Idaho, June 15, 1984).

2.1.5.5.4 Auger Falls Project

COG would do the following:

° use cofferdams during construction of the dam to minimize erosion and sedimentation;

° stabilize and line the power canal before diverting any water, to minimize erosion and sedimentation;

° time construction activities to coincide with low river flows and the dry weather season to minimize erosion and sedimentation; and

° seed the pond and canal banks to prevent erosion.

COG, over a 12-month period, would provide the following variations in minimum flows at the proposed diversion dam:

° October 1 to November 15--the lesser of 60 percent of the river flow at the diversion dam or gradual increases in flow from 350 cfs to 1,200 cfs by November 14;

° November 16 to February 15--the lesser of 60 percent of the river flow at the diversion dam or 1,200 cfs;

° February 16 to March 31--the lesser of 60 percent of the river flow at the diversion dam or a gradual decrease in flow from 1,200 cfs to 350 cfs by March 31;

° April 1 to June 30--a minimum flow of 350 cfs;

° July 1 to September 15-a minimum flow of 670 cfs; and

° September 16 to 30--a minimum flow of 350 cfs.

2.1.5.6 Fishery Resources

2.1.5.6.1 Milner Project

CC would do the following:

° during the nonirrigation season only, maintain a minimum flow of 58 cfs in the Snake River below Milner dam; and

° after consultation with IDFG, implement habitat enhancement measures for fishery resources that would compliment IDFG's warmwater fishery programs underway in Milner reservoir.

2.1.5.6.2 Star Falls Project

To mitigate losses of fisheries management options for the stretch of the Snake River affected by the project, B&C would contribute funds to one or more programs proposed by IDFG for fisheries enhancement in southern Idaho.

2.1.5.6.3 Twin Falls Project

IPC would dedicate funds from the new project to provide a one-time $50,000 payment to IDFG to protect and enhance fishery resources of Vinyard Creek. An agreement between IPC and IDFG stated that funds would be provided to IDFG only after a license was granted for the project, and would be considered full and complete settlement and satisfaction of the following four issues identified as areas of concern: (1) fish mortalities and the necessity of hatchery fish plantings, (2) flow fluctuations, (3) experimental vegetative plantings near Vinyard Creek, and (4) sedimentation in Vinyard Creek (letter from Logan E. Lanham, Senior Vice-president, Idaho Power Company, Boise, Idaho, June 15, 1984).

2.1.5.6.4 Auger Falls Project

COG would do the following:

° install a vertical-slot fishway at the diversion dam to provide upstream fish passage during project operation;

° construct two wildlife ponds, next to the power canal, each pond having 2 surface acres and a depth of 10 to 12 feet;

° ensure the wildlife ponds are stocked with warmwater fish species to provide recreational warmwater fishing opportunities; and

- use an aeration system to keep the wildlife ponds ice-free during the winter months to provide resting areas for waterfowl.

2.1.5.7 Aquatic Plants and Macroinvertebrates

The four applicants proposed no mitigaton.

2.1.5.8 Visual Quality

2.1.5.8.1 Milner Project

- To minimize changes in visual quality, CC would design the project structures to blend with the surrounding area.

2.1.5.8.2 Star Falls Project

B&C would do the following:

- tint the materials used to construct the dam and other concrete structures to blend with the surroundings;
- construct the canal embankment of rock;
- use color and building materials that make the recreational facilities blend with the surrounding area;
- improve access to the canyon and to the project by constructing viewing locations;
- alternate flow levels in the natural stream channel at Star Falls;
- use daily and seasonal timing of alternate flows in the river;
- employ landscape screening techniques; and
- choose channel and bank modifications that blend with the surrounding environment.

2.1.5.8.3 Twin Falls Project

IPC would do the following:

- install an underwater, rather than above water, intake that is not visible, and locate only the head works of the intake structure above the water level;
- bury the penstock in an 18-foot-diameter tunnel and vertical shaft cut into the cliff;

- use the existing topography to screen the switchyard and remote operating facilities from view; and

- along the base of the cliff, at the edge of the south pool, construct a partially buried, semioutdoor powerhouse, similar in appearance to the existing powerhouse, and not easily visible to the public.

2.1.5.8.4 Auger Falls Project

COG would do the following:

- follow careful construction techniques to control air pollution, noise, and excessive degradation of natural features at the project site;

- use earth-tone colored paint and avoid the use of reflective metals;

- employ landscape techniques that screen the project from view;

- utilize native plant species for revegetating areas disturbed by construction activities and for screening the landscape.

2.1.5.9 Cultural Resources

2.1.5.9.1 Milner Project

- Before construction, CC would develop a photographic record, in consultation with the Idaho State Historic Preservation Officer.

2.1.5.9.2 Star Falls Project

B&C would do the following:

- protect a rock shelter (site 10JE50) located on the north side of the river, by covering the site with sand and rock;

- if feasible, construct a rock embankment to protect an open occupation site (site 10JE67) from adverse project effects;

- if building a rock embankment is infeasible, scientifically recover the data at the site before construction;

- recover the archeological data at China Cave (site 10TF726) before construction;

- record the architectural elements of structures 7 and 8 (site 10TF727) according to the standards of the Historic American Building Survey and conduct limited subsurface sampling at the site;

- minimize the cultural impacts to the Caldron Linn site (site 10JE52/10TF728) by coloring the visible concrete portions of the weir to simulate the natural basalt found in the area;

- release flows over the weir into the natural channel at irregular points along the weir to create the appearance of a natural falls;

- spill water irregularly over the weir into the natural channel to simulate the natural flow of water into Star Falls and into nearby walls of the falls;

- construct points above the falls for viewing the canyon; and

- erect four interpretive signs explaining the historic significance of Caldron Linn, placing one sign on the north side of the canyon near the weir, one sign on the south side of the canyon near the weir, one sign near the boat put-in site at Murtaugh bridge, and one sign at the proposed recreational site above the falls.

2.1.5.9.3 Twin Falls Project

IPC proposed no mitigation for cultural resources.

2.1.5.9.4 Auger Falls Project

COG would monitor four localities (site 10TF430) during construction, and if cultural remains are encountered, would contact the state archaeologist.

2.2 ALTERNATIVES TO THE PROPOSED ACTION

The only alternatives to licensing all of the projects as proposed would be these: (1) a combination of projects that would not include all of the proposed projects; (2) licensing some or all of the projects, modified to ensure the public safety, provide greater public benefit, or to reduce environmental impacts; and (3) denial of all the license applications, the no-action alternative.

Based on the Council's 1986 Power Plan, the reasonable generic nonexclusionary resources available to meet the regional load growth and resource retirement replacement needs are the following: conservation programs, development of hydroelectric projects, cogeneration, and combustion turbines; and ultimately development of coal-fueled, steam-electric plants. These resources cannot be considered as exclusionary alternatives under the Council's Power Plan.

Under the Council's 1986 Power Plan, none of the conservation or generation resources are mutually exclusive. All environmentally acceptable resources are considered for development, based upon their life-cycle economics, with conservation receiving a 10-percent economic advantage over the other resources. Development of any of the proposed projects or other resources in the Council's resource portfolio would not foreclose the development of other resources, but could affect the timing of the development of other resources economically in the Council's projected resource schedule. The staff does not believe that the development of the proposed projects could have any significant effect upon conservation efforts in the region. The effectiveness of conservation will be more significantly influenced by the lack of a viable vehicle to transfer conservation opportunities between the public and private sectors of the power market, rather than limited by the development of competing resources.

Included in sections 2.2.1 through 2.2.5 are descriptions of the Council's generic nonexclusive alternatives, which could be developed to help the region meet its future load requirements, either with or without development of the proposed projects.

2.2.1 Nonexclusionary Alternative Conservation and Generating Resources

Numerous alternatives to the proposed hydroelectric projects could supply energy to the region or could reduce the consumption of electricity and thereby extend the adequacy of the existing resources. The Council, in the 1986 Plan, set forth several conservation and development scenarios that would enable the region to meet its long-term power requirements under various load growth assumptions (Northwest Power Planning Council, 1986).

The Council used the levelized cost of energy from a coal-fueled, steam-electric plant, which would begin operation in the year 2000, as the economic yardstick against which the other forms of generation and conservation were compared, in order to establish an economical resource development and conservation portfolio. A coal plant was chosen as the basis for threshold evaluation because coal plants are the region's most economical potential large power production resource. The Council projected the development of all of the available economic conservation, 200 MW of the expansion of existing hydroelectric projects, and all of the available economic cogeneration resources by the year 2002, in the medium-high load growth scenario. The staff assumed that hydroelectric generation should be considered regionally economical, if the levelized cost from its projected on-line date would be less than the levelized cost of energy from coal-fueled steam-electric plants. The coal plant energy cost would be based on production cost only until the year 2002, and on the total energy cost, including coal plant construction and production costs, thereafter.

Since the feasibility of the proposed projects were evaluated based on energy need in the year 2002, after the development of the economical conservation and cogeneration resources, those conservation and cogeneration development options cannot be considered as exclusionary alternatives to the proposed projects.

The staff's feasibility methodology was designed to determine the economic feasibility of constructing the proposed hydroelectric projects and alternatives before January 1, 1992, to displace the construction of coal plants in the year 2002. The feasibility analyses of development of the proposed projects and the hydroelectric alternatives before January 1992 is consistent with the Northwest Power Planning Act, since the Act gives a higher priority to renewable resource development than to cogeneration, and since development of cogeneration is being actively pursued in accordance with the Public Utility Regulatory Policies Act (Public Law 96-501, section 4(E)(1)).

2.2.2 Nonexclusionary Hydroelectric Alternatives

In the Pacific Northwest, there is a virtually unlimited number of hydroelectric sites, because any point on any stream or river is a potential site. Only a few of those sites can be considered as potentially feasible, because of the very complex interrelationship of conditions that govern the economic feasiblility of hydroelectric site development. Some of the conditions that determine the feasibility of site development are cost of financing, cost of fuel in the region, current tax law and tax incentives, current physical conditions in the vicinity of the site (such as the existence of access roads and transmission facilities), and fixed physical attributes of the site (such as the size of the drainage area, the characteristics of the runoff from the drainage area, and the slope of the streambed from the point of diversion to the point of generation), as well as environmental mitigative costs of development and operations.

The Council has indicated that hydroelectric projects other than those included in the plan would be installed when needed, if these projects are found to be environmentally acceptable and cost effective. This would be so regardless of the dispostion of the proposed Snake River projects. Therefore, hydroelectric projects that are environmentally acceptable and that are more cost effective than the thermal yardstick of cost effectiveness established in the plan would be nonexclusionary within the context of the regional power plan.

2.2.3 Nonexclusionary Nonhydroelectric Generating Resources

The federal government, private industry, and other institutions have committed a considerable amount of money and technical manpower to developing cost-effective technologies for the use of alternative energy sources to provide electric power generation.

Review of the Council's 1986 Plan shows that the Council considered a wide spectrum of power resources alternatives in developing the resource portfolio recommended by the Council for the Northwest power development (Northwest Power Planning Council, 1986). In developing the resource portfolio, the Council considered resource reliability, availability, relative cost effectiveness, compatibility with the environment and the power systems, and the priorities established in the Act.

The types of nonhydroelectric, electrical power-generating resources examined included system thermal generating plant efficiency improvements, strategies for better use of the hydropower system, renewable resources, cogeneration, nuclear and coal generation, and power imports. The renewable resources generation included geothermal, municipal solid waste, solar, wind, and biomass generation. The resource programs resulting from the Council's analyses included cost-effective conservation, gas turbines to provide for better use of hydropower systems, cogeneration resources, and new coal generation. Most of the renewable resources studied were found to be not sufficiently cost effective, reliable, or available for inclusion in the resource portfolio.

° Geothermal--No geothermal electric powerplants are currently operating in the Northwest, but it has been estimated that 4,400 average megawatts of electrical energy could be obtained through the development of 10 regional geothermal resource areas. Because of the magnitude of the energy involved and of the apparent cost effectiveness, geothermal generation is considered promising. Because of a lack of information in the geothermal areas, however, the resource was considered to be unavailable as an alternative form of generation for the resource portfolios.

° Muncipal Solid Waste--Although considered potentially cost effective, this resource was not included in the plan because of uncertanties about air quality effects, siting, and general public acceptance.

° Solar Generation--Despite recognition of a large regional potential, the Council concluded that the high cost of solar electrical generating technology (both solar thermal and solar voltaic generation) preclude consideration of this technology as an available resource alternative.

° Wind Generation--The reliability and availability of wind turbines have been demonstrated, and potential sites offering a large resource potential have been identified in the Northwest. Nonetheless, the Council's estimated cost of wind energy from even the best sites is not presently cost-competitive with new coal plants.

° Wood-Fired Generation--One utility-operated generating plant using wood residue and several wood-fired plants operated by small power producers are in operation in the region. Because of uncertainties regarding costs and availability, however, no additional stand-alone, wood-fire plants were considered suitable for inclusion in the resources portfolio.

° Cogeneration--The Plan considers the availability of 320 MW of energy from congeneration in the high-load scenario, 190 MW under medium load levels, and 130 MW under the low-load scenario. Future assessments of availability will reflect the effects of economic activity and of possible innovative financial arrangements, and may consider advanced cogeneration concepts.

° Nuclear Generation--The Council found that the preservation of options for completing construction of the Washington Public Power Supply System nuclear projects WNP 1 and WNP 3 would be more cost effective than other resources included in the resource portfolios; the Council also found that there are significant barriers to preserving and completing the two plants. Because of this perception, the Council judged the two units to have insufficient reliability and availability for inclusion in the resource portfolio.

° Coal-fueled Generation--The conventional, direct-fired, steam-electric powerplant is the established technology for producing electricity from coal. There are 12 coal-fired units capable of producing 2,480 average MW of energy in the region. One additional unit, Coalstrip 4, is scheduled to become operative before the end of 1986, and will produce an average of 370 MW. In evaluating alternative coal-burning electric generating technologies, the Council considered fluidized bed combustion designs, intergrated coal gasification combined-cycle plants, and magnetohydrodynamics.

  Coal gasification, combined-cycle, and magnetohydrodynamics technologies are still in the developmental state, and currently are not considered reasonable alternatives to the conventional coal plant. Additionally, conventional technology presently holds a cost advantage over the fluidized bed technology. The alternative coal technologies were not included in the Council's resource portfolio.

The staff does not take issue with the Council's findings about the availability and cost-effectiveness of the alternative nonhydroelectric generating technologies. The staff believes that the spectrum of resources considered by the Council encompasses reasonable alternatives at this time.

2.2.4 Coal-Fueled, Steam-electric Powerplant Alternative

In developing the resource portfolio to meet electric power requirements, the Council identified a generic coal-fired powerplant, assumed to be installed in the year 2000, as the measure of

cost effectiveness for the inclusion of resources in the resource portfolio. The staff adopted the coal-fired plant as the most reasonable fossil-fueled alternative to the proposed hydropower projects in the Snake River Basin.

Under the Council's Power Plan, the coal plant is considered to be the regional marginal resource, which is to be deferred by the development of more cost-effective generation and conservation resources. Even though the coal plant is nonexclusionary under the Plan, it is being treated as an alternative in this impact statement, because it has been identified as the resource in the Council's resource portfolio that would be delayed by the other, more economical resources, including hydroelectric generation.

Location

The generic coal-fired plant alternative is assumed to be located in eastern Oregon or Washington, fairly close to the Columbia River. For purposes of the environmental analysis, the staff chose the Creston site in eastern Washington, as described by the Bureau of Reclamation and the Washington State Energy Facility Site Evaluation Council (1981), for site-specific evaluation of the potential impacts of a coal-fired plant.

Description

The plant would consist of two conventional coal-fired units with electrostatic precipitators and scrubbers to control air quality and with cooling towers to minimize water impacts. The plant site would require about 400 acres of land to accommodate the required facilities and about 1,130 additional acres to dispose of ash and scrubber sludge. In addition to the major buildings for the main power station, warehouse, and machine shop, and the administration requirements, the site would encompass a fire engine house; a fire water pumphouse; a circulating water pumphouse; a guard house; various storage, containment, and operations structures; and cooling towers. In addition to the turbine-generator, miscellaneous powerplant equipment, and auxiliary electrical equipment, the plant facilities would provide steam generation, turbine run-up, fuel handling, water supply, condenser and feed water treatment, condenser cooling water treatment, air quality control, waste disposal systems, and a transmission switchyard.

The water system would supply Columbia River water to the water treatment plant, for use in the powerplant, to the ash and coal handling areas, and to the mechanical-draft cooling towers for makeup. A sewage treatment plant and sewer system would handle plant wastes and storm runoff; water pollution control treatment facilities would also be provided.

The fuel-handling system would be designed for 708 tons/hour, the approximate burn rate at 100 percent load for two 603-MW units. The normal supply of fuel would be washed, Wyoming subbituminous coal, which would be crushed at the mine. The coal would be transported by unit-train rail shipment directly to the plant site. About 10 unit-train deliveries per week, consisting of approximately 100 cars, each carrying 100 tons, would be required to move the needed coal. Fuel oil would be delivered by rail tank cars and trucks.

A feedwater system, supplying feedwater for the boiler and spray water for superheater and reheater steam temperature control, would consist of a deaerator, boiler and feed pumps, high-pressure closed feedwater heaters, and piping to the economizer inlet. A condensate system would include demineralized water storage, condensate storage, a condensate polisher, three low-pressure, closed feedwater heaters, and condensate supply-and-eject piping.

The steam generating system would use a balanced-draft, single-reheat, drum-type boiler, designed to burn Wyoming subbituminous coal in normal operation and no. 2 fuel oil for ignition and flame stabilization. The boiler efficiency is projected as 86 percent. The system would supply a rated steam flow of 4.8 million pounds per hour to the turbine-generator at turbine inlet conditions of 2,400 pounds per square inch gage and at 1000 degrees Fahrenheit (°F)/1000°F.

The turbine-generators, designed for indoor installation, would consist of high-pressure, intermediate-pressure, and double-flow, low-pressure sections. At these steam conditions, a back pressure of 2 inches of mercury, and 0 percent makeup, the turbines would have a net rating of 603 MW. The generators would be rated at 794 megavolt amperes, 0.9 power factor, 60 hertz, and 3,600 revolutions per minute. The unit station heat rate is projected to be 9,911 British thermal units (Btu) per kWh.

A condenser cooling water system would provide cooling water to the condenser, the auxillary cooling water heat exchangers, and the condenser vacuum pump seal water heat exchangers. The condenser would be single-pass and would have a total surface area of 350,000 square feet.

Heat would dissipate into the environment through the mechanical-draft wooden cooling tower, which would be designed at a cooling water flow rate of 275,000 gallons per minute (gpm).

Makeup water to the cooling tower (to replenish losses from evaporation, drift, and blowdown) would be delivered by three raw water pumps located on the Columbia River, and which would supply the total raw water requirement for each unit. Each pump would be rated to deliver approximately 7,000 gpm.

A turbine runup system would provide automatic turbine runup, synchronizing, and loading of the turbine-generator unit. The units would also be provided with a turbine supervisory system for monitoring turbine operation.

The air quality control system would be designed to comply with the 1979 federal New Stationary Sources Performances Standards (NSSPS) for electric utility, steam-generating units. Both generating units and related facilities would be designed to meet or exceed these standards.

Two electrostatic precipitators (ESP) would be included with each unit to remove fly ash from the hot flue gas. Following ESP processing, wet-limestone, slurry, venturi scrubbers would be used to desulfurize flue gas, which would be fed to an induced-draft fan, and would be exhausted from a 580-foot-tall stack.

Bottom and fly ash handling systems would transport ash from the furnace, economizer, air preheater, and precipitator-baghouse hoppers to dewatering bins and fly ash silos. A facility for pulverizer pyrite disposal would be designed to handle approximately 12 hours of storage, with 2 hours for emptying the facility; the 10-hour margin would be used for any on-line maintenance that might be required. Fly ash would be assumed to be 85 percent of the total ash. The precipitator-baghouse hopper storage capacity would be for approximately 8 hours.

Flue gas desulfurization (FGD) sludge would be thickened and filtered to increase solids to about 75 percent by weight. For stability, the dewatered sludge would be mixed with bottom ash, fly ash, and Portland cement. A conventional dry waste disposal system would be used. The waste, consisting of bottom ash, fly ash, FGD sludge, and cement, would be transported to an onsite landfill, where it would be dumped and compacted. Over the 30-year lifetime of the powerplant, approximately 1,000 acres would be required for disposal of the waste at an average depth of 20 feet.

Construction and Operation

- Construction Schedule--Completion of construction and beginning of commercial operation of the first unit in the plant is estimated to require 84 months. An additonal 12 months would be required to put the second unit in service.

- Operation and Maintenance--Based on operation for 6,132 hours per year at full plant capacity (equivalent to a 70-percent plant factor), the annual energy generation from the plant would be 7,395 MWh per year. At a plant heat rate of 9,911 Btu/kWh, and burning Wyoming subbitumous coal (8,445 Btu/pound), this approximates the consumption of 4.36 million tons of coal, 99,854 tons of limestone, 7,925 tons of cement, and 765 tons of chlorine, the withdrawal of 5.19 billion gallons of raw water, and the processing of 496,171 tons of sludge per year.

Operation and maintenance of the plant would require a staff of 256, including 11 plant managers, 100 operators, 90 maintenance people, 30 general helpers, 13 people to operate laboratories and storerooms, and 12 security personnel.

2.2.5 Nongenerating Nonexclusive Alternatives

Nongenerating alternatives reduce power demands and make available generating resources that would have been needed to serve the increment of load eliminated by the nongenerating alternatives. Such resources considered by the Council in developing the 1986 Plan for the Northwest include system efficiency improvements and conservation (both price-induced and programmatic) in the residential, commercial, industrial and agricultural sectors of the economy. Among the nongenerating system efficiency improvements, the Council considered reduction of power transmission costs in the transmission and distribution systems. Efficiency improvements in the generating technologies were also considered, and are identified in the sections dealing with generating alternatives.

The Council considered conservation from a regional perspective, and did not distinguish between conservation resulting from specific programs (incentive programs initiated by utilities or state or federal agencies to encourage conservation efforts) and conservation motivated by rising prices of electricity (whether the price is generated by rate restructuring, by directly or indirectly controlled load management techniques, or simply by market conditions). The Council defined the technical potential for conservation and the estimates of achievable conservation after extensive and detailed analyses, and developed price-related supply curves for the various conservation measures applicable to each of the economic sectors. The conservation measures included space conditioning and water heating, the two largest single categories of consumption in the residential sector (which covered both new and older residences), and the application of energy-efficient appliances. In the commercial sector, the Council identified the consumption of typical existing buildings and new commercial buildings, and developed the potentially achievable conservation in these buildings; the Council also defined the potentially available conservation in waste water treatment. The Council developed the consumption patterns for 10 existing commercial buildings, for each building, evaluated three primary types of conservation options, lighting measures, structural improvements, and space conditioning (heating, ventilation, and cooling). The conservation assumed for new buildings reflected the improvements that would result from using model conservation standards based on building practices developed by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and stipulated in ASHRAE 90-80E.

In wastewater treatment plants, the treatment processes (pumping, aeration, and sludge treatment), account for the largest uses of energy. Energy required for lighting and space conditioning is less significant. Of the 15 energy conservation measures analyzed, only one was not cost-effective.

In the industrial sector, uses of electricity are more diverse and conservation potential is more site-secific than in the other sectors; also, energy use data are considered proprietary by many industries. The industrial sector consumed about 39 percent of the firm load in 1983. About 45 percent of that was consumed by the direct service industries (DSI), mainly aluminum companies with some chemical producers and other primary metal producers. Among the nonDSI consumers, the largest are those that use lumber and wood products, pulp and paper, chemicals, food processing, and primary metals, these represent about 85 percent of the nonDSI demand. Because of shortcomings in earlier studies and because of the problems already discussed, the Council based its estimate of conservation potential for the industrial sector on surveys, conducted by industry trade associations, of more than 200 industrial firms in the Northwest. In these surveys the trade associations requested estimates of how much conservation would be available at specific prices in each of four areas (motors, motor controls, lighting, and an "other site, or firm, specific" category), the equipment lifetime in each of the categories, and the amount of cogeneration that would be available at specific prices. The Council plan included 100 percent of the total amount of conservation identified by the plant managers as achievable in the survey.

Conservation opportunities considered in the irrigation sector were fittings redesign, mainline modifications, improved scheduling, and low pressure irrigation on center-pivot, side-roll, and handmove systems. Estimates of available conservation were developed for both existing and new acreages.

The 1986 Plan incorporates conservation resources as the highest priority resource available to the Northwest and makes conservation a key ingredient in the plan. In determining the available cost-effective conservation resources, the Council considered four ways of defining cost-effectiveness and chose the method giving the highest value as the soundest level of costeffectiveness for conservation. The resource portfolios previously described reflect the installation of conservation resources that are based on this cost-effectiveness criterion.

2.2.6 No-Action Alternative

The no-action alternative would constitute a denial of all of the applications for license to construct, maintain, and operate the proposed projects. This alternative would mean that the potential electric energy that could be derived by developing

the falling water energy at the proposed sites in the Snake River Basin would be unused.

The no-action alternative for each of the proposed sites would preserve the existing fish, wildlife, vegetative, recreational, aesthetic, archeological, and socioeconomic values of the sites, as described in section 3.1, but these resources would be subject to the impacts of land and water use from commercial activities in and outside of the Snake River Basin.

Currently, there is no need for additional resources to allow the region to meet its electrical power requirements. If none of the proposed projects is constructed, there will be no pressing need for additional resources for a number of years. When the need for additional resources develops in the future, it could be met with any combination of potential resources from the Council's portfolio.

If the Commission selects the no-action alternative, there would be no danger of causing a power shortage in the region; all that would be lost would be the economic benefits of the proposed projects and the benefits associated with reducing the burning of fossil fuels by the use of a renewable resource.

If the Commission selects the no-action alternative, it is probable that some or all of the proposed project sites would never be developed. Because of the loss of tax incentives, the potential for changes in the laws that govern the market for power from private projects, and the potential for increases in the cost of money in the future, it is probable that denial of licenses for the proposed projects would foreclose the development of the proposed project sites well beyond the time of need for additonal resources projected by the Council.

2.3 DESIGN ALTERNATIVES

2.3.1 Location

The staff developed three alternatives, close to the project locations proposed by the applicants (section 2.1.1.).

2.3.1.1 Milner Project

The staff developed two Milner Design Alternatives, no. 1 and no. 2 (figure 2-2), at reconnaissance level, using information from license applications, site maps, public meetings, and staff visits. Those alternatives would be located in the proposed project area. Both alternatives would modify the powerhouse location by moving it upstream, minimizing the length of Snake River bypassed by flows used for power generation. Alternative no. 1 would locate the powerhouse at the dam; alternative no. 2 would locate the powerhouse near county road 1300S bridge, about 2,000 feet downstream from Milner dam.

2.3.1.2 Star Falls Project

The staff's Star Falls alternative (figure 2-8) is the applicant's favored configuration. It would be located in the proposed project area, but would extend the tailrace approximately 800 feet downstream through Basalt Falls so as to capture 8.5 feet of additional project head.

2.3.2 Alternative Design Project Facilities

2.3.2.1 Milner Design Alternative no. 1

This alternative (figure 2-2) would include the existing Milner dam and reservoir and the following additional facilities: (1) an intake structure with provisions for winter operation and the handling of ice; (2) a penstock, 50 feet long and 17 feet in diameter, to convey flows from the intake to the powerhouse; (3) a concrete and steel powerhouse, below the dam, containing a Kaplan turbine generator unit of 14.5-MW capacity (4) a tailrace; (5) a switchyard; (6) 2 miles of access road; and (7) 2 miles of transmission line. Estimated annual generation would be 47 GWh.

The estimated cost of this alternative is $19,200,000 in 1984 dollars.

2.3.2.2 Milner Design Alternative no. 2

This alternative (figure 2-2) would include the following additional facilities: (1) a modified North Side Main Canal to convey both power and irrigation flows; (2) a modified canal control structure for revised operation; (3) a wasteway along the left side of the existing North Side Main canal to facilitate operation during freezing weather; (4) a forebay and inlet structure to convey flows between the expanded canal and the penstock; (5) a penstock, 17 feet in diameter and over 100 feet long, to convey flows from the inlet structure to the powerhouse; (6) a concrete and steel powerhouse containing a Kaplan turbine generator unit of 19.9-MW capacity; (7) a tailrace; (8) a switchyard; (9) a 2-mile-long transmission line; and (10) 3 miles of access road. Estimated annual generation would be 64 GHh.

The estimated cost of this alternative is $27,000,000 in 1984 dollars.

2.3.2.3 Star Falls Design Alternative

This alternative (figure 2-8) would be similar to the proposed project described in section 2.1.2., with the following modifications.

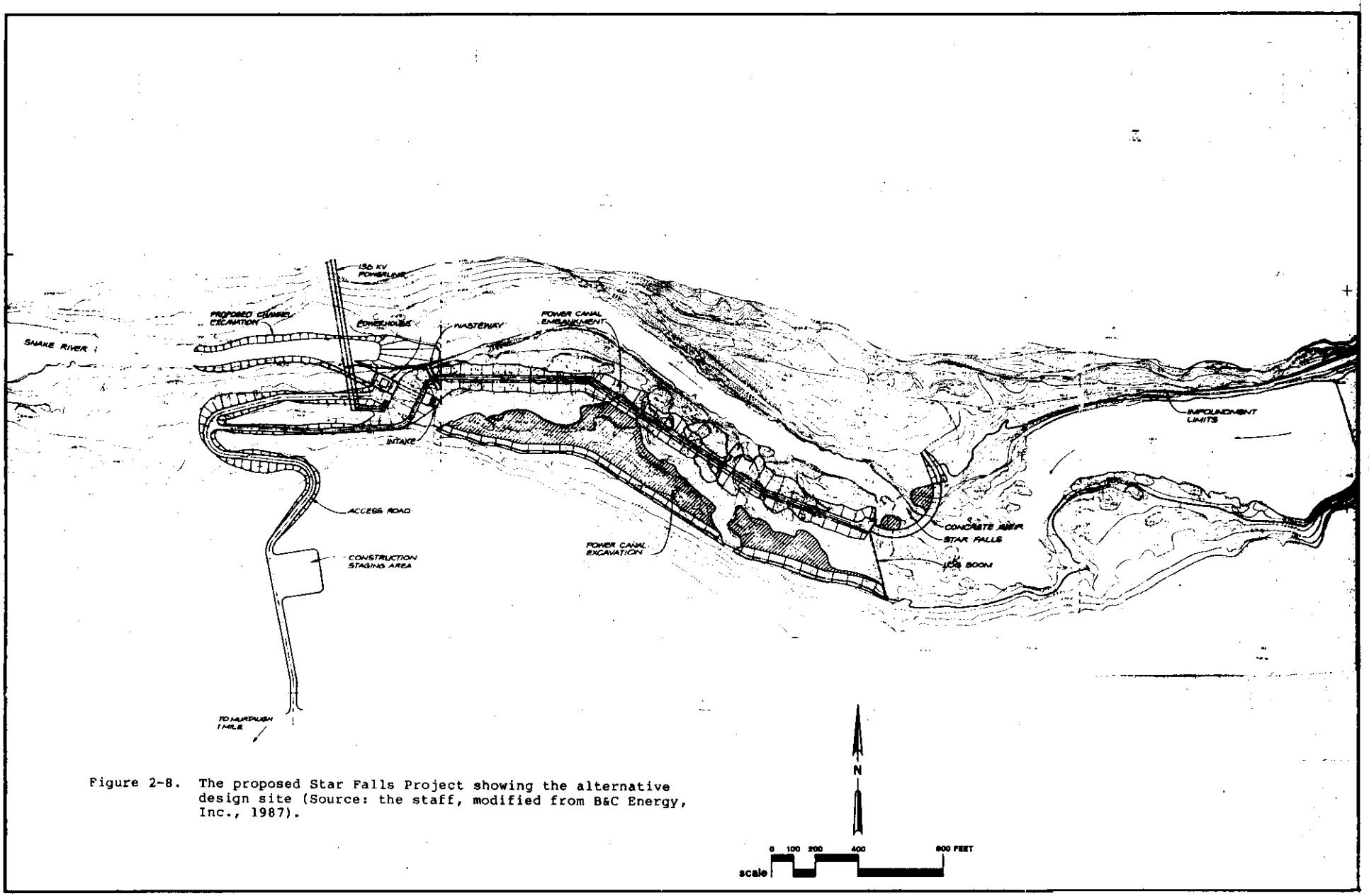


Figure 2-8. The proposed Star Falls Project showing the alternative design site (Source: the staff, modified from B&C Energy, Inc., 1987).

(1) The Snake River channel would be excavated to capture the falls (Basalt Falls) below the tailrace and to increase the project head; the channel excavation would vary from 10 to 12 feet in depth, would be approximately 800 feet long, and would require the removal of 40,000 cubic yards of river bottom. (2) The powerhouse foundation would be 8.5 feet below that originally proposed. (3) The penstock length would be increased 13 feet. (4) The installed capacity would be 32.9 MW. (5) The estimated annual generation would be 99,366,000 kWh.

The estimated cost would be $37,520,000 in 1986 dollars.

2.3.3 Construction Requirements

If a proposed project is licensed, the licensee would be required to provide construction plans and specifications for Commission approval before starting construction. During construction, the Commission's Regional Office staff would inspect the project periodically for adherance to construction plans and specifications and for observance of accepted engineering practices and procedures.

The staff would verify if the construction procedures conform to special articles; the licensee would have to exert special effort in controlling construction-related sediment and installing project construction cofferdams.

2.3.3.1 Operation and Maintenance

2.3.3.1.1 Construction Schedule

The construction schedule of the design alternatives would be the same as the construction schedule of the proposed project (section 2.1.3.1.).

2.3.1.2 Operation

All three design alternatives would be operated in the same way as the proposed projects.

2.4 ECONOMIC COMPARISON OF PROPOSED PROJECTS AND ALTERNATIVES

The staff has studied the economics of the proposed projects and the potential alternatives. The estimated construction costs developed by the applicants for the hydroelectric projects were escalated by the staff to the midpoint of construction, assuming the projects would come on line in 1992. The staff based the projected escalation rate for hydroelectric construction on Bureau of Reclamation construction costs indices for the past 5 years.

Based on the 1986 Tax Reform Act, the staff made the following Economic analyses assumptions.

Factor	Value
Tax credits	
Private developer (new dam)	0 percent
Municipal developer	0 percent
On-line date	January 1, 1992
Financing term	30 years
Term of analysis (the length of a Commission license)	50 years
Insurance cost	0.25 percent of investment
Construction, operation, and maintenance escalation	5.4 percent

The staff based operation, maintenance, administrative and general costs for the hydroelectric plants included in the analysis on the hydroelectric industry averages; these were escalated for the first 10 years of the project's life, held at zero escalation for over 40 years, and levelized over the term of the analyses. All of the privately developed projects were assumed to pay the same rate of federal, state, and local taxes.

A summary of the economic analyses for the proposed alternative projects is shown in table 2-2. In analyzing the projects in table 2-2, the staff assumed an 11-percent interest rate for private developers and a 9-percent interest rate for municipal developers. In all cases, the discount rate or opportunity cost of money was assumed to equal the cost of money.

The staff compared the levelized annual cost of the hydroelectric project to the levelized cost of producing an equivalent amount of power from a generic, coal-fired, steam-electric plant in the Pacific Northwest. The staff used the Council's 1986 Northwest Conservation and Electric Power Plan to develop the methodology for levelizing the cost of power from a generic coal-fired, steam-electric plant. The Pacific Northwest region is predominantly a hydropower resource area, and has problems meeting energy requirements in adverse water years. Based on the Council's Plan, and assuming a median-high load growth scenario and the development of the Council's resource portfolio, the region may become energy deficient in 2002. New powerplants then would have to be constructed. Since the region will be energy sufficient until 2002, the value of new hydroelectric energy for the region should be

based only on the incremental cost of fuel and variable operation and maintenance charges. After 2002, the value of hydroelectric energy should be based on the full avoided cost of energy from new coal-fueled, stream-electric plants, including the fixed capital and fixed operation and maintenance, as well as the variable, costs (including fuel and variable operation and maintenance costs). The levelized cost of energy from a coal-fueled, steam-electric plant is summerized in table 2-3.

Table 2-2. Economic comparison of proposed hydroelectric projects and the design alternatives (Source: the staff).

Project	Installed Capacity (kilowatts)	Total on-line capital cost ($ million) 1/	Levelized Cost (mills/ kilowatt-hours(kWH) 2/	Estimated average annual energy gigawatt-hours	Levelized net benefits (mills/kWh) 3/
Milner	43.65	59.4	57.9	142.0	25.2
Star Falls	29.7	45.5	77.2	90.4	8.5
Star Falls Design Alternative	32.9	48.81	75.3	99.4	10.4
Twin Falls 4/	42.51	44.3	73.1	120.0	12.6
Auger Falls	43.6	86.2	74.0	157.6	11.7

1/ Total estimated costs to place project in operation January 1, 1992, including interest during construction. Construction costs were escalated to midpoint of construction. Interest during construction for all projects was assumed to be 11 percent for private developments and 9 percent for municipal developments.

2/ 50-year, present-worth-levelized annual costs are based upon 11 percent cost of money for private developments and 9 percent for municipal developments. Annual cost for private development includes insurance, federal, state, and local taxes, and operation, maintenance, administrative, and general costs, escalated for 10 years into the future.

3/ Net annual benefits are based on the levelized value of energy from a coal-fired, steam-electric plant in the Pacific Northwest.

4/ An existing 9-MW generator is currently licensed. All data refer to the proposed expansion only.

Table 2-3 Levelized cost of energy from a coal-fueled, steam-electric plant (Source: the staff). 1/, 2/

Interest (percent)	Private Development (mills/kWH)	Municipal Development (mills/kWh)
9	-	83.12
11	85.75	-

1/ All costs and escalation rates were adopted from the Pacific Northwest Power Planning Council's 1986 Power Plan. Levelized costs are in 1992 dollars.

2/ Study assumptions:

capital cost of coal-fueled, steam-electric plant are $3,068/kWh, January 2002, without interest during construction;

fuel costs are 20 mills/kWh, January 1985; fixed operation and maintenance costs are 3.8 mills in 1992; variable operation and maintenance costs are 1.55 mills in 1992;

escalation rates for capital escalation, operation, and maintenance are 5.4 percent and for delivered fuel are 6 percent.

3 THE AFFECTED ENVIRONMENT

3.1 METEOROLOGY

3.1.1 Climate

The climate of the project area is semiarid and is characterized by hot, dry summers, cold winters, and windy springs. Average annual precipitation in the project area is around 9 inches, including an average snowfall of about 25 inches from November through March. Precipiation is fairly consistent throughout the year, except from July through September, when the total for the 3 months is less than 1 inch, well below the monthly average. January and July are the coldest and warmest months with average temperatures of 29.4 °F and 72.7 °F, respectively. During the summer, temperatures in excess of 100 °F are common inside the Snake River Canyon. Microclimatic conditions in the canyon occur at springs, near steep canyon walls, or at other geologic features that cause the climate to vary at the site.

3.1.2 Air Quality

The rural nature of the proposed project area and the lack of commercial development in much of the study reach of the Snake River Canyon result in good to excellent air quality (personal communication, James Close, Senior Air Quality Specialist, Division of Environment, Idaho Department of Health and Welfare, Twin Falls, Idaho, March 25, 1987). The nearest air quality monitoring station is at Kimberly, Idaho, about 3.5 miles south of the canyon. Dust particles, composed of natural soil particles, become more abundant in the air during the spring and fall, when farmers are tilling the fields, but the air quality remains generally excellent.

3.1.3 Noise

Wind and rushing water are the primary sources of noise in the Snake River Canyon. The natural waterfalls within the 32-mile-long study reach create a low rumble that can be heard from the canyon rim.

3.2 LAND FEATURES AND GEOLOGY

3.2.1 Physiography and Topography

The four proposed projects would be located in the Snake River Canyon, in the west-central Snake River Plain in southern Idaho (figures 2-1 and 3-1). In the study reach from Milner dam downstream to the proposed powerhouse site for the Auger Falls Project, the canyon is a steep-sided trench, cut into the relatively flat, surrounding plain (figure 3-2).

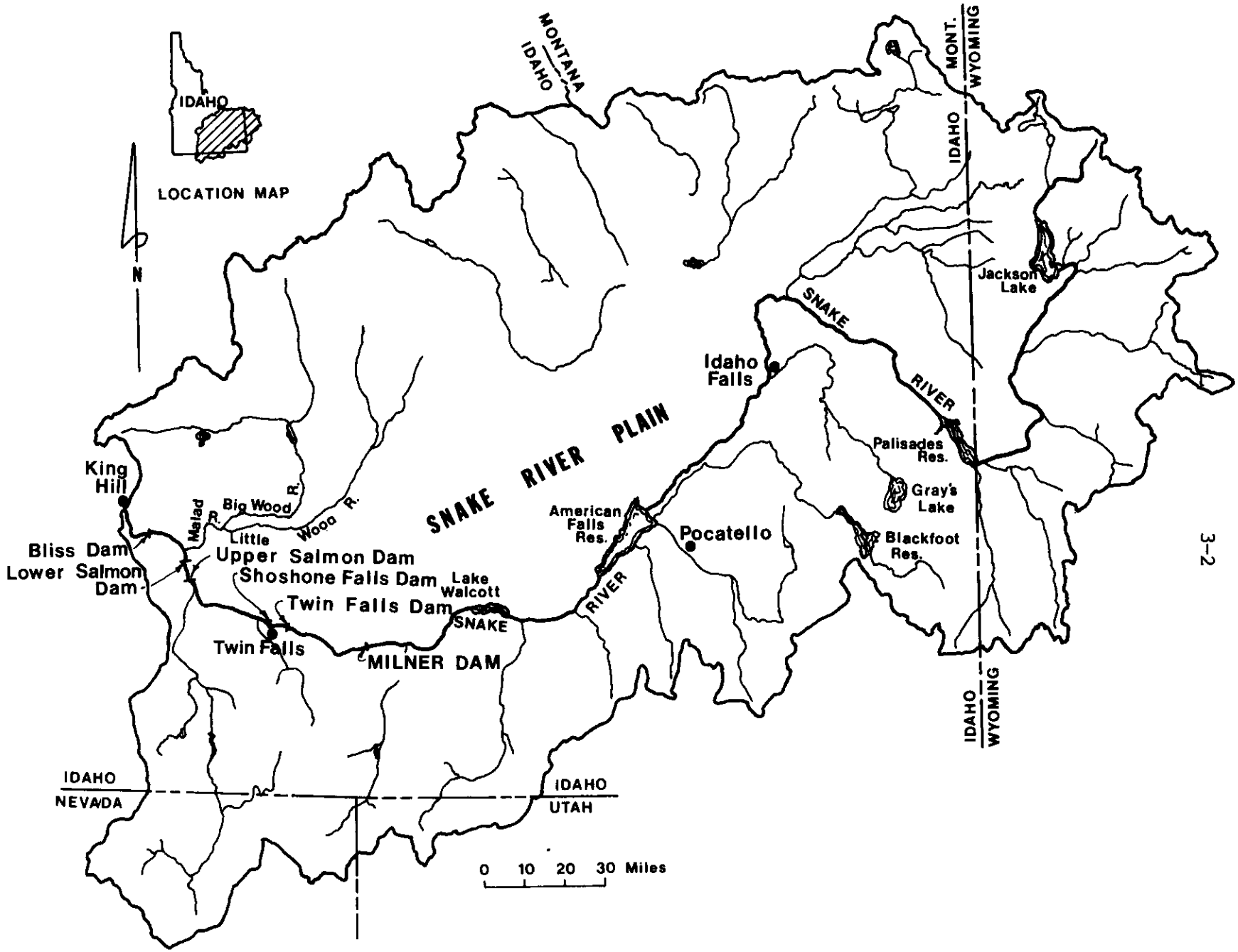


Figure 3-1. The Upper Snake River Basin showing the locations of major dams and reservoirs on the Snake River (Source: the staff, modified from Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

The main canyon is about 130 feet deep at the upper end and nearly 500 feet deep at the lower end of the study reach. The canyon progressively widens; it is about 600 feet wide at Milner dam and about 4,800 feet wide near the entrance of Rock Creek, in the lowermost portion of the study reach, and close to the proposed powerhouse site for the Auger Falls Project. More than three-quarters of the canyon is 600 to 1,100 feet wide from rim to rim; at a point near the Perrine Memorial Bridge (Perrine Bridge) crossing on U.S. Highway 93, about 1 mile north of Twin Falls, the canyon widens to about 4,800 feet throughout the remaining 5 miles of the study reach to Rock Creek. It is difficult to enter the canyon and to cross the canyon from the north rim to south rim; access is limited to a few roads and trails (figure 3-2). In most of the study reach, travel along the canyon floor is possible only by boat or raft, except for the reach below the Perrine Bridge.

Both canyon walls are relatively smooth, straight, and composed of basalt (Malde, 1968); these walls are relatively unbroken, except for the entrance of Dry Creek, about 5 miles below Milner dam, and the entrance of Rock Creek in the lowermost end of the study reach. There are a number of small tributaries and irrigation returns entering the Snake River in the study reach, but Rock Creek forms the largest canyon.

Four major waterfalls occur in the Snake River Canyon reach under study (figure 3-2): the 212-foot Shoshone Falls (figures 3-3 and 3-4), the 130-foot Twin Falls (figures 3-5, 3-6, and 3-7), the 36-foot Star Falls (figures 3-8 and 3-9), and Auger Falls (figures 3-10), a cascade that drops 55 feet over a distance of 1,500 feet. There are also two major dams associated with existing hydropower facilities at Shoshone Falls and Twin Falls; these structures form large reservoirs in the canyon.

The Snake River Canyon forms a chute, with the river occupying the floor of the canyon from wall to wall throughout most of the study reach, until it reaches the Perrine Bridge, where the canyon expands and where the river meanders through the river bottomlands to the end of the study reach at Rock Creek. A short distance below an abandoned haul road bridge, about 3 miles west of the Perrine Bridge, the river enters another smaller chute within the main canyon, before reaching Rock Creek. The smaller chute, which contains Auger Falls, has the talus slopes of the 375-foot-tall north canyon wall on the north bank and the 70- to 80-foot-tall steep cliff on the south bank.

3.2.2 Geology and Soils

The Snake River Plain is a broad, bowed depression that extends more than 300 miles across southern Idaho; it is composed of basalt lava flows about 4,000 feet thick. The geologic units within the 32-mile-long study reach are part of a unique complex of repeated

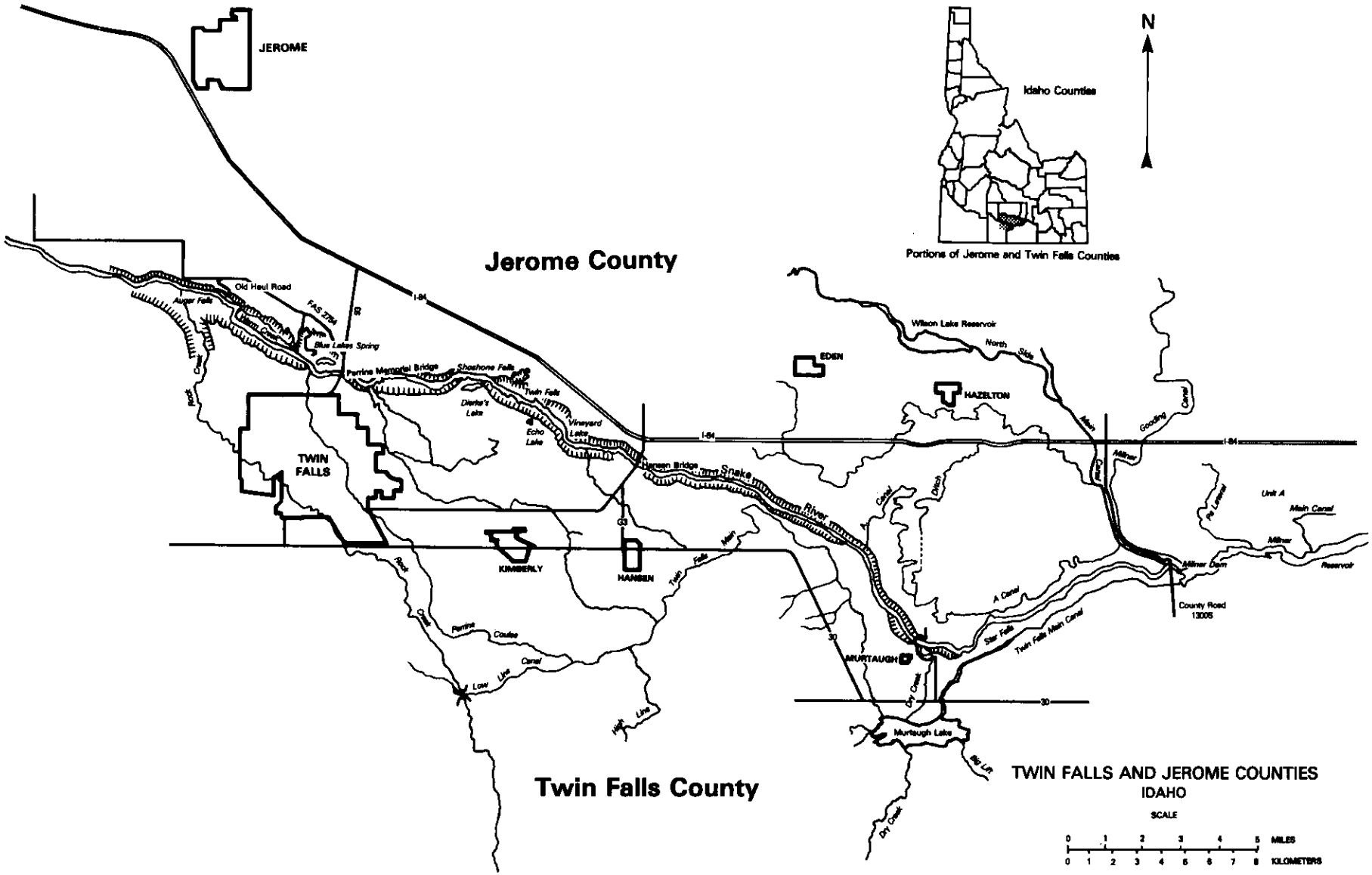


Figure 3-2. The 32-mile-long study reach of the Snake River between Milner dam and Rock Creek, showing the four major waterfalls, roads crossing the Snake River Canyon, and portions of the major irrigation canals (Source: the staff).

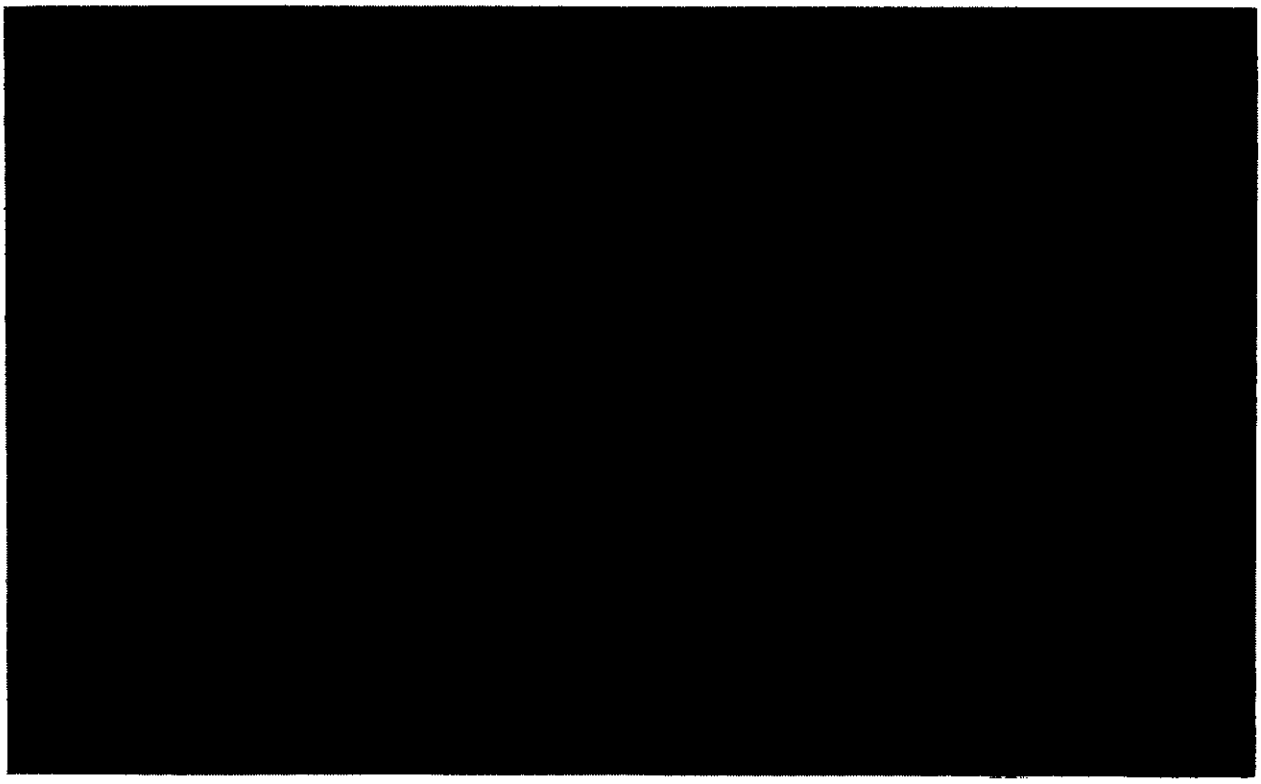


Figure 3-3. Shoshone Falls on December 10, 1986, with flows of about 10,400 cubic feet per second. The Shoshone Falls powerhouse (lower left) is almost completely obscured by mist from the falls (Source: the staff, photograph by Lee Emery).

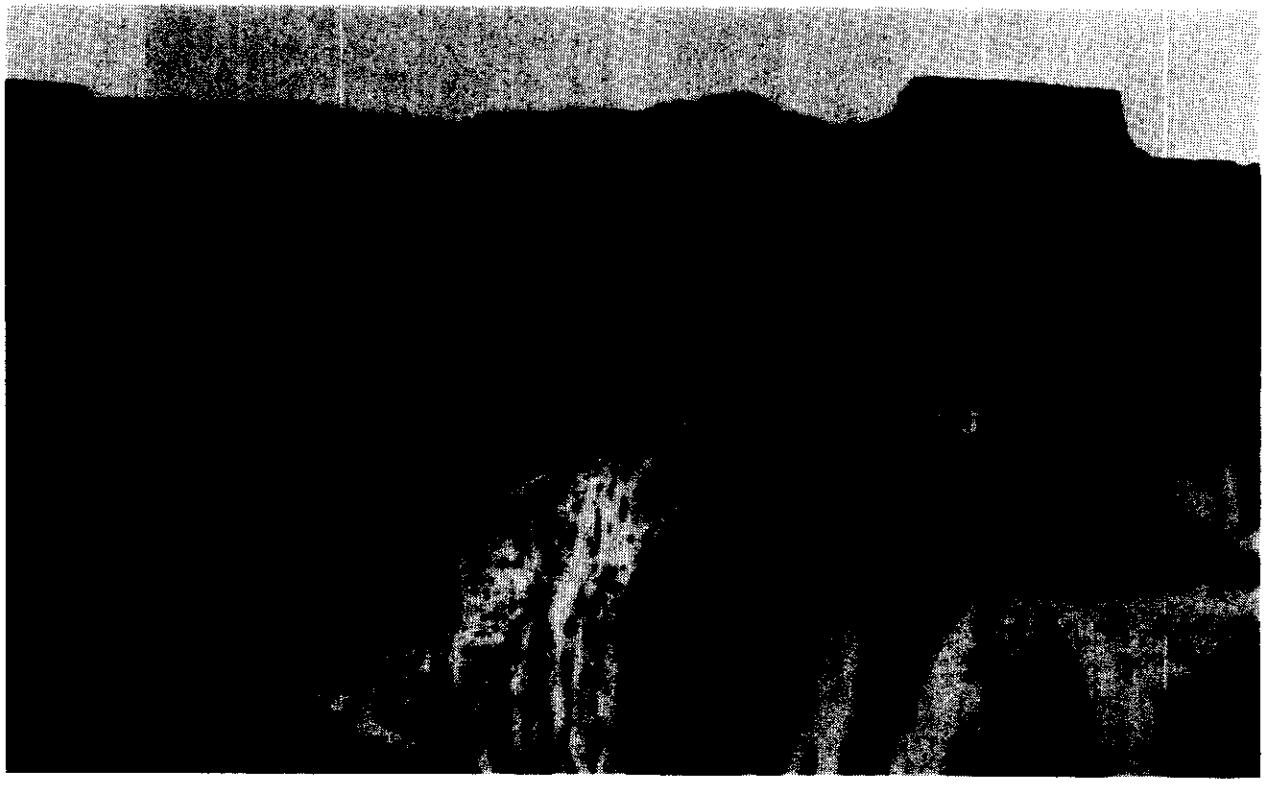


Figure 3-4. Shoshone Falls on June 1, 1987, with flows greatly reduced to about 80 cubic feet per second by irrigation diversions upstream at Milner dam and by the operation of three generating units at the Shoshone Falls Project (Source: the staff, photograph by Kathleen Sherman).



Figure 3-5. Twin Falls around 1914, before hydropower development at the site (Source: Twin Falls Historical Society).

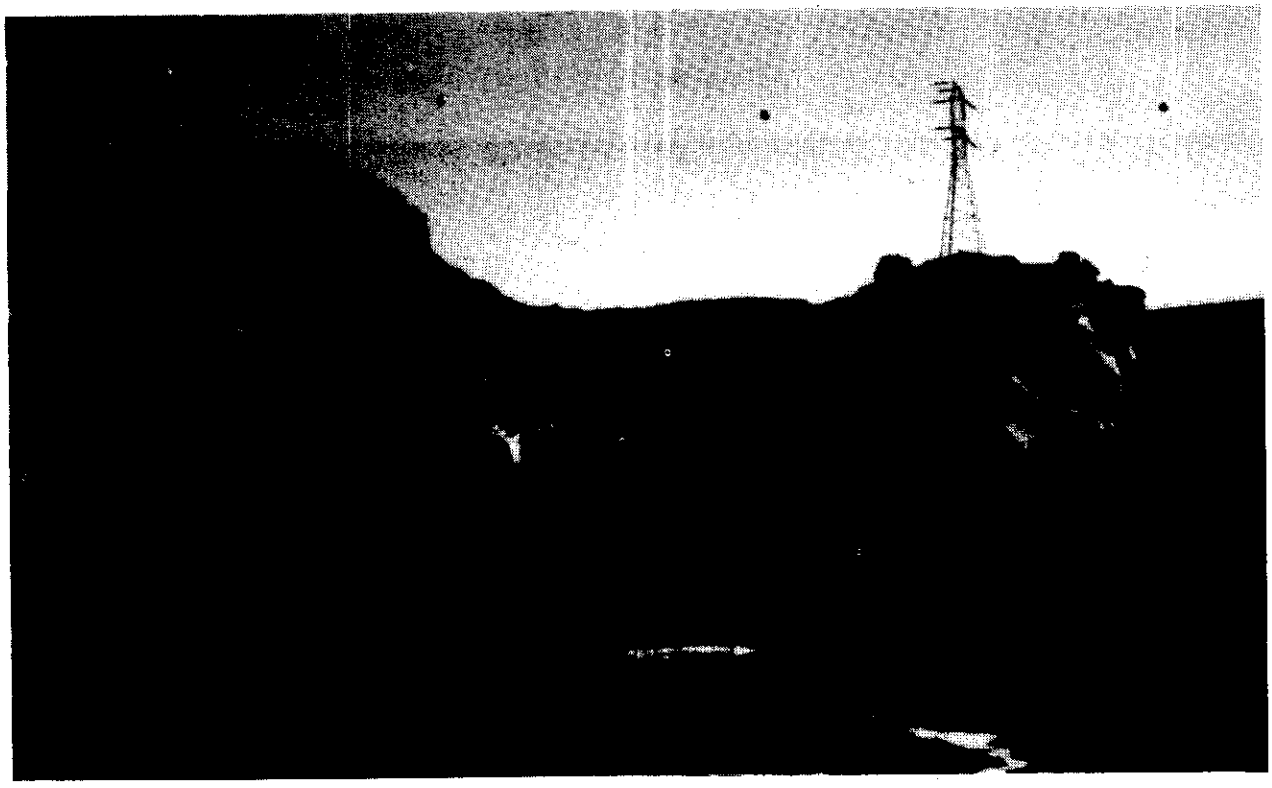


Figure 3-6. Twin Falls on November 4, 1986, with flows of about 2,800 cubic feet per second. (On the extreme right of the picture is a wall of the dam which is part of the existing Twin Falls Project)(Source: the staff, photograph by Lee Emery).

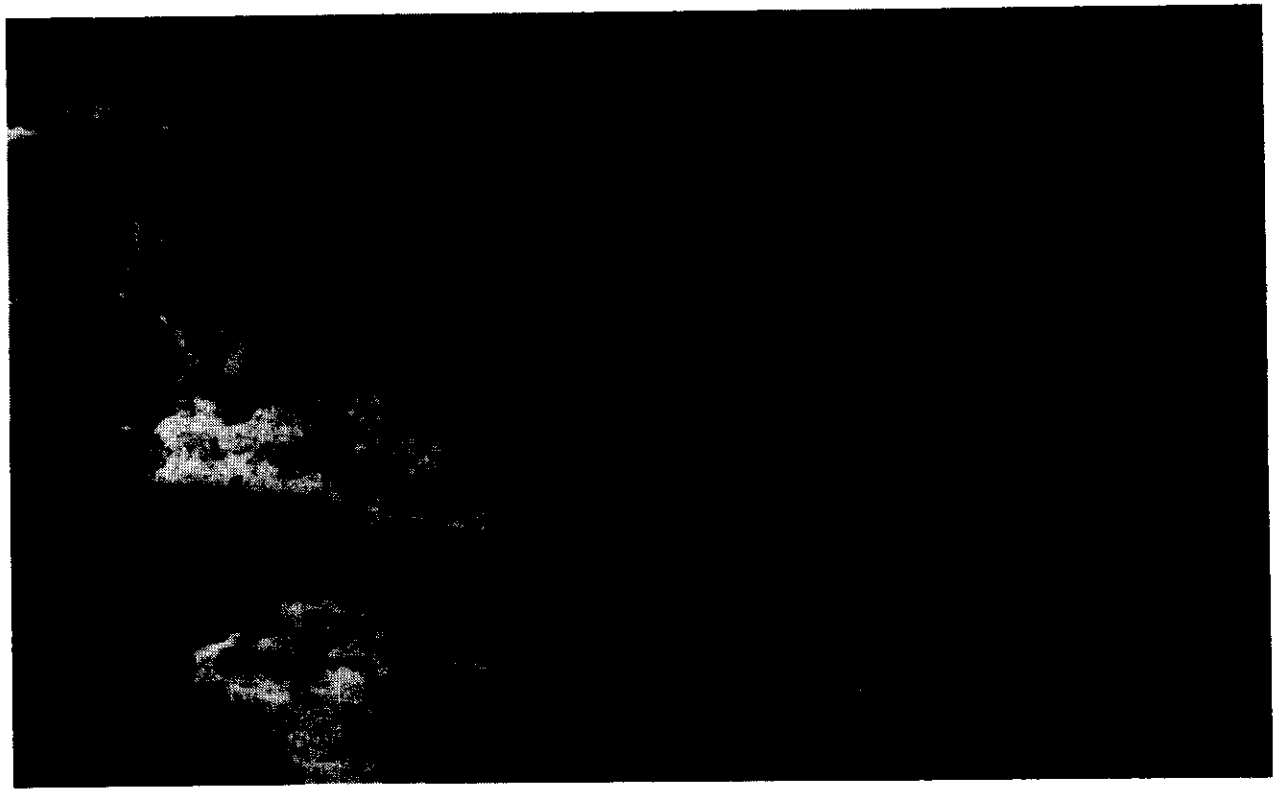


Figure 3-7. Twin Falls on June 2, 1987, with flows of less than 10 cubic feet per second. The river flows over the falls are drastically reduced by irrigation diversions upstream at Milner dam and by the operating Twin Falls Project. (The dam and portions of the existing Twin Falls Powerhouse are on the right side of the picture) (Source: the staff, photograph by Kathleen Sherman).

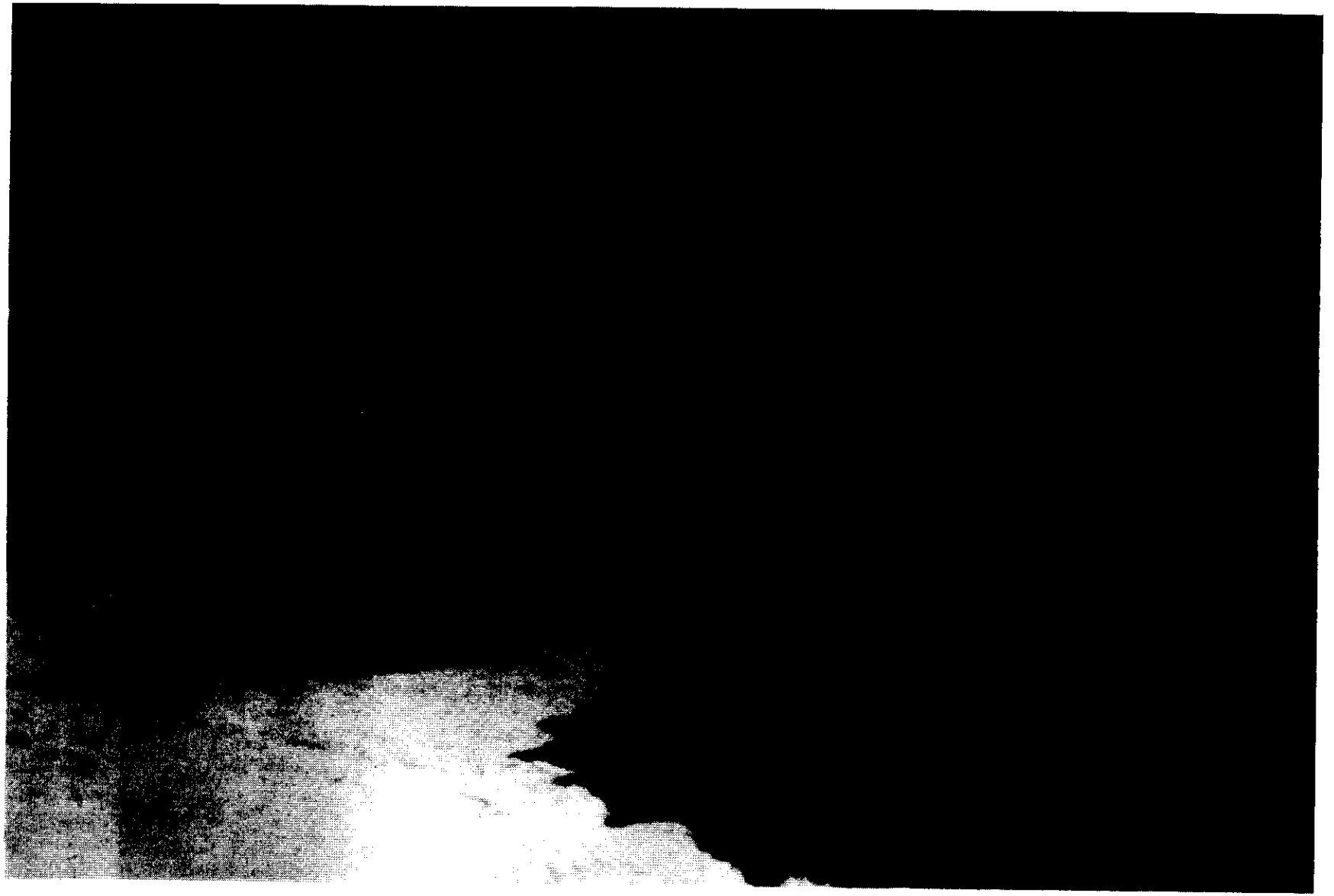


Figure 3-8. Star Falls on November 3, 1986, with flows of about 6,600 cubic feet per second. (These and other higher water flows produce smaller cascades similar to the ones seen on the right side of the photograph)(Source: the staff, photograph by Alan Mitchnick).

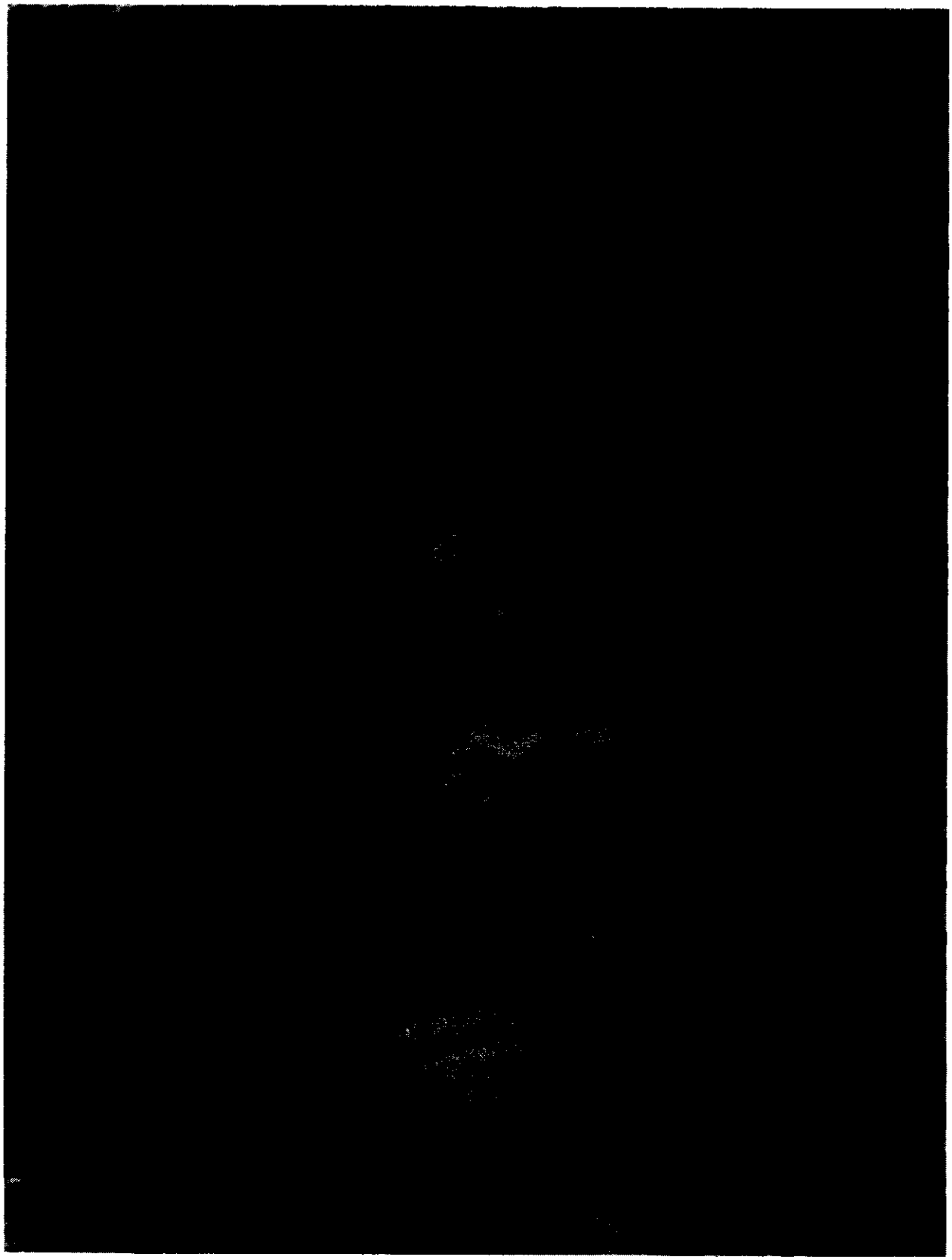


Figure 3-9. Star Falls on June 2, 1987, with flows of about 39 cubic feet per second. The flows illustrate the effects of the diversion of river water at Milner dam for irrigation (Source: the staff, photograph by John Estep).

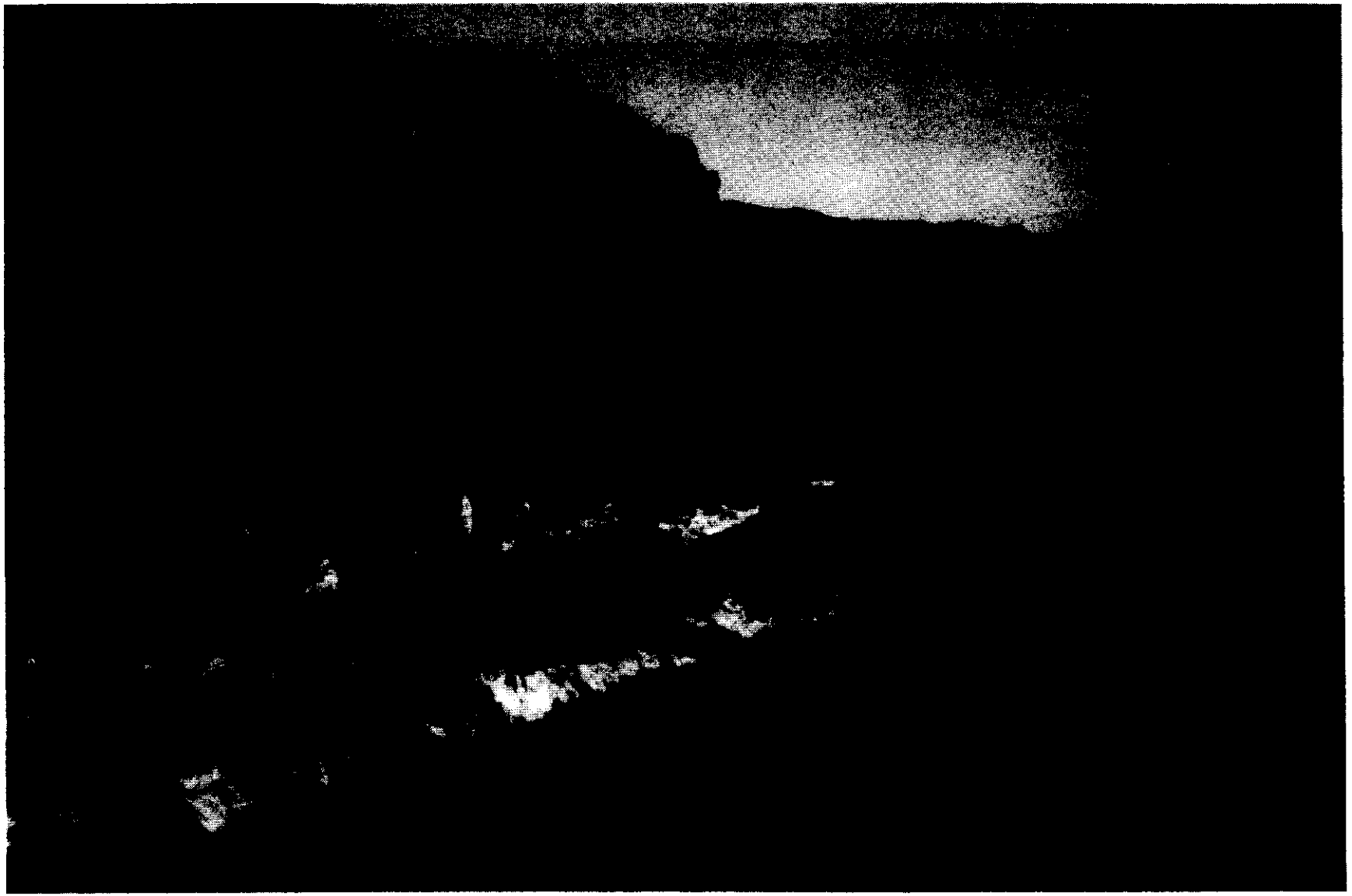


Figure 3-10. Auger Falls on November 5, 1986, with flows of about 1,800 cubic feet per second (Source: the staff, photograph by Lee Emery).

basaltic lava flows, pillow lavas, canyon fillings and cuttings by the Snake River, and river and sedimentary beds formed by large ancestral lakes. The geologic features include deposits associated with the catastrophic Bonneville flood, which flowed through the canyon about 20,000 to 30,000 years ago. One such feature is a 1,500-foot-long gravel bar along the north bank of the canyon, near Star Falls. The Bonneville flood also may have been responsible for the removal from the canyon floor of much detritus (rock fragments or loose material caused by disintegration), as well as for the erratic deposition of well-rounded basalt boulders, from 2 to 10 feet in diameter, with other poorly sorted basaltic sand mixtures in bars 5 to 20 feet thick (commonly referred to as Melon gravels).

The jet-black basalt bedrock is exposed in the steep-sided, canyon walls. The basalt is resistant to weathering and dominates the chute in the project reach. Weathering and other geologic activities have changed some portions of the canyon walls; blocks of basalt have broken free from the walls to form talus slopes along the base of the walls. Throughout the study reach, the exposed basalt walls have been extensively jointed. The columnar jointing occurred many years ago, as a result of the contraction of lava during cooling. The vertical joints are generally spread 2 to 3 feet apart. The horizontal jointing, with joints spaced from a few inches to more than 20 feet, also was caused by the cooling of lava flow bedding. In some portions of the study reach, the basalt flows are interbedded with stream and lake deposits. The basalt flow layers along the canyon walls have varying densities, because of the presence of vesicles caused by the gas escaping from the hot lava during cooling. Vesicular basalt is porous, permeable rock.

Talus slopes occur throughout most of the 32-mile-long study reach; they are best developed in the lower 5 miles of the canyon, below the Perrine Bridge, where they extend from the base of the walls to nearly two-thirds the height of the wall (figure 3-10). The talus is composed of large angular blocks of basalt that have been broken away from the canyon wall by weathering. Unconsolidated deposits along the base of the canyon walls also include Melon gravels, alluvium (stream deposits of silt, sand, and gravel), and colluvium (a mixture of loose rock debris and soil that has accumulated on the slopes).

Water infiltrates into the fractured basalt near the canyon, and forms seeps and springs at many different altitudes above the canyon floor. The location and magnitude of discharge of springs is highly variable; most issue from the north wall of the canyon. The area of springs along the north side of the Snake River between Milner dam and King Hill, Idaho, is commonly referred to as the Thousand Springs area (Covington et al., 1985), although more specifically, Thousand Springs is located in section 8, township

8 south, range 14 east, and is a group of springs along a 1-mile reach of the river, about 5 miles southeast of Hagerman, Idaho (personal communication, Gerald F. Lindholm, Hydrologist, Geological Survey, Boise, Idaho, March 13, 1987).

Most discharge from the Snake River Plain aquifer, which underlies the eastern Snake River Plain, is springflow in the Thousand Springs area. Groundwater discharge to the Milner to King Hill reach totaled 4.7 million acre-feet in 1980 (personal communication, Gerald F. Lindholm, Hydrologist, Geological Survey, Boise, Idaho, July 17, 1987). The Snake River aquifer is one of the largest groundwater systems in the United States (Nace, 1973). Blue Lakes Spring is the largest spring occurring in the study reach and is located along the north canyon wall west of the Perrine Bridge. Blue Lakes Spring is the water supply source for Twin Falls, Idaho, and also provides some water to three fish hatcheries in the immediate vicinity.

Soils above the canyon rim consist primarily of varying thicknesses of loess (a wind-deposited silt and fine sand that is nonplastic and poorly compacted). These soils are subject to wind erosion when vegetative cover is removed. The areas above the canyon are extensively developed for agricultural purposes. Much of the water used for irrigation is removed from Milner reservoir and transported through a well-developed canal system that extends on both sides of the canyon to near Bliss, Idaho.

3.2.3 Geologic Hazards and Problems

Existing and potential geologic hazards within the proposed study reach include slumping, slope failure, and other forms of mass movement of soil and rock fragments, soil erosion, permeable geological formations, rockfall associated with the weathering of the canyon walls, earthquakes, and rockfalls or mass movement of rock fragments and soil associated with construction activities that include blasting or tunneling.

The proposed projects are located within the Volcanic Rift Tectonic Province, where groundshaking from seismic activity may occur. The most recent earthquake occurred on October 28, 1983; a seismic event of 6.9 magnitude on the Richter scale was centered near MacKay, Idaho.

3.2.4 Milner Project

The canyon near the project site is a narrow, steep-walled gorge carved out of basalt (figures 3-11, 3-12, and 3-13). The canyon is about 130 feet deep and about 250 feet across at the proposed powerhouse site. Talus and colluvium occur at the base of the cliffs; in other areas, the cliffs end abruptly at the rivers edge and there is no talus or colluvium. Jointing and fracturing of the basalt bedrock is common along the rim of the

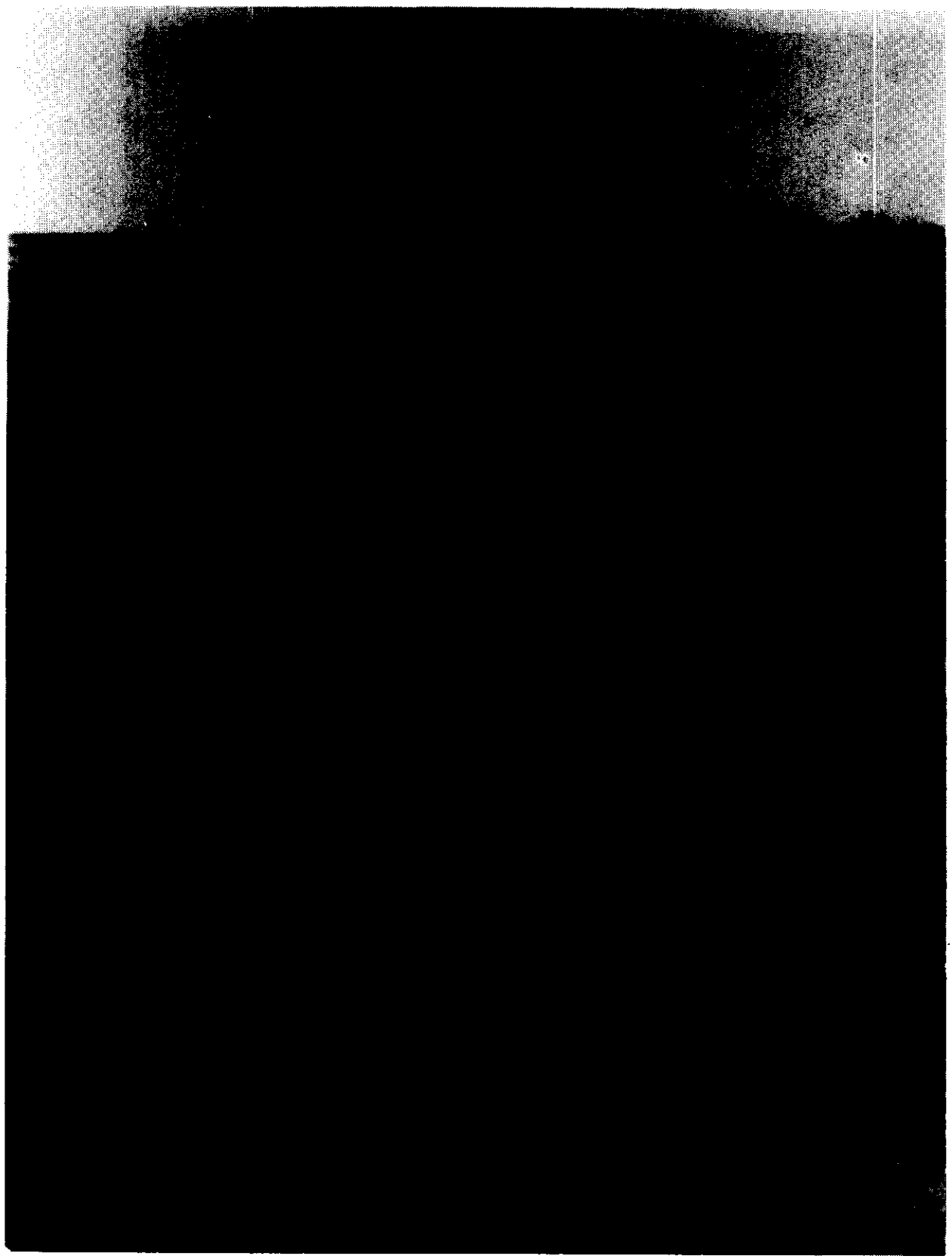


Figure 3-11. A section of the Snake River below Milner dam on November 3,1986, with flows of about 6,600 cubic feet per second. (The proposed Milner Project would bypass this whitewater stream reach)(Source: the staff, photograph by Alan Mitchnick).

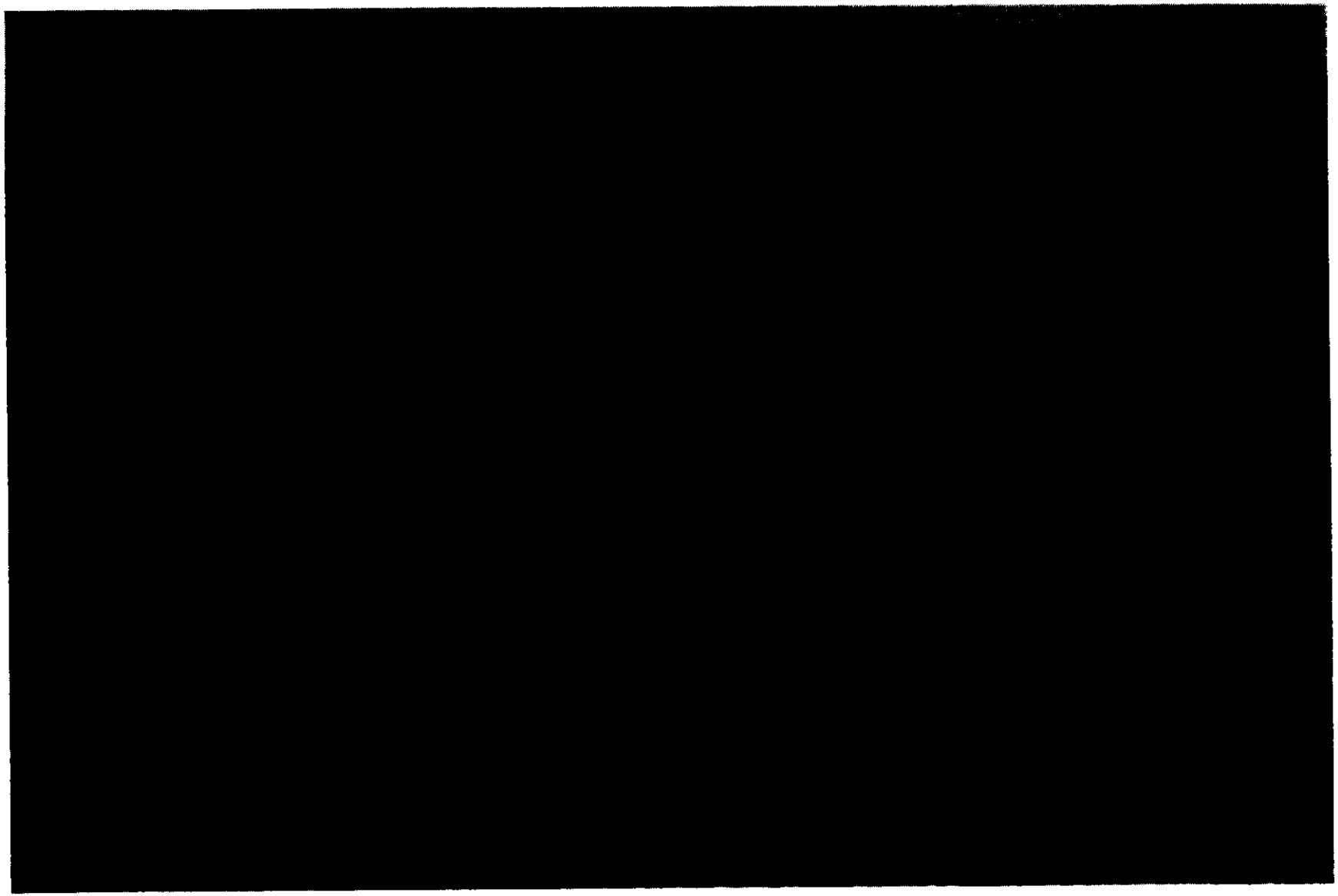


Figure 3-12. A section of the Snake River below Milner dam (same as figure 3-11) on June 3, 1987, with flows of about 39 cubic feet per second. All water has been diverted from the river for irrigation at Milner dam and the flows visible in the river represent water that is leaking through Milner dam. The powerhouse for the proposed Milner Project would be located near the center left bank of the river (Source: the staff, photograph by John Estep).

canyon, especially near the powerhouse site. Fissures and cracks are up to about 6 inches wide and ten feet deep in places. Soils consist of a thin layer of loess.

Milner dam is formed on basalt bedrock and would be unaffected by the project. The Twin Falls Main Canal, along the south canyon rim, generally parallels the canyon throughout the project reach (figure 3-2). The canal is an earth and riprap-lined canal. In some areas the canal has been excavated into the underlying basalt bedrock. Project construction would modify about 6,500 feet of the existing canal (figure 2-2) (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

The canal would be enlarged to a minimum total width of 20 feet to increase the canal capacity to 7,000 cfs. The canal would be enlarged by removing soil and rock along the south side of the canal, and by excavating into bedrock on the north side of the canal. Portions of the new canal, where the bedrock is jointed or cracked, may be subject to seepage losses. A forebay would be excavated next to the north bank of the canal, between the canyon rim and the existing canal, at a site about 5,000 feet downstream from the mouth of the canal. The forebay would be formed by embankments and some excavation below the surface. An intake structure would be constructed at the north end of the forebay nearest the canyon rim and the lowest portion of the intake, and the foundation for the embankments would be excavated into rock (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

A 385-foot-long, 17-foot-diameter steel penstock would descend about 100 feet from the forebay to the proposed powerhouse, located on a small basalt bench at the bottom of the canyon (figure 3-13). The penstock would be constructed on and anchored to the bedrock. About 180 feet of the penstock would be supported on concrete piers, where it would descend 50 feet on a gentle slope before reaching the steep south canyon wall, where it would then descend 60 feet at about a 45-degree slope down the face of the cliff to the powerhouse. Near the edge of the cliff, the upper bend of the penstock would be restrained by a concrete support anchored to bedrock. The penstock would be encased in concrete from the lower bend to the powerhouse. Powerhouse construction would include excavation into bedrock. A tailrace would be excavated 170 feet from the powerhouse to the river channel. Over 600 feet of riverbed would be excavated to lower the tailwaters (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

A concrete wasteway would be built on the north bank of the Twin Falls Main Canal, about 3,800 feet downstream from the mouth of the canal, and about 1,200 feet upstream from the proposed forebay. The wasteway would consist of a concrete struc-

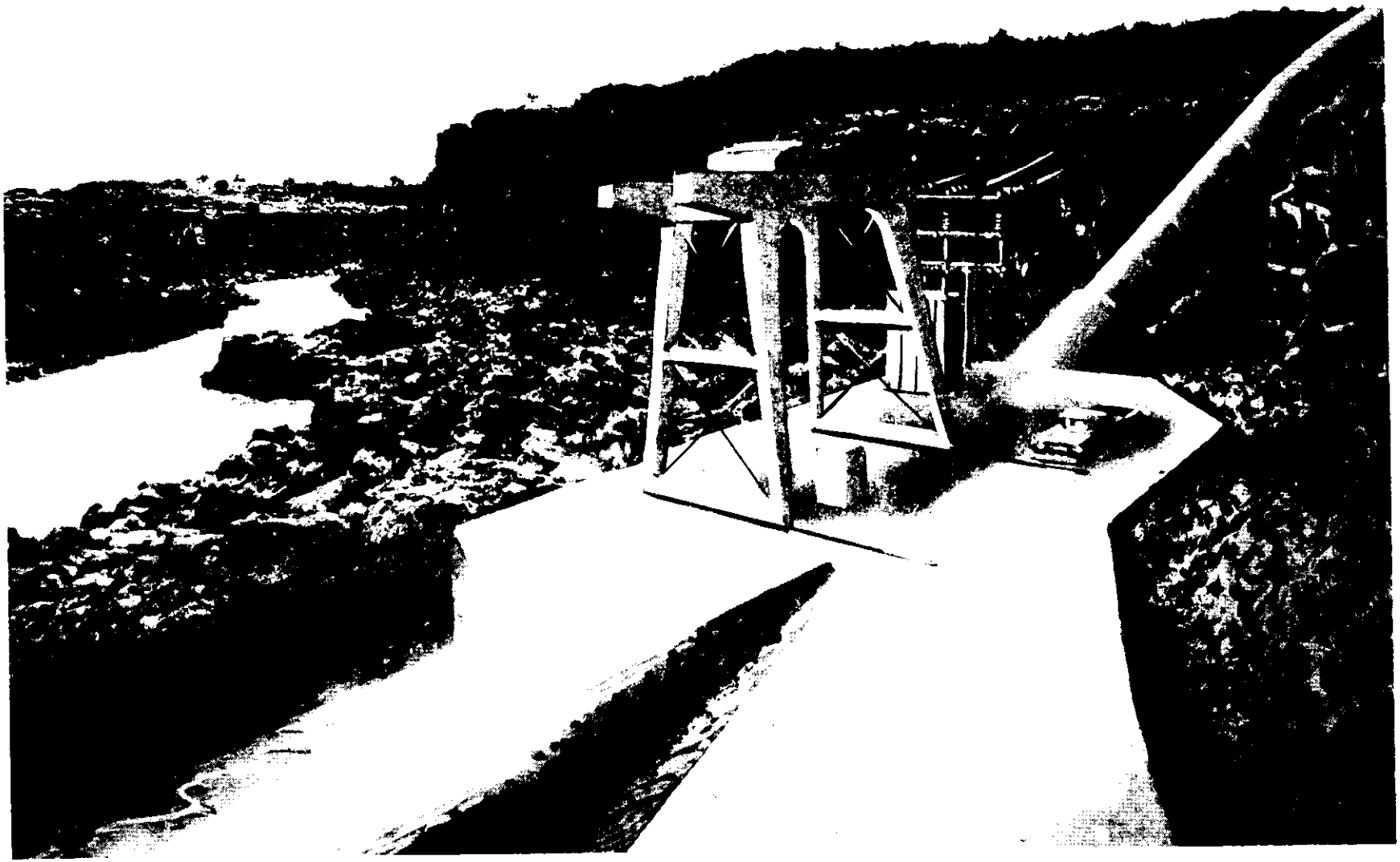


Figure 3-13. Artist's conception of penstock, powerhouse, and access road in the Snake River Canyon for the proposed Milner Project (Source: Twin Falls Canal Company and North Side Canal Company, LTD., 1984).

ture, placed on bedrock, which would sluice ice or excess water away from the canal when needed. The flows from the wasteway would pass through a rock channel to the canyon rim, and over portions of the sparsely vegetated land surface through an existing natural channel to the Snake River (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

A 2,300-foot-long access road would lead from the canal embankment road near the forebay to the powerhouse. The first 1,700 feet of the road would be relatively flat until it reaches the canyon rim. The road would descend from the canyon rim, 45 feet into the canyon, on a 10-percent maximum grade, in a side-hill cut to the powerhouse. This 600-foot-long road section would be cut partially into the basalt cliffs and partially through talus and colluvium (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

3.2.5 Star Falls Project

The canyon in the project area is dominated by steep walls, made of resistant, vesicular, olivine basalt flows that were successively deposited. Star Falls is formed by an eroded, discontinuous ledge of basalt that extends across the river and along a portion of the south side of the river. This basaltic rock ledge, which covers an area between Star Falls and the south canyon wall, has been extensively scoured by floodwaters, forming "scablands" (isolated, steepwalled mesas, 20 to 30 feet high, surrounded by erosion channels) (figure 3-8) (B&C Energy, Inc., 1984).

Bedrock in the project area is hard and generally unweathered, although the cracking of exposed basalt in the canyon is fairly widespread. The cracks develop from normal weathering activities such as the freezing and the thawing of water trapped in the vertical joints. Ice wedging and gravity enlarge the joints. The cracks range from a few inches to nearly 3 feet wide, are 20 to 30 feet deep, and may extend as much as 50 feet back from the rim of the canyon. Cracked bedrock is more prevalent on the south rim than on the north rim of the canyon and appears to be concentrated in areas where springs emerge from the base of the canyon wall. The cracking along the south rim of the canyon, near the proposed sites for the powerhouse, canal and dam, is relatively minor compared to the cracking upstream, in the area of the proposed project reservoir (B&C Energy, Inc., 1984).

There is a large, fan-shaped deposit of Melon gravels near the proposed powerhouse site. The rapids located immediately upriver (Amnesia Falls) and downriver (Basalt Falls) from the proposed powerhouse site also appear to consist of Melon gravels. A large, relatively thin bar of Melon gravels, on the north side of the river near the falls, is subject to local sand and gravel mining activities by the Twin Falls Construction Company (state

of Idaho Mineral Lease No. 3581-R) during periods of low flow (letter from Don F. McNarie, Land Records Specialist, Bureau of Lands, Boise, Idaho, to Thomas W. Haislip, Jr., Environmental Project Manger, CH_2M Hill Engineers, Boise, Idaho, October 24, 1984). There is currently a single placer claim for gold on a 20-acre site on the north side of the river between Star Falls and Basalt Falls; there is no evidence that gold has been recovered, and the economic potential is unknown. Thin, scattered deposits of alluvium (unconsolidated gravel, sand, and silt) occur along the river and where tributaries enter the river. On the south side of the river, the alluvium forms a thin mantle in the channels that dissect the scablands. Small piles of gravel scattered along the south bank near the proposed power canal route indicate that gold placer mining occurred in the past, and it is likely that the mining activities consisted of working the gravel trapped in potholes within the scablands (B&C Energy, Inc., 1984).

Talus aprons are more or less continuous throughout the canyon, where large angular blocks of basalt have broken away from the cliff face as a result of weathering or seismic activity, and have accumulated near the base of the cliff. The abundant talus at the base of the canyon walls appears to have accumulated since the Bonneville flood, and indicates that rockfall occurs frequently. On the south side of the river, where many of the project facilities would be located, the basaltic debris is mixed with soil, and the talus supports the growth of vegetation. Talus slopes on the north side of the river are considerably more extensive than those on the south side; little vegetation is present on the north-side talus slopes, which consist of loose rock (B&C Energy, Inc., 1984). Springs flowing from the base of the talus slopes along the south canyon wall also help to support vegetation. For the life of the project, these springs would flow into the proposed power canal, and would no longer reach the Snake River at their former entry points.

Soils within the canyon generally consist of a thin mantle of sand, gravel, and rock talus, with smaller amounts of sand and silt deposited on bedrock surfaces. Silty loam and fine sandy loam soils occur along the access road alignment. Soils above the canyon rim are nonplastic, loessial silt loams. The hazard of water erosion in the soils above the canyon is slight, because the land surface is relatively flat. These soils, however, are subject to wind erosion when vegetation is removed (B&C Energy, Inc., 1984).

On the south side of the canyon, above the proposed diversion site, small slumps appear to have been caused by breached irrigation canals, located above the rim, which probably flooded the soils, making them unstable. No other unstable or potentially unstable areas have been identified within the project area. Along the south canyon wall, talus that consists of loose rock would not be disturbed during project construction (B&C Energy, Inc., 1984).

The proposed 20-foot-high, 500-foot-long, gravity-arched concrete dam would be anchored on massive basalt and would create a 161-acre impoundment on the Snake River (figure 2-3). The power canal would be developed parallel to the south canyon wall by excavating into basalt bedrock, Melon gravels, and talus. The 2,200-foot-long power canal would be formed by the talus-covered canyon wall on the south side and by an embankment constructed of rock and earthfill on the north side. The power canal embankment would be founded on a basalt bedrock bench, below and parallel to the south canyon rim (B&C Energy, Inc., 1984).

A 21-foot-diameter, 190-foot-long penstock would extend from a penstock intake structure, at the northwest end of the power canal, to the proposed powerhouse, at the bottom of the canyon. The penstock would be buried as it descends from the bench to the powerhouse. Excavations for the powerhouse and the 200-foot-long tailrace would occur in talus and basalt bedrock. The proposed extension of the tailrace would also be excavated into basalt bedrock and alluvium (B&C Energy, Inc., 1984).

A concrete wasteway near the penstock intake would remove floating debris and ice from the power canal and would discharge over the bedrock bench and directly into the Snake River. To allow access to the power canal embankment, a 2,500-foot-long access road would be constructed from the south canyon rim to the bench along the river and would then descend to the powerhouse site. A road also would be built along the crest of the power canal embankment, and would extend from the penstock intake to the dam (B&C Energy, Inc., 1984).

3.2.6 Twin Falls Project

In the project area, the Snake River Canyon is entrenched 250 to 300 feet below the general level of the basalt plain. Bedrock consists of massive rhyolite at the base of Twin Falls and a series of jointed, fractured, basalt lava flows overlying the rhyolite (figures 3-5, 3-6, and 3-7). Bedrock is generally hard, dense, and impermeable, although there are localized zones of weak or closely fractured rock. Talus occurs at the base of the cliffs, and typically consists of large, angular basalt boulders. Where soil has accumulated, talus slopes generally support vegetation. Much of the upland area above the canyon is mantled by loess. There is little residual soil within the project area, but the soils that do occur tend to slump when wet. Erosion occurs along the existing reservoir shoreline (Idaho Power Company, 1983a).

Eolian sand (blowsand) deposited by wind has accumulated along the base of the canyon walls and may cover talus deposits. The largest deposits of blowsand within the project area are on the slopes of a small ravine, along the south bank of the river, below the dam, and near a small, unnamed stream. This stream originates

as a spring at the headwall of the ravine, and flows into the Snake River on the downstream side of a finger of rock extending out from the canyon rim. The noncohesive blowsand is highly erodible, particularly when slopes are undercut or vegetation is removed (Idaho Power Company, 1983a).

A 1,875-foot-long road, currently under construction (figure 2-4), crosses the largest deposit of blowsand in the project vicinity. This road will provide access to the existing powerhouse. The road alignment crosses the headwall of the small ravine, upslope of the spring, and continues along the west side of the ravine, where blowsand is lying at about the natural angle of repose. The roadbed will be supported on fill slope in this area, because any cut into the cohesionless sand may destabilize the existing slope. The fill slope embankment will essentially fill the upper portion of the small ravine, and a 42-inch culvert will convey flows from the spring under the roadbed. The river side of the toe of the fill will be protected with riprap to prevent erosion. The road will pass through a finger of rhyolite bedrock, requiring blasting for a 100-foot-long tunnel. Beyond the tunnel, the road will parallel the river, along the existing canyon contour, on a fill slope supported by a gabion retaining wall that will extend to the existing powerhouse (Federal Energy Regulatory Commission, 1987).

A proposed 110-foot-long, 18-foot-wide concrete and steel bridge would be constructed from a rock-filled area, next to the existing powerhouse, across the river to the proposed powerhouse (figure 2-4). The powerhouse would be excavated into rhyolite bedrock at the base of the basalt cliffs and the tailrace would be excavated into rhyolite within the river channel. The powerhouse site is subject to rockfalls from near the top of the basalt cliffs, where there is a zone of block flow or breccia rubble up to 20 feet thick (Idaho Power Company, 1983b).

The proposed intake structure would replace an existing low-level sluice in the Twin Falls dam. The proposed water conduit would be drilled through bedrock and would be lined with 18 inches of concrete and steel, reducing the 21-foot-diameter tunnel accordingly. The 21-foot-diameter vertical shaft would be excavated 120 feet into massive and closely jointed basalt. The 93-foot-long horizontal tunnel portion of the conduit would be excavated into deeply weathered rhyolite. The base of the tunnel would be in hard, dense, locally fractured rhyolite (Idaho Power Company, 1983b).

3.2.7 Auger Falls Project

In the project area, the Snake River lies entrenched about 400 to 500 feet below relatively level land along the canyon rim (figure 3-10). The canyon walls rise almost vertically from the river, but there is considerable topographic variation within the

canyon. There are several terraces and benches inside the canyon; in some areas, the benches form steep slopes, including a 70-foot near vertical drop to the proposed powerhouse site and a 70- to 80-foot, near-vertical chute that contains Auger Falls (J-U-B Engineers, Inc., 1983).

The last half mile of the Rock Creek channel crosses the canyon floor before the creek flows into the Snake River just downstream from the proposed powerhouse site. Rock Creek flows through a well-defined canyon before it enters the Snake River Canyon. The canyon floor gently slopes toward the river over most of the floodplain, but along the canyon walls the talus slopes form a very steep angle to the river (J-U-B Engineers, Inc., 1983).

The olivine basalt flows in the project area are massive, vesicular, or coarse-grained rock, interbedded locally with smaller quantities of stream and lake deposits. The spacing, size, and extent of vertical jointing and fracturing of the basalt varies over much of the project area. Jointing occurs in the basalt almost continuously along the rim of the canyon, and may extend as far as 10 feet back from the rim in some areas (J-U-B Engineers, Inc., 1983).

The floor of the canyon is composed of basalt, with a mantle of Melon gravels. The highly permeable Melon gravels minimize surface runoff. Alluvial deposits of sand, silt, clay, cobbles, and boulders along the river are from a few inches to several feet deep. The walls of the canyon are nearly covered by talus and the basalt rock cliffs are exposed near the canyon rims. Talus consists of basalt rock fragments up to several feet in diameter, mixed with large amounts of fine materials. Vegetation covers much of the talus along the south side of the canyon wall, although there are areas where loose rock is exposed (J-U-B Engineers, Inc., 1983).

Soils in the project area range from loamy fine sand to silty fine sand. These noncohesive soils are subject to severe piping and cutbank failure on excavated or cut slopes. The arid soils are highly erodible, particularly on steep slopes or where vegetation is removed. The soils are generally very permeable, so they are well to excessively drained (J-U-B Engineers, Inc., 1983). These arid soils dry quickly and retain little moisture for plant growth; thus disturbed areas may be very difficult to revegetate.

The proposed diversion site includes rock outcroppings of massive to slightly fractured basalt and alluvial gravel deposits. The diversion weir would use rock anchors for added stability. The power canal would be 9,000 feet long and would be 19 feet deep, about 15 feet wide at the bottom, and about 82 feet wide at the top (figure 2-5). The canal would be lined to reduce seepage

losses. The power canal would be constructed primarily in basalt and Melon gravels. Part of the canal would parallel the former riverbed, where the river once crossed the floodplain, and where the river presently makes the first S-turn just downstream from the proposed diversion site (J-U-B Engineers, Inc., 1983).

The first several hundred feet of the power canal would be constructed on mixed alluvium and colluvial talus deposits; then the canal would cross a relatively flat to gently undulating terrace, overlain by gravel deposits. Soils along the canal alignment include excessively drained, loamy fine sand, with large diameter boulders. Seismic data indicates that the hard basalt that occurs along the proposed power canal alignment extends from 8 feet to more than 20 feet below the ground (J-U-B Engineers, Inc., 1983).

The three 255-foot-long penstocks leading from the canal to the proposed powerhouse would range in size from 19 feet to 13 feet in diameter. About the first 120 feet of the penstocks would be placed on the existing surface of the basalt bedrock. Trenches for the lower portions of the penstocks would be excavated through the rim and into the face of the near-vertical, 70- to 80-foot-high vertical cliff that forms the south bank of the Snake River (J-U-B Engineers, Inc., 1983).

The basalt composing the cliffs ranges from predominantly hard and massive to slightly fractured. From the face of the cliff, the joints and fractures extend into the basalt no more than 5 to 10 feet. More than 160 feet of the existing rim and face of the cliff would be blasted to accommodate placement of the trenches for penstocks, powerhouse, tailrace, staging area, and control building. The trenches for the penstocks would descend about 100 feet to the powerhouse. Where necessary, the penstocks would be anchored and grouted into solid rock (J-U-B Engineers, Inc., 1983).

The powerhouse, located at the base of the cliff, would require excavation into the cliff. The powerhouse foundations would be about 120 feet below the existing surface and about 50 feet below the high water elevation of the Snake River. The tailrace would be blasted about 23 feet through solid rock, from beneath the powerhouse to the river channel (J-U-B Engineers, Inc., 1983).

Two new access roads would be constructed. One road would be built on the south embankment of the proposed power canal. The second road would extend from the canal embankment to the switchyard and the top of the powerhouse, and from the switchyard to the lower part of the powerhouse. This lower portion of the road would extend from the switchyard towards the river, descend to the river channel, follow along the south bank of the river to the pool, and follow a narrow rock ledge along the pool to the proposed powerhouse site (J-U-B Engineers, Inc., 1983).

3.3 AQUATIC ENVIRONMENT

3.3.1 Upper Snake River Basin

The Snake River, the major body of surface water in the area of the four proposed projects, traverses Idaho from east to west (figure 3-1). The river originates at elevations above 9,500 feet along the Continental Divide in Wyoming and flows 1,038 miles to a confluence with the Columbia River at Lewiston, Washington. The Upper Snake River Basin drains an area of 35,857 square miles in Idaho, Wyoming, Nevada, and Utah. In Idaho, the basin's 28,400-square-mile drainage includes all the drainages to the Snake River from the Montana and Wyoming borders on the east to King Hill, the western boundary of the Upper Snake River Basin, as well as the streams north of the Snake River that sink into the lava fields and recharge the Snake River Plain Aquifer.

The Upper Snake River in the proposed study reach is heavily regulated by dams (figure 2-1). Only about 65 percent of the 800 miles of the Snake River in Idaho is free flowing. American Falls reservoir is 75 miles upstream from Milner dam (figure 3-1), and Lake Walcott is 42 miles upstream from Milner dam. American Falls reservoir is a large storage reservoir and affects the discharge in the area of the proposed projects. Flow in the 32-mile-long study reach is most affected by Milner dam. At Milner reservoir, the flow is diverted into the Twin Falls Main Canal, the North Side Main Canal, and the Gooding Canal, where it is used for irrigation. Milner dam is operated with a zero-cfs minimum flow; this flow was set by Policy 5A of the Idaho State Water Plan, which by the Idaho Water Resource Board adopted on December 12, 1986 (letter from A. Kenneth Dunn, Director, Idaho Department of Water Resources, Boise, Idaho, January 20, 1987). Policy 5A formerly called Policy 32, was approved by the Idaho legislature on March 22, 1985. At present, about 58 cfs leaks through Milner dam when no water is released to the Snake River downstream. Two other dams are present within the study reach, one at Shoshone Falls and one at Twin Falls.

3.3.1.1 Water Quantity

The flow of the Snake River is primarily influenced by snowmelt and discharge from the Snake River Plain Aquifer. The principal source of streamflow is snowmelt, which occurs primarily during the spring and early summer months. Annual precipitation in the watershed varies from 60 inches at the higher elevations to less than 10 inches in the valley (Geological Survey, 1982). The study area is located near the southern edge of the Snake River Plain Aquifer. The aquifer is recharged by streamflow, by precipitation directly onto the plain, and by the percolation of irrigation water. Most of the groundwater from the aquifer discharges into the 92-mile reach of the Snake River between Milner reservoir and King Hill, Idaho. On an annual basis, over

60 percent of the total streamflow that is measured at King Hill is from groundwater discharge (Idaho Department of Health and Welfare, 1983)(table 3-1). During the irrigation season, when large amounts of water are diverted from the river, the percentage of groundwater in the total river flow can be considerably higher.

Table 3-1. Water yield of the Snake River Plain, 1955 (Source: the staff).

Flows	Quantity in cubic feet per second	Percentage of mean flows at King Hill
Mean flow at King Hill	9,675	100
Total gain of river between Milner and King Hill	8,157	84
Gains and losses from sources other than the Snake River Plain Aquifer		
Malad River and Clover Creek	351	2.6
Surface-water waste from the north side of canyon	99	1.0
Depletion for irrigation at King Hill	-99	-1.0
Water yield from Salmon Falls Creek Basin	148	1.5
Return flow from the Milner low-lift canal	39	.4
Water yield from the Dry Creek area	99	1.0
Return flow and surface waste from the Twin Falls side tract	1,151	11.9
Net gain	1,688	
Discharge from the Snake River Plain Aquifer	6,469	66.9

Mundorff et al. (1964) found that the total gain from the aquifer to the Snake River in the area between Milner dam and King Hill was about two-thirds of the discharge measured at the Geological Survey (USGS) gage at King Hill. Travis et al. (1964) stated that over 80 percent of the groundwater discharge occurs at Thousand Springs (table 3-1). Agricultural return flows from the Twin Falls Main Canal constitute the largest source of surface water inflow to the Snake River between Milner dam and King Hill.

Historic mean discharge in the Snake River is 2,711 cfs (for 58 years) at Milner, Idaho (river mile [RM] 638.7), 3,103 cfs (for 61 years) near Kimberly, Idaho (RM 617.5), and 5,340 cfs (for 37 years) at Buhl, Idaho (RM 596.8) (Geological Survey, 1985). During the 1984 Water Year, maximum discharges occurred in June, and minimum discharges occurred in July; maximum readings were 21,300 cfs, 25,600 cfs, and 25,300 cfs, and minimum discharges were 299 cfs, 426 cfs, and 1,580 cfs at the Milner, Kimberly, and Buhl stations, respectively. The marked decrease in discharge results largely from seasonal decreases in snowmelt and irrigation withdrawals.

The major tributaries to the Snake River between (figure 3-2) Milner dam and the site of the proposed Auger Falls powerhouse are Devil's Washbowl Spring, also called Vinyard Creek (which has a mean discharge of 22 cfs), located about one-half mile upstream from Twin Falls dam; Devil's Corral Spring, (average discharge of 48 cfs) between the Twin Falls dam and Shoshone Falls; the Fish Hatchery waste station, USGS gage no. 13-0903.70 (discharge ranging from 9.8 cfs to 60 cfs, flows are usually above 30 cfs), about 1.3 miles upstream from the Perrine Bridge on the south wall of the canyon; Blue Lakes Spring (average discharge of 218 cfs), about 1 mile downstream from the Perrine Bridge on the north side of the river; Warm Creek (average discharge of 39 cfs), about 1 mile below Blue Lakes Spring; and Rock Creek (average discharge of 213 cfs) at the downstream boundary of the 32-mile-long study reach.

3.3.1.2 Water Quality

Snake River water quality is rated good by the Idaho Division of Environment as it enters the basin, with few documented problems (Idaho Department of Health and Welfare, 1983). As a result of point and nonpoint sources (primarily agricultural return flows) of pollution; however, water quality is rated fair as it leaves the basin near King Hill; the water is degraded in terms of temperature, nutrients, bacteria, and metals. The IDHW classifies water quality in the area of the proposed projects as suitable for domestic and industrial water supply, irrigation, livestock watering, and salmonid spawning and rearing (Federal Energy Regulatory Commission, 1985).

Water quality has been measured at irregular intervals at USGS monitoring stations: at RM 640 at Milner reservoir near Milner dam in the Snake River 0.4 miles downstream from Milner Dam; at RM 617.5, in the Snake River near Kimberly, Idaho, 1,200 feet downstream from the Twin Falls powerplant; and at RM 596.8, in the Snake River near Buhl, Idaho, about 26 miles downstream from the proposed Auger Falls powerplant. The monitoring stations in the Snake River below Milner dam and at Kimberly reflect the quality of water in reservoir releases. General trends in water quality within the study area can be seen by comparing the means of all available data for water quality variables collected from the surface water of Milner reservoir and from stations on the mainstem Snake River (table 3-2). Concentrations of dissolved minerals increase in the river in a downstream direction, primarily as a result of the addition of water discharged from springs and from irrigation returns. Springs that enter the Snake River between Milner dam and King Hill average 260 milligrams per liter (mg/l) of dissolved solids; the surface water sources average 560 mg/l of dissolved solids (J-U-B Engineers, Inc., 1984).

Table 3-2. Mean levels of water quality variables in Milner reservoir and in the Snake River (n equals the number of samples used in the calculations of the means)(Source: Environmental Protection Agency, 1987).

Variable	Milner reservoir		Snake River Stations					
			Milner		Kimberly		Buhl	
	n	mean	n	mean	n	mean	n	mean
Conductivity (micromhos)	----	----	56	439.1	63	534.5	69	570.9
Hardness ($CACO_3$, mg/l)	41	180.9	----	----	21	209.1	2	232.0
Nitrite + Nitrate (dissolved, mg/l)	24	0.28	----	----	20	1.27	1	1.4
Total Phosphorus (mg/l P)	123	0.13	6	0.09	21	0.07	----	----

High levels of phosphate in the Snake River are caused by the natural occurrence of large phosphate rock deposits in sedimentary beds in southeast Idaho and from residual phosphate in fertilizers that enter the river in irrigation return flows. The nutrient content of the upper Snake River rises rapidly as the river flows through the upper Snake River Plain. Maximum values recorded for dissolved nitrites (NO_2) plus nitrates (NO_3) within the study area are 1.4 mg/l at the surface of Milner reservoir and 0.17 mg/l near Kimberly (Environmental Protection Agency (EPA), 1987). At Buhl and King Hill, downstream from the study boundaries, total nitrate and phosphate ((PO_4) concentrations are very high during the entire year; heavy algal blooms occur in reservoirs and in the mainstem Snake River during the summer.

The Snake River is frequently turbid during the irrigation season. High turbidities result primarily from the addition of silts contained in irrigation return waters, but plankton (free-floating algae) also contribute to turbidity. Floodplains and wetlands function to improve water quality by removing silts and nutrients (section 4.3).

Water quality is frequently improved downstream from large reservoirs, because suspended sediments and the associated nutrients and metals settle out in the reservoirs; however, the operation of some of the Snake River reservoirs may occasionally depress dissolved oxygen (DO) concentrations during periods of low flow, winter ice cover, or elevated water temperatures.

USGS and the EPA reported high concentrations of coliform bacteria in the Snake River upstream of the study area (Low, 1980). These agencies investigated water quality conditions in the reach of the Snake River between Minidoka dam, 42 miles upstream from Milner dam, and Milner dam in late October 1977, after the irrigation season had ended and during an abnormally low flow period. During the 1977, study state water quality standards for total and fecal coliform were exceeded at three of nine sample sites. Fecal coliform bacterial densities were high in the late winter, corresponding to brief periods of early snowmelt, and for an extended period from late spring through the summer. Sources of coliform bacteria include municipal sewage treatment plants, food processing plants (located near Burley, Idaho), and agricultural sources.

3.3.1.3 Milner Project

3.3.1.3.1 Water Quantity

The Snake River at Milner dam has a drainage area of approximately 17,180 square miles. Average annual discharge, as measured

at the USGS stream gage station located about 2,000 feet downstream of Milner dam, was 3,193 cfs for the 73-year period of record. A maximum discharge of 40,000 cfs was recorded at the gage site in 1918, and a minimum discharge for the period of record of 2 cfs was recorded for 12 consecutive days in 1936 and for 30 consecutive days in 1961. Based on 50 years of USGS data, monthly mean discharge at the Milner gage, adjusted for storage effects of upstream resevoirs, ranges from 456 cfs in August to 6,324 cfs in April (Idaho Department of Water Resources, 1981).

During the height of the irrigation season, from July through September, almost the entire flow of the Snake River reaching Milner reservoir is diverted into the Twin Falls Main Canal, North Side Main Canal, and the Milner Gooding Canal for irrigation purposes (figure 3-2 and 3-12). When all flows are diverted for irrigation, discharge at the gage consists only of seepage flow through the basalt rock and the gates at Milner dam. IDFG estimated that this seepage flow was 58 cfs during February 1979. The recorded discharge at the gage during the low-water period was less than 58 cfs on a number of days from 1960 through 1984; however, for example, during the very low water year of 1961, flows averaged less than 5 cfs for 138 days during the irrigation season (Twin Falls Canal Company and North Side Canal Company, Ltd., 1987). During the irrigation season, spillage at Milner dam occurs during short periods of significant rainfall and when supplying water purchased by IPC for delivery to powerplants downstream from Milner reservoir.

3.3.1.3.2 Water Quality

Water quality of the Snake River downstream of Milner dam declines during the summer months, when essentially all inflow to Milner resevoir is diverted for irrigation. During this period, flow in the Snake River downstream of Milner dam consists of leakage from the dam, agricultural return flows, surface runoff, and aquifer discharge. Water quality is substantially improved in the Snake River downstream from Milner reservoir near the Thousand Springs, the high-quality aquifer discharge, but there is no spring inflow and no irrigation returns in the bypassed area between Milner dam and the proposed Milner powerhouse. Some water quality sampling has been conducted in the Milner reservoir releases, but most water quality studies have been conducted in the reservoir. The staff has not interpreted water quality data collected in 1987 from the reservoir and the river at the Milner Project site.

DO concentrations below state standards have been measured in Milner reservoir. During the summer of 1983, DO, secchi disk, and temperature were measured at six sample locations in the vicinity of the proposed Milner project by CC. Samples were collected at three stations within the reservoir, and in the Twin Falls Main Canal near the point of diversion. Surface to bottom measurements of temperature and DO in Milner reservoir varied only slightly at the times these samples were collected. During the 1983 study, temperature and DO were generally slightly higher

at the station 6 miles downstream (within the area of the proposed Star Falls reservoir). Numerous rapids in the Snake River immediately downstream from Milner dam provide aeration (figure 3-15).

Other studies demonstrate that, at times, low DO concentration occur in Milner reservoir and in reservoir releases. During a study conducted by USGS and EPA in 1977, a low water year, water temperature and DO were found to be stratified at a sample site just upstream of Milner dam; DO was found to be below the state's 90 percent saturation standard at a 25-foot depth in Milner reservoir (Low, 1980). Automatic monitoring of DO concentrations was conducted in the surface waters of Milner reservoir between 1968 and 1972; the minimum daily average measured at the surface was 2.4 mg/l and the minimum concentration reported was 1.6 mg/l (Environmental Protection Agency, 1987).

The reach of the Snake River from Milner dam upstream to Minidoka dam is classified as having limited water quality; DO is one of the important limiting variables (Yearsley, 1975). Conditions have been particularly critical during periods of low flow, when the discharges from municipal and industrial waste sources were at a peak, for example, during the food processing season; major fish kills occurred in Milner reservoir in the 1960's (Yearsley, 1985). Reductions in waste discharges from point discharges (at J. R. Simplot and Ore-Ida food processing plants in the Burley-Heyburn area) in the early 1970's substantially improved DO in Milner reservoir. A mathematical model based on the results of an October 1974 field study indicated, however, that violations of state water quality criteria for DO would occur at river flows of 2,000 cfs, if waste loadings were equal to those observed during October 1974 (Yearsley, 1985). (Waste discharges measured in late October 1977 by Low (1980) were less than those measured in 1974). Yearsley estimated that point discharges accounted for 28 percent of the oxygen demand; nonpoint sources, instream, and sediment oxygen demand accounted for 39 percent of the demand. During this period, net algal oxygen production accounted for 43 percent of the total oxygen source. Decomposition of these algae later in the fall and winter would cause a major reduction in DO.

Table 3-3 shows the mean levels of all available data for selected water quality variables sampled at the surface in Milner reservoir near the dam (Environmental Protection Agency, 1987). Heavy metals have been measured in high concentrations in the surface waters of Milner reservoir; for example, cadmium concentrations averaged 15.3 mg/l (table 3-3). Cadmium concentrations of 0.8 to 9.9 mg/l in water are known to be lethal to several species of aquatic insects, crustaceans, and fish, and concentrations of 0.7 to 5.0 mg/l have been associated with sublethal effects, such as decreased growth, inhibited reproduction, and population alterations (Eisler, 1985). A conservative estimate is that adverse effects on fish or wildlife are either pronounced or probable when cadmium concentrations exceed 3 mg/l (Eisler, 1985).

Table 3-3. Selected water quality variables measured at the surface of Milner reservoir at Milner dam, using Geological Survey data for the period of record from 1969 to 1981 (Source: Environmental Protection Agency, 1987).

Variable	Number	Mean	Maximum	Minimum
Water temperature (Celsius)	133	9.6	23.5	0
Turbidity (JTU)	88	7.7	70	1.0
Conductivity (micromho)	132	448	658	315
Dissolved oxygen (DO) (mg/l)	128	10.2	15.1	5.50
DO saturation (percent)	128	100.6	133	51
Biological oxygen demand (BOD)(5 day)(mg/l)	47	4.2	10	0.6
pH Standard Units (SU)	132	8.3	9.2	6.1
Total alkalinity (mg/l)	107	162	249	56
Total nitrogen (mg/l)	123	0.92	2.7	0.04
Dissolved NO_3+ NO_2 (mg/l)	41	1.24	35.06	0
Total phosphorus (mg/l P)	123	0.13	2.7	0.01
Total organic carbon (mg/l)	88	3.7	14	0.0
Total hardness $CaCO_3$ (mg/l)	41	181	233	0
Dissolved arsenic (ug/l)	3	10.7	30	0
Total arsenic (ug/l)	65	3.4	7	1
Total cadmium (ug/l)	43	15.3	20	1
Total chromium (ug/l)	67	4.8	20	0
Total copper (ug/l)	68	37	190	1
Total lead (ug/l)	70	103.9	200	0
Total zinc (ug/l)	70	43.7	290	0
Total mercury (ug/l)	75	0.34	0.8	0.0
Total coliform bacteria (per 100 ml)	47	62,014	920,000	160
Fecal coliform (per 100 ml)	56	479	10,300	0

Total copper concentrations in the surface water of Milner reservoir averaged 37 micrograms per liter (ug/l), with measured concentrations ranging up to 190 ug/l. EPA criteria for copper in water having a hardness of 200 mg/l (as Calcium carbonate ($CaCo_3$)) allow a 4-day average concentration of 21 ug/l and a 1-hour average concentration of 34 ug/l (Environmental Protection Agency, 1986). The mean acute toxicity value for copper of all studies conducted on rainbow trout is 42.5 ug/l (Environmental Protection Agency, 1985).

Total mercury was measured in relatively high concentrations in the surface of Milner reservoir with a mean of 0.34 ug/l. EPA (1986) states that for the protection of aquatic life, the 4-day average concentration of mercury in water should not exceed 0.012 ug/l more than once every 3 years on the average. Two tissue samples of fish collected in Milner reservoir in 1979 contained 0.12 and 0.28 milligrams per kilogram (mg/kg) wet weight of mercury (Environmental Protection Agency, 1987).

Hardness of water significantly alters the concentration at which heavy metals induce toxic effects in fish; in general, as hardness increases, the tolerance of fish to metals also increases. The water in the Snake River is relatively hard, and because of inflow from springs and irrigation returns, hardness increases in a downstream direction.

In April 1977, heavy metals and pesticides were measured in the sediments of the Snake River above Milner dam, near Milner, Idaho. The following values (mg/kg dry weight), representing a single sample, were measured: arsenic, 2.0, chromium, 8.9, copper, 9.0, and zinc, 30. Values for DDT were 1.2 micrograms/kilogram (ug/Kg) of mud, and for polychlorinated biphenols (PCB's) were 1.0 ug/kg of mud.

3.3.1.4 Star Falls Project

3.3.1.4.1 Water Quantity

Based on daily records from 1957 to 1983, mean monthly flows in the proposed project area have ranged from 463 cfs in August to 6,304 cfs in April (B&C Energy, Inc. 1984). B&C estimates that about 100 cfs of water accrues to the Snake River between Milner dam and the location of the proposed reservoir; these water sources are not identified by B&C and are suspect.

3.3.1.4.2 Water Quality

Available water quality information from the project area indicates a nutrient-enriched system with high concentrations of suspended plankton. Between September 25 and October 8, 1984, B&C collected site-specific water quality data from below

Milner dam, within the proposed impoundment area, and at Murtaugh Bridge, about 1 mile downstream from the proposed Star Falls dam. The B&C measured the following ranges of values for 10 variables: 5-day biological oxygen demand (BOD) less than (<) 3.0 mg/l; NH4-N, < 0.2 mg/l; N02 + N03-N, 0.17 to 0.35 mg/l; total Kjeldahl nitrogen, <0.5 to 0.6 mg/l;pH, 8.1 to 8.5; total phosphorus, < 0.10 to < 0.20 mg/l; PO_4-P, 0.10 to 0.16 mg/l; Secchi disc readings, 2.4 to 3.2 feet; and plankton biomass, 0.274 to 0.502 mg/l.

3.3.1.5 Twin Falls Project

3.3.1.5.1 Water Quantity

At the Twin Falls site, the Snake River drains an area of more than 17,000 square miles. The existing project reservoir has a normal surface area of 85 acres and is approximately 1.5 miles long. The total storage capacity is about 1,000 acre-feet at the normal pool elevation of 3,511.4 feet above mean sea level. The project reservoir is a shallow body of water with a short water retention time, varying from 0.6 hour to 39 hours, depending on streamflow. About 350 to 425 cfs accrues annually to the Snake River between the Milner gage below Milner dan and the Kimberly gage, below Twin Falls dam (personal communication, Rick Backsen, Lead Hydrologic Technician, Twin Falls Field Office, Geological Survey, Twin Falls, Idaho, October 6, 1987).

The streamflow of the Snake River at Twin Falls is affected by upstream storage and diversion for irrigation. The minimum, mean, and maximum monthly discharges for the Snake River at the Twin Falls Project are 310, 2580, and 19,340 cfs, respectively, based on 51 years of flow data, adjusted to 1980 levels of depletion for irrigation. The maximum discharge at the Kimberly gage (USGS No. 13090000), about 1,500 feet downstream from the project, is estimated to be 27,200 cfs, based on a gage height reading made in July 1927; the minimum discharge of 95 cfs occurred in April 1977.

3.3.1.5.2 Water Quality

Table 3-4 shows means and ranges for selected water quality variables of all available data collected at the Kimberly gage downstream from Twin Falls reservoir. Water quality records from the USGS Kimberly gage for the 1981 Water Year include specific conductance and water temperature, which were measured on nine dates, and other variables, which were measured only during November 1980 and June and September 1981. The data indicate relatively hard water, with high levels of dissolved minerals and a nutrient-enriched system (table 3-4). Total dissolved concentrations were found to be as high as 452 mg/l's; dissolved nitrogen and total phosphorus concentrations were

found to occur at levels of 1.0 and 0.17 mg/l, respectively. Specific conductance ranged from 460 to 664 umhos and water temperature ranged from 3.5 Celsius (°C) to 29.5 °C.

Table 3-4. Selected water quality variables in the Snake River near Kimberly, Idaho, using Geological Survey data for the period of record from 1970 to 1974 (Source: Environmental Protection Agency, 1987).

Variable	Number	Mean	Maximum	Minimum
Water temperature (Celsius)	62	12.0	20.5	0
Conductivity (micromho)	63	535	732	207
pH (SU)	21	8.1	8.7	7.7
Alkalinity (mg/l)	18	192	246	150
NO_2 + NO_3 (dissolved) (mg/l)	20	1.3	2.5	0.1
Total phosphorus (mg/l as P)	21	0.07	0.17	0.02
Total hardness ($CaCO_3$, mg/l)	21	209	250	180
Total dissolved solids (mg/l)	21	347	452	257

The short water retention time in Twin Falls reservoir probably prevents stable thermal stratification. Temperature profiles measured in the reservoir on September 9, 1982, varied a maximum of 1.25°C from top to bottom; DO was measured at the surface only, and ranged from 9.1 to 10.8 mg/l on that date. There may be some chemical stratification during the summer low-flow periods. Reservoir water quality data collected during the summer of 1987 have not been processed. The short retention time in the reservoir, reaeration at Twin Falls, and the rapids below the dam presently contribute to the maintenance of relatively high DO levels in the reservoir and in the Snake River downstream.

3.3.1.6 Auger Falls Project

3.3.1.6.1 Water Quantity

Discharge in the Snake River at the project site varies widely on a seasonal basis. Flows are typically highest during the winter and spring months and lowest during the summer months, when as much as 100 percent of the flow is diverted from the river for irrigation purposes about 30 miles upstream at Milner dam. Between Milner dam and the project site, groundwater springs and irrigation return flows augment the discharge from Milner dam.

The average annual discharge at the Kimberly gage, about 3 miles upstream from the proposed project, was 3,100 cfs for the period of record, with a range of mean daily flows from 95 cfs to 27,200 cfs (Geological Survey, 1984). Proposed project area flows, augmented by discharge from springs and irrigation return flows, are about 328 cfs higher than those measured at at Kimberly (Cogeneration, Inc., 1983). Median discharge at the project during the summer (Kimberly gage data plus inflow from springs upsteam of the project boundary) is about 670 cfs (based on the most recent 20 years of data from the Kimberly gage, plus inflow from springs between the gage and the project boundary) (Cogeneration, Inc., 1983). When the demand for irrigation water begins in April, discharge starts to drop sharply toward summer levels; then, generally in early October after the irrigation season ends, flows in the project area begin to increase (Cogeneration, Inc., 1983). From November to June during average or high water years, flow over Milner dam contributes from 80 to 100 percent of the discharge at the Kimberly gage. In a low water year, discharge from Milner reservoir makes up less than 5 percent of the flow at the Kimberly gage during the summer, because of irrigation diversions at Milner reservoir.

Rock Creek (figure 3-2), which flows into the Snake River immediately below the site of the proposed powerhouse at RM 606.4, is the largest tributary stream within the project area. Rock Creek had an average discharge of 213 cfs for the period of record from 1923 to 1946 and in 1984) (Geological Survey, 1984). Warm Creek, a tributary that discharges to the Snake River in the bypassed reach, had an average discharge of 39 cfs and a range of 5 to 196 cfs, based on 18 readings taken from 1973 to 1985 (Environmental Protection Agency, 1987). COG states that two other sources of surface water enter the Snake River between the proposed diversion site and the proposed powerhouse site. These are Wasteway No. 6, which contributes no flow from October through February and provides an estimated 1 cfs from March through September, and the "K" lateral, which contributes a maximum of 15 cfs in August and no flow from December through March. The types of vegetation found on the talus and rock banks along the north wall (figure 3-10) indicate the presence of spring seepage along the major portion of the river, from Warm Creek to the area below the proposed powerhouse site, but the amount of water entering the river from these seeps is unknown (Cogeneration, Inc., 1984).

3.3.1.6.2 Water Quality

Water quality in the project area of the Snake River varies in accordance with the large variations in discharge from winter to summer. During the summer, water quality is degraded as a result of the inflow of water that has been used for irrigation;

nutrient loads, suspended solds, and turbidity are greatly increased. Water quality is also degraded in the project vicinity by industrial and municipal sources of pollution, such as the Twin Falls wastewater treatment plant, approximately 2 miles upstream from the proposed diversion structure. Discharge from three fish hatcheries and runoff from livestock grazing and feeding areas and irrigation returns also enter the river above and below the bypassed reach. Total dissolved solids were measured at the beginning and end of the two sample periods and ranged from 290 mg/l in late June to 570 mg/l in October (Falter et al., 1976).

COG's water quality data for the part of the Snake River in the project area demonstrate that measured values for temperature, nutrients, and solids violate state standards during some times of the year (Cogeneration Inc., 1984). COG recorded a water temperature of 21.5 °C on August 12, 1982 (Cogeneration Inc., 1984). Concentrations of nitrogen (N) and phosphorus (P), critical nutrients for plant production, are above desirable levels of 0.3 mg/l as N and 0.05 mg/l as P, as set by EPA and the IDHW (Cogeneration Inc., 1984).

DO levels in the project reach change daily and nightly as well as seasonally. DO concentrations are near saturation levels during the day, but are below saturation at night. Measurement of DO concentrations made in August 1984 ranged from 7.4 to 9.1 mg/l during a 24-hour sampling period (Cogeneration, Inc., 1984). The high biomass of aquatic plants present during the irrigation season depresses DO concentraitons at night through plant respiration; plant decomposition depresses DO levels in the summer and fall. DO concentrations in the project area are thought to be saturated during the nonirrigation season, but are lower during the irrigation season. Return irrigation flows and wastes from fish hatcheries and from the Twin Falls wastewater treatment plant may also reduce DO concentrations during the irrigation season.

High nutrient levels, low flows, and high water temperatures during the summer promote the growth of algal blooms in low gradient reaches of the river (Congeneration, Inc., 1983). In the Hagerman-Twin Falls area, algal growths form floating mats during the summer months. Lower flows increase the area on the river bottom where velocities are suitable for the growth of periphyton. Falter et al. (1976) measured the biomass of periphytic algae at Murtaugh, about 22 miles upstream; algae occuring on glass slides was measured during two 8-week periods, beginning in late June and late August 1975. The mean of ash-free dry weight samples was 3,811 from July through August and 3,428 from September through October. Means of chlorophyll a and total chlorophyll concentrations were 25.82 and 44.20, respectively, from July through August and 8.69 and 4.29, respectively, from September through October.

Water quality in Rock Creek, a tributary of the Snake River that enters the river below the large pool where the proposed powerhouse would be built, has been rated as very poor. Water quality data collected near the mouth of Rock Creek had mean levels of 717.7 micromhos for conductivity, 496.9 mg/l for total dissolved solids, 5.2 mg/l for dissolved nitrites plus nitrates, and 0.2 mg/l (as P) for total phosphorus, as well as high levels of metals (mean level of 17.8 ug/l for total copper, 10.5 ug/l for total arsenic, and 42.5 ug/l for total zinc) (Environmental Protection Agency, 1987).

3.3.2 Fishery Resources

Trout habitat in the Snake River is good throughout most of the free-flowing reaches between C.J. Strike Reservoir, about 130 miles below the study area, and Lake Walcott, about 42 miles above the proposed project area (figure 3-1) (Idaho Department of Fish and Game, 1986). Trout habitat is especially good in the section between Milner dam and King Hill, where large amounts of spring flow are discharged into the Snake River from the Snake River Plain Aquifer. An approximate average of 5,900 cfs is discharged from these springs along the north bank of the Snake River. Some of the highest quality trout habitat occurs downstream from the study reach in the Thousand Springs area near Salmon Falls dam. Trophy-sized trout are caught in portions of the Snake River below Minidoka dam and below upper Salmon Falls dam; large trout have also been captured in the river segment between Murtaugh Bridge and Twin Falls dam (Idaho Department of Fish and Game, 1986).

Fish species that have been collected within the 32-mile project area are listed in table 3-5. Trout species that occur in study reach of the river include rainbow trout, brown trout, cutthroat trout, and rainbow-cutthroat trout hybrids. The cutthroat and rainbow-cutthroat hybrids are found mainly in the area between Milner dam and Twin Falls dam (Idaho Department of Fish and Game, 1986). The cutthroat trout is the only native trout in the study reach and is well adapted to the high velocities found in large rivers, such as the Snake River (Kiefling, 1978). Other game fish inhabiting the study reach include smallmouth bass, largemouth bass, bluegill, bullhead, channel catfish, yellow perch, and mountain whitefish. Nongame fish such as carp, Utah suckers, and Utah chubs are the most abundant species.

The Pacific Northwest Rivers Study (Allen et al., 1986), which was conducted to assess the fisheries value of river segments in Idaho, Montana, Oregon, and Washington, includes the 32-mile reach; participants in the Rivers Study included biologists and resource experts from state and federal agencies and Indian tribes (Allen et al., 1986). Within the study area, a value class of 1 (outstanding resident fish resources) was assigned to the reaches from Murtaugh Bridge to Twin Falls

Table 3-5. Common and scientific names of fish collected in the Snake River between Milner reservoir and Rock Creek, including fish caught in Milner reservoir and in the Twin Falls Main Canal, with identification of species by project area. (M = Milner, S = Star Falls, T = Twin Falls, A = Auger Falls) (Source: the staff).

Common names	Scientific names	Projects M	S	T	A
White sturgeon	Acipenser transmontanus				x
Mountain whitefish	Prosopium williamsoni	x	x		x
Cutthroat trout	Salmo clarki	x		x	x
Cutthroat-rainbow hybrid				x	
Rainbow trout	Salmo gairdneri	x	x	x	x
Brown trout	Salmo trutta	x			
Brown bullhead	Ictalurus nebulosus	x		x	
Black bullhead	Ictalurus melas		x		
Channel catfish	Ictalurus punctatus	x	x		
Bluegill	Lepomis macrochirus	x			
Black crappie	Pomoxis nigromaculatus	x			
Smallmouth bass	Micropterus dolomieui	x	x		
Largemouth bass	Micropterus salmoides	x			
Yellow perch	Perca flavescens		x		
Carp	Cyprinus carpio	x	x	x	x
Northern squawfish	Ptychocheilus oregonesis			x	x
Peamouth	Mylocheilus caurinus				x
Chiselmouth	Arocheilus alutaceus				x
Speckled dace	Rhinichthys osculus		x		
Redside shiner	Richardsonius balteatus	x	x	x	
Bridgelip sucker	Catostomus columbianus			(?)	
Mountain sucker	Catostomus platyrhynchus		x		
Utah sucker	Catostomus ardens	x	x	x	
Largescale sucker	Catostomus macrocheilus	x		(?)	
Mottled sculpin	Cottus bairdi	x	x		
Utah chub	Gila atraria	x	x	x	

reservoir, the Twin Falls reservoir, and from Shoshone Falls to Rock Creek; a value class of 3 (moderate resident fish resources) was assigned to the river reach from Twin Falls dam downstream to Shoshone reservoir; and the river reach from Milner dam to Murtaugh was classified as "unknown resident fish resources".

Natural reproduction of rainbow trout in some areas of the study reach is limited by poor habitat, caused by rapid currents, widely fluctuating water levels, heavy siltation, heavy plant growth, and localized areas of poor water quality. Tributary streams entering the Snake River, especially those that originate from springs, are utilized for spawning by trout. Vinyard Creek, (cover photograph), which enters on the north side of the river about half a mile above Twin Falls dam, is a major spawning area for cutthroat and rainbow-cutthroat hybrid trout (Idaho Department of Fish and Game, 1986). Sections of the Snake River that IDFG has classified as blue ribbon or class I (known for both the quality and quantity of trout caught) contribute fish to the study reach. The extent to which the three trout hatcheries in the study reach contribute rainbow trout to the river through inadvertent releases is unknown.

Rainbow trout are the major game fish species in the study reach. The majority of trout are caught near the mouths of tributary streams and in springs. Limited access to the study reach (figure 3-2) prevents many anglers from fishing sections of the river in this area. IDFG (1986) regards the rainbow-cutthroat hybrid as the primary game fish occurring between Murtaugh Bridge and Twin Falls dam and reports that many of these hybrids attain large sizes, some reaching weights of over 6 pounds.

The Snake River historically supported runs of chinook salmon (Oncorhynchus tshawytscha), steelhead (Salmo gairdneri), white sturgeon, Pacific lamprey (Entosphenus tridentata), and cutthroat trout as far upstream as Shoshone Falls (Everman, 1896; Bowler, 1982). Shoshone Falls, a 212-foot-tall natural waterfall located about 2.7 miles downstream of Twin Falls dam, has historically formed.a natural barrier to the upstream migration of native species of fish. Before dams were built on the river, anadromous species were present only in the proposed Auger Falls Project areas of the study reach; hydroelectric construction in the downstream Middle Snake River has blocked anadromous species from gaining access to the Upper Snake River.

Populations of sturgeon, which occur in the remaining free-flowing sections of the Snake River below Shoshone Falls, are recognized as species of special concern by the state (Idaho Department of Fish and Game, 1978). Although habitat for this species is available in this reach, few sturgeon have been collected in the reach; this indicates that the population of white sturgeon is severly depressed. The absence of smaller fish in the reach below Shoshone Falls suggests that little or no reproduction has occurred there in recent years. (The white sturgeon has a long maturation time of 11 to 34 years.) In studies in 1980 and 1980, seven white sturgeon were captured downstream near Bliss, Idaho, but only one sturgeon was captured in the study area, in a pool immediately above the confluence of Rock Creek and the Snake River (Lukens, 1981). By contrast, in 1979 and 1980, 313 white sturgeon were captured in the free-flowing sections of the river further downstream, between C.J. Strike reservoir and Bliss dam (Cochnauer, 1980). White sturgeon are successfully reproducing further downstream between Bliss dam and King Hill; sturgeon grow at a faster rate in that area and reach lengths of over 9 feet (Idaho Department of Fish and Game, 1986). Additional information about sturgeon is found in section 3.5.2.

3.3.2.1 Milner Project

3.3.2.1.1 Milner Reservoir Fishery

Milner reservoir, which encompasses about 3,000 acres, contains a warmwater fishery with limited to marginal habitat for spawning and rearing warmwater sport fish species. Reid (1972) surveyed fish populations in Milner reservoir and reported that 8.5 hours of gill net effort produced 6 mountain whitefish, 21 Utah chubs, 10 Utah suckers, and 1 carp. Other surveys conducted in Milner reservoir report the presence of rainbow trout, channel catfish, yellow perch, largemouth bass, and black crappie (Parametrix 1975, 1976). Bell (1979) surveyed the area below Minidoka dam, at the head of Milner reservoir, and reported the presence of rainbow trout, cutthroat trout, brown trout, and mountain whitefish. In August 1983, CC conducted studies using fyke and floating drift nets; the collections contained Utah suckers, carp, brown bullheads, Utah chubs, and redside shiners. Utah suckers dominated the fyke net collections and Utah chubs dominated the floating gill net collections.

IDFW has planted warmwater fish species in Milner reservoir; during 1983, the agency planted 705,812 channel catfish fry and 14,030 channel catfish, larger than 6 inches, in the reservoir. In addition, salvage operations from nearby irrigation canal systems resulted in the collection of 450 black crappie, 450

bluegills, and 6 smallmouth bass. The authors of the Idaho Fisheries Management Plan for 1986 through 1990 state that there is a great demand for more warmwater fish species in Milner reservoir (Idaho Department of Fish and Game, 1986). The plan calls for stocking Milner reservoir with adult and fingerling smallmouth bass, channel or blue catfish, yellow perch, bluegill, and possibly flathead catfish. The plan also calls for improving warmwater fish habitat by placing structures on the reservoir bottom to provide cover.

3.3.2.1.2 Snake River Downstream From Milner Dam

The amount of habitat available for fish in the Snake River downstream from Milner reservoir varies seasonally and depends on the extent of flow diversions for irrigation at Milner dam. Below the reservoir, the river is subject to complete depletion for irrigation purposes.

Few fishery studies have been conducted on the section of the river within the project area. Reports by White and Cochnauer (1975), Cochnauer (1976), and Cochnauer and Mabbott (1981) identify rainbow trout, cutthroat trout, rainbow-cutthroat hybrid trout, channel catfish, yellow perch, largemouth bass, smallmouth bass, brown trout, and mountain whitefish as game fish populations inhabiting the Snake River in the vicinity of the proposed project. Studies were conducted in February 1979 immediately below Milner dam; species collected included rainbow trout, cutthroat trout, mountain whitefish, redside shiner, carp, and coarse scale suckers (Simpson, 1979; Cochnauer, 1979; and Bell, 1980). Rainbow trout collected by Cochnauer (1979) averaged 17 inches in length. Bell reported that game fish populations in river reach below Milner dam move downstream during the irrigation season, when flows in the river are reduced to leakage from the dam.

B&C conducted fish investigations in the proposed Milner Project area during March 1983; no fish were collected below Milner Dam (B&C Energy, Inc., 1984). Collections by CC using electrofishing gear, produced a total of 174 fish, predominately dace and redside shiners, with some mottled sculpins and Utah suckers. These collections did not provide data on game fish population; the lack of game fish in the collections may have resulted from the reduction of flows from 656 cfs to 106 cfs, which were made to facilitate access to the river to collect the fish.

A fishery for catfish may exist at the headwaters to the Twin Falls Main Canal, located at Milner reservoir. The Twin Falls Main Canal would be modified for the proposed project (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

3.3.2.2 Star Falls Project

The FWS and IDFG classify the proposed project area of the river as a class II, high-priority fishery resource (U.S. Fish and Wildlife Service, 1978). IDFG has designated the 8.5-mile reach between Milner dam and Murtaugh Bridge as a coldwater fishery, (figure 3.2), and has set a management goal for a catch rate of 0.5 trout per hour.

During March and July 1983, B&C conducted fish surveys in the project area. Electrofishing samples, taken at 15 to 20 minute intervals along each bank, were collected at sites from just downstream of Milner dam to a site immediately downstream of the proposed Star Falls dam. Mountain suckers were the most numerous species caught in March, and redside shiners were the most abundant fish species collected in samples during July. Three rainbow trout and four mountain whitefish were collected in March, but none were collected in July. No smallmouth bass were collected during the March sampling period; 13 smallmouth bass were collected in July. During the survey, most game and nongame fish species were collected in rapids, rather than in deeper run or pool habitats. The survey results probably indicate that the electrofishing gear did not function well in deeper areas of the river, but may also represent differences in the availability of suitable habitat or of available food.

At the request of IDFG, B&C conducted additional fisheries sampling at five sites in September 1984. Other fish surveys IDFG conducted on the Snake River demonstrated that electrofishing produced results that were biased toward the collection of nongame fish species; IDFG therefore recommended that the B&C conduct studies using gill nets. B&C used both gill nets and electrofishing equipment during the 1984 survey. Mountain whitefish (45 fish), yellow perch (61), channel catfish (2), and smallmouth bass (1) were the only game fish B&C collected in the 1984 survey, and all individuals collected were adults. The dominant species in gillnet collections were Utah suckers (1,175) and redside shiners (1,091).

3.3.2.3 Twin Falls Project

The Snake River within the proposed project area is classified as a fishing stream of statewide importance (Pacific Northwest River Basins Commission, 1971). Downstream of Twin Falls dam, the river is managed as a wild rainbow and cutthroat trout fishery, with an approximate catch rate of 0.5 fish per hour (Idaho Department of Fish and Game, 1986). IDFG manages Twin Falls reservoir and portions of the Snake River extending upstream to Murtaugh Bridge as a preservation fishery for wild cutthroat, rainbow-cutthroat hybrid, and rainbow trout; the agency emphasizes the protection of native cutthroat and rainbow-cutthroat hybrid populations (Idaho Department of Fish and Game, 1986).

IPC conducted fish surveys in Twin Falls reservoir during September 1982, and reported Utah suckers and Utah chubs were the dominant species in the project area (Idaho Power Company, 1983). Fyke net samples (fished a total of 45 hours) produced 85 Utah suckers, three Utah chubs, and six brown bullheads. Gill samples produced only one Utah sucker, one Utah chub, and one redside shiner. Hook and line angling for a total of 20 hours yielded two trout (identified as either cutthroat or rainbow-cutthroat trout hybrids) and six bullheads.

No surveys have been conducted in the Snake River downstream from the Twin Falls dam. IPC (1983) states that the same species collected in Twin Falls reservoir would be expected in the Snake River downstream from Twin Falls dam, with the addition of the northern squawfish, because the backwaters of Shoshone Falls reservoir extend 2.2 miles upstream from Shoshone Falls and because there is only one rapids area between the two reservoirs.

Visual observations by IPC indicate that large numbers of carp and suckers use the small unnamed spring area immediately downstream from the Kimberly gage. In November 1986, the staff saw carp in the unnamed creek.

Bell (1979) stated that there is spawning habitat for rainbow trout, cutthroat trout, and rainbow-cutthroat trout hybrids in Vinyard Creek, and in other spring areas within the project boundary. Although Vinyard Creek is the primary salmonid spawning habitat in the project area (Idaho Department of Fish and Game, 1980), turbid irrigation wastewater that enters the creek from surrounding farmland has degraded the spawning habitat in the creek by causing sedimentation of the gravel substrate. Limited rough fish spawning may occur in a small unnamed spring on the south side of the river channel, immediately downstream of the Kimberly gage.

3.3.2.4 Auger Falls Project

Fish species captured in September and October 1984 in the Snake River near Auger Falls included rainbow trout, mountain whitefish, smallmouth bass, chiselmouth, peamouth, redside shiner, and northern squawfish (letter from Marc A. Auth, Project Coordinator for Auger Falls Project, to J-U-B Engineers, Inc, Boise, Idaho, November 19, 1984). The configuration of the stream within the project boundaries appears best suited for rainbow trout and channel catfish; the large pool at the proposed project outfall appears suitable for sturgeon habitat (Cogeneration Inc., 1983). Trout may be introduced into the project area from inadvertent releases of fish from three trout hatcheries located between the Perrine Bridge and Rock Creek. COG states that rainbow trout captured in the mouth of Rock Creek during an electrofishing survey in January 1984 were hatchery-reared (Cogeneration, Inc., 1983). Trout spawn in spring and seep areas downstream from Shoshone Falls

and within the project reach (letter from William B. Dillon, III, Deputy Attorney General, Idaho Department of Fish and Game, Boise, Idaho, August 16, 1984).

During the nonirrigation season, anglers use the Snake River primarily from the fall through the spring months (Cogeneration, 1983). During the summer turbidity is high and algal blooms produce floating mats of vegetation that render the main river channel in the project area nearly unfishable. The accessible spring areas are heavily fished for trout throughout the year and Rock Creek receives moderate fishing pressure. In the proposed project reach, Blue Lakes Spring is the most significant spring discharge into the Snake River. Angler efforts in the project area are directed toward rainbow trout, brown trout, smallmouth bass, and channel catfish (Cogeneration, 1983). Reid (1972) conducted interviews in the area between March and December 1971 and estimated a catch rate for rainbow trout of 0.55 fish per hour.

Bluegill Lake had 350 visitor-days (a visitor-day is defined as one visit by one angler) reported in 1979 by anglers fishing for warmwater fish stocked in the lake (Cogeneration, Inc., 1983). The lake was drained in the early 1980's; the dam at one end of the lake has been rebuilt.

3.3.3 Aquatic Macroinvertebrates

The aquatic insect fauna in the study area of the Snake River is dominated by two orders, Diptera (flies) and Trichoptera (caddisflies). Falter et al. (1976) reported that caddislies were the predominant taxa in benthic invertebrate samples collected at most sites in the river. At Murtaugh Bridge, just downstream from the proposed Star Falls powerhouse, the dipteran family Chironomidae (midges) were most abundant in the 1976 study. In November 1986, the staff collected taxa at Murtaugh Bridge that included Hydropsychidae (caddisflies), Simuliidae (blackflies), Blephariceridae (net-winged midges), and Chironomidae (midges). In the area of the proposed Auger Falls Project, the staff observed Hydropsychidae, Chironomidae, Ephemerellidae (mayflies, including Baetis and Ephemerella), and other invertebrates, such as amphipods, clams, and several species of snails. In general, the staff's qualitative sampling indicated that macroinvertebrate species typical of productive regulated rivers occur in the study reach. Many of the species of benthic invertebrates are scrapers that feed on benthic algae or filter feeders that feed on algae, and small invertebrates, which are either sloughed from the river bottom or float downstream from Milner reservoir. The staff's collections of macroinvertebrate fauna in the study area were much the same as those of Falter et al. (1976). In November 1986, the staff observed that the marked reduction in discharge at American Falls (to allow repairs of the hydropower facility at Shoshone Falls) stranded large numbers of invertebrates along the shore of the Snake River.

Several mollusks that are unique to southern Idaho are thought to occur within a range that includes the study reach. (See section 3.5).

3.3.3.1 Milner Project

Aquatic macroinvertebrates were collected over a 5.5-mile-length of Milner reservoir near Burley, Idaho (Parametrix, 1976). These samples contained very few living organisms. Oligochaete worms and a small number of chironomid larvae comprised the majority of the living macrofauna. Molluscan shells were common in most of the samples, but very few live snails and no live clams were sampled. The live snails were of the genus Parapholyx, and the live limpets were of the genus Ferrissia. CC suggested that herbicides or pesticides in the reservoir may have contributed to the low level of organisms collected (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

3.3.3.2 Star Falls Project

In September 1984, B&C conducted benthic sampling, using a Ponar dredge to sample on bedrock and in heavily silted substrates in the project reach. Twenty-six worms and 10 midge larvae were collected in 15 dredge samples. No samples were collected using appropriate sampling gear in the rapid- and run-type habitat in this reach of the Snake River, where most macroinvertebrates would be expected to occur.

3.3.3.3 Twin Falls and Auger Falls Projects

IPC and COG did not conduct invertebrate sampling. The staff's qualitative sampling in November 1986 in the area of the proposed Auger Falls Project, at an abandoned haul road bridge, indicates that the species composition in this reach of the Snake River is typical of that in productive, regulated rivers and would be similar to that of the other proposed project areas.

3.3.4 Aquatic Plants

There is little information on aquatic plants in the study reach. Aquatic plants include rooted vascular plants, phytoplankton (free-floating algae), and benthic attached algae (periphyton). Rooted aquatic plants are limited in some areas of the study reach by high-flow velocities, fluctuating water levels, and a narrow littoral zone. High turbidity in the river during the irrigation season limits all plant growth.

Planktonic algae grow in slow-flowing stretches of the river and in the reservoirs; part of the planktonic algae originate as periphyton (algae growing on the river bed) and become detached from the substrate, especially during high or fluctuating flows.

During the summer, high nutrient levels, low flows, and high water temperatures are all factors that produce synergistic effects, which promote the occurrence of algal blooms in low gradient reaches of the river (Cogeneration, Inc., 1983). In some slow-flowing stretches of the study area, extensive algal growth forms floating mats in the summer. Downstream from the study reach, near the town Bliss, diatoms dominate the rapids areas, because of the high flow velocities (Connor, 1980). The major genera of diatoms observed in that area included Tabellaria spp., Nitzchia spp., Diatoma spp., Fragilaria spp., and Navicula spp. Green and blue-green algae included Cladophora spp., Ulothrix spp., and Microspora spp.; filamentous forms, attached to larger rocks, predominated. These species would also be expected to occur within the rapids in the study reach.

Periphyton provides a direct food source for herbivorous fish, such as suckers and carp, and provides food and cover for aquatic invertebrates. The staff noted heavy growths of periphyton in early November 1986, especially in the area of the proposed Auger Falls project.

Falter et al. (1976) measured the biomass of periphytic algae at Murtaugh Bridge, about 6 miles upstream from the project area. The biomass of algae growing on glass slides was measured during two 8-week periods, beginning in late June and late August 1975. Mean biomass (ash-free dry weight of the samples) was 3,811 milligrams per square meter (mg/m^2)during the July to August period and 3,428 mg/m^2 during the September to October period. Mean levels of chlorophyll a and total chlorophyll (mg/m^2) that accumulated on the slides from July through August were 25.8 and 44.2, respectively and from September through October, were 8.7 and 4.3, respectively, These values far exceed those for periphyton in free-flowing streams and in unpolluted streams in the area. Total dissolved solids were measured at the beginning and end of the two sampling periods and ranged from 290 mg/l in late June to 570 mg/l in late October.

3.4 TERRESTRIAL ENVIRONMENT

The project area lies within the Snake River Plain of the Great Basin. Bailey (1980) classifies this area as the sagebrush-wheatgrass section of the Intermountain Sagebrush Province. The area is within the rain shadow of the Sierra Nevada and Cascade Mountains, and is characterized by a semi-arid climate and by vegetation dominated by big sagebrush (Artemesia tridentata). In general, two major plant communities occur along the Snake River between Milner dam and Auger Falls. These are the widespread sage brush-grassland community and the much less common forest-shrub riparian or wetland community associated with the Snake River, its tributaries, springs, and near-surface groundwater seeps. Although the project area receives an average of 9 inches of precipitation per year, plants requiring greater amounts of water can survive because of the presence in the project reach of Thousand Springs, an extensive spring system. These springs create a braided ecosystem of riparian habitats, which are connected with the existing riparian vegetation along the shoreline of the Snake River, wherever soil and water are available.

3.4.1 Riparian Communities

The riparian community is the most important community in the project area in terms of vegetative diversity and value to wildlife. The riparian community varies from emergent herbaceous wetlands, associated with springs and seeps, to sparsely populated woody areas, containing small trees and understories of shrubs. Riparian communities, such as those along the Snake River, account for less than 0.6 percent of the land area of Idaho (Boccard, 1980) and are of special concern to fish and wildlife agencies. Water projects and other developments have reduced the riparian habitat of the Snake River by an estimated 50 percent (letter from Jerry M. Conley, Director, Idaho Department of Fish and Game, Boise, Idaho, December 8, 1986). The remaining riparian communities are therefore particularly important for maintaining diverse and abundant wildlife populations.

The emergent herbaceous wetlands in the project area typically consist of sedges (Carex spp.), horsetails (Equisetum arvense), cattails (Typha latifolia), rushes (Juncus spp.), cocklebur (Xanthium strumarium), and sunflower (Helianthus annus). This wetland type occurs primarily as a narrow fringe along the Snake River flood zone, near springs, and in low areas near the river. Many of the springs and seeps contain lush growths of watercress (Nasturtium officinale). The distribution and composition of woody riparian vegetation along the Snake River varies a great deal, depending on the slopes near the river, the soil, and the agricultural development. The most common trees within the riparian zone are willow (Salix spp.), black cottonwood (Populus trichocarpa), and common cottonwood (P. deltoides), but water birch (Betula occidentalis), netleaf hackberry (Celtis reticulata),

black locust (Robinia pseudoacacia), alder (Alnus tenufolia), common chokecherry (Prunus virginiana), and the introduced Russian olive (Eleagnus angustifolia) also occur frequently, wherever soil and water conditions are favorable. Common understory species within the riparian zone are squawbush (Rhus trilobota), golden current (Ribes aurem), dogwood (Cornus nutallii), Wood's rose (Rosa woodsii), nettle (Urtica dioica), and Soloman's seal (Smilacia stellata).

3.4.1.1 Sagebrush-grassland Community

The vegetative sagebrush-grassland community is by far the most common in the project area. Although big sagebrush is the dominant shrub species, green rabbitbrush (Chrysothamus viscidiflorus), gray rabbitbrush (C.nauseosus), and other shrub species are well represented in some areas. Shadscale (Atriplex confertifolia) and greasewood (Sarcobatus vermiculatus) are common components of the shrub grassland community north of the river. Junipers (Juniperus scopulorum) are scattered throughout the area adjacent to the river. Understory vegetation is composed of a variety of grasses and a few forbs. Common grasses are cheatgrass brome (Bromus tectorum), needle-and-thread (Stipa comata), sandbury blue grass (Poa sandbergii), and wheatgrass (Agropyron spp.). The grass cover is often sparse, because there is insufficient moisture and because the talus slopes and basaltic cliffs contain very little soil to support plant growth.

3.4.1.2 Cliff and Talus Slope Vegetation

Little vegetation occurs on the basalt cliffs and talus slopes in the project area. The cold, temperate, desert canyon is quite different from other floristic units outside the canyon; the flora of more mesic species (those requiring moderate moisture) occur in the canyon. The stark geologic features and the lack of detritus sharply limit the opportunities for establishing vegetation in certain reaches of the canyon (Smithman, 1968). The steeper portions of the canyon exhibit sparse vegetation, and the species that do grow there are repeated throughout the study reach wherever there are similar soil and water conditions. Western clematis (Clematis lingusticifolia) and squawbush are widespread in the cliff and talus zone; shaggy fleabane (Erigeron pumilis) was observed growing out of basalt rock. Where pockets of soil occur on the cliffs, there are bladder fern (Cystoptires fragilis) and buckwheat (Erigeron spp.). The talus slopes support such plants as desert parsley (Lomatium dissectum), greasewood, horsebrush (Tetradymin spp.), and shaggy fleabane. Several widespread native plants that prefer sandy soil grow in talus slopes containing large amounts of sand and in sandy blow-out areas; these species include Indian rice grass (Oryzopsis hymenoides), Geyers milkvetch (Astragalus gexeri), and evening primrose (Oenothera pallida).

3.4.2 Project-Specific Plant Communities

Although plant communities are similar throughout the reach between Milner dam and Auger Falls, the distribution of the various plant communities along the study reach is far from uniform. To some extent, this variability is caused by the lack of suitable habitat. The narrow canyon in the vicinity of Milner dam has steep basaltic cliffs that end at the water's edge, thereby limiting suitable habitat for vegetation. Downstream from Milner dam, the canyon expands, and there are terraces and river bottom areas where plant communities can develop. Riparian vegetation grows sporadically along portions of the study reach of the Snake River; there are pockets of vegetation along the banks of the river where seeps and springs provide life-supporting water (figure 3-14).

The following is a description of riparian vegetation at each of the four project sites, with emphasis on the significant riparian communities that would be affected by construction and operation.

3.4.2.1 Milner Project

The zone of riparian vegetation in the project area below Milner dam is not well developed, probably because the steep talus slopes near the river provide little suitable habitat (figure 3-11). Woody riparian growth is generally limited to a narrow fringe of willows along the river, wherever there is soil and space. In addition to the wetlands along the river itself, emergent wetlands, dominated by cattails, have developed next to and extending into the Twin Falls Main Canal and the small inlets. A dense community of immature Rocky Mountain juniper, though not strictly a riparian community, is associated with the remnants of a former river channel on the north side of the canyon, below Milner dam. Big sagebrush and rabbitbrush are found on a bench and on a moderate slope within the canyon.

3.4.2.2 Star Falls Project

The wide bench that extends along the south bank of the river for nearly a mile below the site of the proposed dam supports the most significant stand of riparian vegetation within the 32-mile-long study reach. Flows from the river, during periods of high water, and flows from the numerous springs support a well-developed riparian community with a variety of species. Common within the area are Woods rose, golden currant, willow, Russian olive, skunk bush, Indian paintbrush, and common chokecherry. Some of the numerous springs throughout the area support small herbaceous wetlands. One such wetland, primarily consisting of cattails and supporting a lush growth of watercress, is located among the rocks immediately downstream of the proposed dam site. This wetland appears to be supported by nearby springs, rather than by flooding from the river. Extending upriver from the falls is

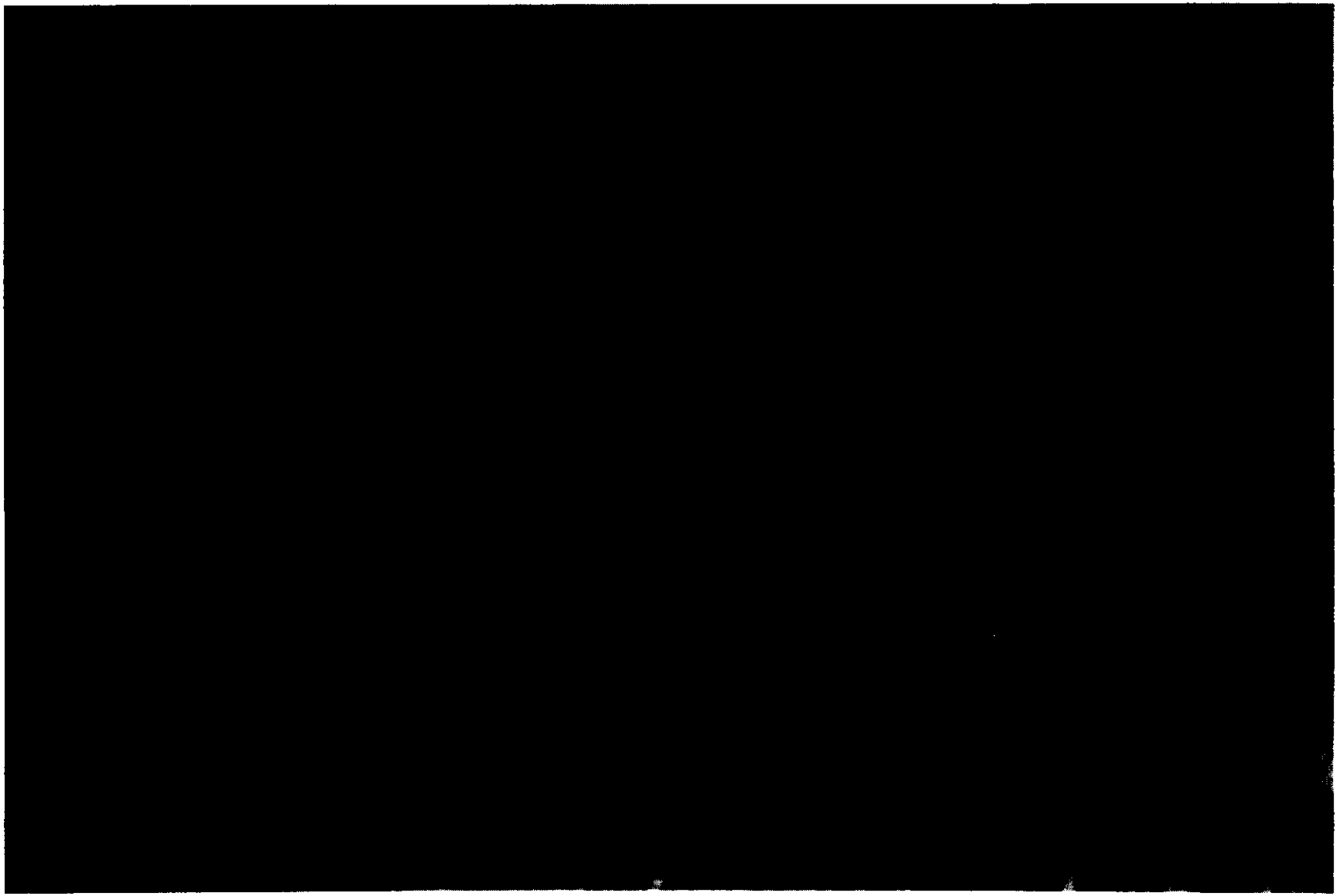


Figure 3-14. A sediment delta and sediment plume (center of photo) formed in the Snake River at the mouth of an unnamed stream near the Kasel Witherspoon Project. (Note the pocket of riparian habitat near the sediment delta which contrasts with the lack of riparian habitat on the opposite shore of the river (Source: the staff, photograph by John Estep on June 3, 1987).

a narrow, continuous fringe of woody riparian growth, particularly along the southern bank. A thick stand of sagebrush often borders the riparian zone.

3.4.2.3 Twin Falls Project

Approximately 23 acres of riparian vegetation, including both woody growth and herbaceous wetlands, lie within the proposed project boundary. The riparian communities are generally limited to a narrow fringe along the margins of the river and along tributaries or small pockets of habitat associated with springs or seeps. Somewhat more extensive riparian stands are located a few hundred yards downriver of the existing powerhouse, near the site of the proposed access road, and along the banks of Vineyard Creek, on the north side of the existing reservoir, about half a mile upriver from the dam.

3.4.2.4 Auger Falls Project

Riparian vegetation in the project area is found along the banks of the Snake River (figure 3-14), along ponds and springs, and within a small drainage that runs along the southern boundary of former wastewater settling ponds, formerly owned by Idaho Frozen Foods, Incorporated, and located near Rock Creek. The most significant riparian vegetation on the river is a well-developed band of willows, up to 250 feet wide, which extends along the west bank for about 3,000 feet below the diversion site. Inland from the willows is a narrow band of alders and squawbush. The riparian vegetation within the former Snake River channel primarily consists of various sedges and rushes, but woody species are scattered among the herbaceous plants.

3.4.3 Wildlife Resources

The Snake River and adjacent lands are of considerable value to wildlife. Riparian habitats and free-flowing rivers are the most valuable habitat types for wildlife, and are the two habitat types that are most limited in the Snake River Canyon. Much of the riparian habitat and free-flowing reaches of the Snake River have been altered or lost because of the hydroelectric development and the removal and transport of water through the extensive irrigation system that supports agricultural activities in the land around the river.

The Snake River is a major wintering area (table 3-6) and migration corridor for waterfowl using the Pacific flyway. Mallards (*Anas platyrhynchos*) and Canada geese (*Anser canadensis*) comprise much of the waterfowl population using the flyway. Waste grain from croplands outside the canyon provides forage for these species in the study reach. About 350,000 mallards winter along the Snake River near Boise, and another 90,000 winter between Twin Falls and American Falls (Bellrose, 1976). About 12,000 geese winter along the Snake River (Bellrose, 1976).

Table 3-6. Results of the Idaho Department of Fish and Game's annual midwinter waterfowl surveys of the Snake River, averaged over a 7-year period from 1977 to 1983 (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

Area	Waterfowl Numbers								
	Dabblers	Divers	Mergansers	Unidentified ducks	Total ducks	Geese	Swans	Coots	Grand total
Massacre Rocks to Minidoka National Wildlife Refuge (NWR)	136	324	36	10	506	72	4	0	582
Minidoka NWR	3,611	290	31	97	4,029	677	24	3	4,723
Minidoka NWR to I-84 Bridge (Br.)	662	105	38	0	805	850	1	0	1,656
I-84 Br. to Burley Br.	1,226	83	28	0	1,337	842	0	0	2,179
Burley Br. to Milner dam	1,309	30	29	0	1,368	223	0	1	1,592
Milner dam to Murtaugh Br. 1/	40	10	24	0	74	93	0	0	167
Murtaugh Br. to Hansen Br. 2/	126	5	17	1	149	0	0	0	149
Hansen Br. to Perrine Br.	181	3	13	7	204	10	0	0	214
Perrine Br. to Buhl Br. 3/	1,708	103	101	15	1,927	26	0	173	2,126
Buhl Br. to Gridley Br.	2,393	316	135	85	2,929	13	1	1,078	4,021
Gridley Br. to Upper Salmon Falls powerplant	247	106	15	0	368	7	0	436	81
Upper Salmon Falls powerplant to Lower Salmon Falls dam	1,862	392	51	16	2,321	254	0	1,210	3,785
Lower Salmon Falls dam to Bliss dam	655	50	16	2	723	0	0	0	723
Bliss dam to I-84 Br.	256	16	13	1	286	25	0	0	311
I-84 Br. to King Hill Br.	351	13	8	0	372	3	0	1	376
King Hill Br. to I-84 Br. (Glenns Ferry)	704	85	28	0	817	45	0	2	864
I-84 Br. (Glenns Ferry) to Slick Br.	785	72	19	8	884	60	0	28	972
Slick Br. to Indian Cove Br.	1,162	55	12	8	1,237	61	0	71	1,369
Indian Cove Br. to Loverage (Bruneau)	777	103	29	8	917	126	0	667	1,710
Hagerman Wildlife Management Area	70,731	1,354	0	86	72,171	236	0	332	72,739

1/ Area includes the location of the Milner and Star Falls Projects.
2/ Area includes the location of the Twin Falls Project.
3/ Area includes the location of the Auger Falls Project.

Ducks that commonly feed in the fast water sections of the Snake River include common merganser (Mergus merganser) and common goldeneye (Bucephala clangula). As many as a half million ducks move through the Snake River Canyon each winter, primarily between the Hagerman Wildlife Management Area, 25 miles west of Auger Falls, and the Minidoka National Wildlife Refuge, 35 miles east of Milner dam (Federal Energy Regulatory Commission, 1986).

The riparian and wetland habitat along the Snake River and on the limited number of islands in the river provide good waterfowl nesting habitat; Canada goose and mallard are the most common breeding waterfowl species using these habitats.

Year-round habitat for mule deer (Odocoileus hemionus) in the vicinity of the proposed projects is generally good; there are small, scattered resident deer populations in the area. The deer are often associated with the riparian vegetation along the Snake River. During the winter, especially during severe winters, a small number of migratory deer move into the Snake River Canyon. Winter habitat is generally good in the canyon because of the availability of sagebrush and other shrub species; outside the canyon, agricultural practices have greatly reduced available habitat. The deer have limited economic value in the project vicinity; in 1984, only 17 deer were harvested from game management unit 53, which includes the study reach (Idaho Department of Fish and Game, 1985).

The mountain cottontail (Sylvilagus nuttalli) is a common small game mammal found in the vicinity of the proposed projects. Other common mammals include badger (Taxidea taxus), striped skunk (Mephitis mephitis), coyote (Canis latrans), porcupine (Erethizon dorsatum), yellow-bellied marmot (Marmota flaviventris), raccoon (Procyon lotor), and black-tailed jackrabbit (Lepus californicus); many of these species depend on riparian vegetation for part of the year. Beaver (Castor canadensis), muskrat (Ondatra zibethicus), mink (Mustela vison), and river otter (Lutra canadensis), a state sensitive species, rely totally on the aquatic and riparian habitats of the Snake River and the other waterways.

The vertical cliffs of the Snake River Canyon from Milner dam to Auger Falls contain numerous fractures and cavities that provide ideal nesting sites for raptors and other birds; the surrounding shrub-grass vegetation associated with the canyon and the agricultural lands above the canyon contain populations of prey that support the raptors. Raptors commonly found nesting in the Snake River canyon include red-tailed hawk (Buteo jamaicensis), golden eagle (Aquila chrysaetos), prairie falcon (Falco mexicanus), northern harrier (Cirus cyaneus), American kestrel (F. sparverius), and great-horned owl (Bubo virginianus). The rough-legged hawk (B. lagopus) is a common winter visitor to the canyon.

The project areas support a variety of upland gamebirds. The ring-necked pheasant (Phasianus colchicus) is common and is closely associated with grain fields and fencerows. Much of the cover needed by pheasants is not available in the cleared agricultural fields above the canyon, and the riparian habitat in the canyon provides needed roosting cover for the birds, especially during the winter months, when the fields are barren and fallow. The gray partridge (Perdix perdix) occurs in low numbers, predominantly in areas in the study reach where shrub-grasslands are adjacent to the irrigated cropland. Similarly, the California quail (Lophortyx californicus) is found in scattered populations wherever riparian habitats are next to irrigated cropland. The chukar partridge (Alectoris chukar) prefers steep, rugged canyons, talus slopes, rocky outcroppings, and scattered brush and clumps of grass; all these conditions exist in the canyon.

3.4.3.1 Milner Project

The Snake River below Milner dam provides limited ice-free habitat for wintering waterfowl. From 1977 to 1986, the IDFG conducted annual aerial surveys of the project impact area. The results follow.

Species	Average	High count (year)
mallard	5.7	25 (1982)
Canada goose	3.2	29 (1984)
goldeneyes	2.2	15 (1980)
mergansers	1.6	6 (1979)

The ringed-necked pheasant is the primary game species in the project area. A pair of red-tailed hawks have been observed below Milner dam and in an area upstream from the proposed powerhouse site (Twin Falls Canal Company and North Side Canal Company, Ltd., 1984). Canada geese nest along the Twin Falls Canal and in the cliffs above the river.

3.4.3.2 Star Falls Project

The abundance of scrub-shrub wetlands along the south canyon wall and the somewhat level floodplain or bench throughout a portion of the project reach make the project area attractive to nesting waterfowl; the other portions of the project reach have steep cliffs that limit waterfowl nesting habitat. B&C (1984) estimated that a minimum of 10 pair of mallards and at least one pair of Canada geese nested in the project area during 1983. Mallard nesting activity was concentrated in the wetland habitat in the vicinity of Star Falls and within an area 0.5 mile upstream of the falls.

The relatively shallow, open water areas in the project reach during the winter provides habitat for waterfowl. During 1984 surveys, B&C (1984) observed 250 to 300 Canada geese, 300 to 400 mallards, 100 to 125 common mergansers, 5 to 10 lesser scaup (Aythya affinis), and 5 to 10 white-winged scoters (Melanita fusca) in the project reach. The results of the IDFG's annual aerial surveys of the project area, from 1977 to 1986, follow.

Species	Average	High count (year)
mallard	10.9	79 (1982)
Canada goose	43.6	235 (1982)
mergansers	2.8	15 (1980)
goldeneyes	1.7	8 (1982)

B&C (1984) surveyed the project area for raptor nesting activities during June 1983 and identified one golden eagle, two prairie falcons, two red-tailed hawks, and two common raven nests in the rocky canyon walls. B&C also identified two American kestrel nests in the project area, and said it suspects that two pair of great-horned owls also nest in the project area. The staff confirmed the existence of one owl nest during a June 1987 field investigation.

B&C (1984) observed eight wintering raptor species in the project reach during January 1984. The observations included 3 golden eagles, 5 red-tailed hawks, 2 prairie falcons, 1 northern goshawk (Accipiter gentilis), 2 Cooper's hawks (A. cooperii), 1 or 2 sharp-shinned hawks (A. striatus), 2 to 4 red-tailed hawks, and 5 to 10 ravens (Corvus corax).

The project area provides important habitat for ring-necked pheasant. Large numbers of pheasant feed in surrounding agricultural fields above the canyon during the daylight hours and roost in the canyon project area during the night. B&C (1984) observed more than 50 pheasant roosting in groves of trees along the river, and estimated that 200 to 300 birds seek cover in the riparian habitat within the project boundary during severe winters. Low numbers of Hungarian partridge were also observed in the Star Falls Project area.

B&C (1984) surveyed bird populations in the project area and found three times as many breeding and wintering birds using the riparian habitat compared to the adjacent grass-shrub habitat. CH_2M Hill observed 33 different species of birds in the riparian habitat and only 12 species in the grass-shrub habitat.

In the project area, B&C (1984) saw a river otter in at least two locations, and also observed bobcat, a state sensitive species, and as many as eight mule deer.

3.4.3.3 Twin Falls Project

Wildlife habitat in the project impact area is limited because of sparse vegetation and because of the effects the existing hydropower facilities have had on the surrounding area. Wildlife species observed at the site include yellow-bellied marmot, beaver, porcupine, raccoon, and striped skunk (Idaho Power Company, 1983). The riparian habitat is likely used by a variety of other nongame species. A golden eagle's nest, located within 0.5 mile of the project, was active during the 1987 nesting season (letter from Robert D. Cordell, Area Manager, Bennett Hills Resource Area, Bureau of Land Management, Shoshone, Idaho, March 13, 1987).

3.4.3.4 Auger Falls Project

The project reach receives moderate use by wintering waterfowl. J-U-B Engineers, Inc. (1983) observed 242 mallards and 5 common goldeneyes during a February 1983 aerial survey. The results of IDFG's annual aerial surveys of the project area, from 1977 to 1986, follow.

Species	Average	High count (year)
mallard	33.4	163 (1979)
Canada goose	0.9	5 (1985)
goldeneyes	3.5	19 (1980)
mergansers	3.8	14 (1979, 1982)

The cliffs surrounding the Auger Falls Project area provide nesting sites for raptors and other cliff-dwelling bird species. Two prairie falcon nests, one raven nest, and one red-tailed hawk nest are located on the north canyon wall; one prairie falcon nest and one raven nest are located on the south canyon wall; and one golden eagle nest is located on the south canyon wall of Rock Creek. A northern harrier nest is located near the proposed canal right-of-way (J-U-B Engineers, Inc., 1983).

The project area provides good habitat for upland gamebirds. A covey of 25 California quail was observed during February 1983. The mountain quail (Oreortyx pictus), a state sensitive species, has also been observed in the project area (personal communication, Linda Parsons, Wildlife Biologist, Bureau of Land Management, Department of the Interior, Burley, Idaho, January 7, 1987).

Mule deer are commonly sighted in the project area. The staff observed eight deer during a November 1986 site inspection. J-U-B Engineers, Inc. (1983) observed two river otter about 1,000 feet upstream of the proposed intake location.

3.5 THREATENED AND ENDANGERED SPECIES

There are no federally listed threatened or endangered species in the study reach of the Snake River (letters from John P. Wolflin, Field Supervisor, Boise Field Office, U.S. Fish and Wildlife Service, Department of the Interior, Boise, Idaho, January 14, 1987, and March 25, 1987). There are six candidate species which might occur in the study reach, but none have been reported. These include one fish and five snails.

Candidate species are ones that are currently being reviewed by the FWS for inclusion on the federal list of threatened and endangered species. Candidate species have no protection under the Endangered Species Act of 1973, as amended, but they could later be formally proposed and listed during the proposed project construction period for the four projects. Four of the candidate species, the Snake River Physa snail, an undescribed physid, the Bliss Rapids snail, not yet formally named, the Homedale Springs snail (Fontelicella idahoensis), and the Giant Colombia River limpet (Fisherola nuttalli), are under consideration for inclusion in a listing package for fiscal year (FY) 88; there is little information available on the Utah Valvata snail (Valvata utahensis), and it will not be considered with the listing package for the other four snails (personal communication, Jay Gore, Endangered Species Coordinator, Boise Field Office, U.S. Fish and Wildlife Service, Department of the Interior, Boise, Idaho, August 24, 1987). The efforts to formally recommend listing of the four snail species in FY 88 follows information collected in 1980 and 1981 by Dr. Dwight W. Taylor in the Wiley reach of the Snake River, which helped to define the critical habitat for the species between Kanaka Rapids and the C.J. Strike reservoir, and because of the immediate danger of habitat losses posed by reoccurring proposals to construct hydropower projects in the mainstem of the river and on adjacent springs between Kanaka Rapids and the C.J. Strike reservoir (personal communication, Jay Gore, Endangered Species Coordinator, Boise Field Office, U.S. Fish and Wildlife Service, Department of the Interior, Boise, Idaho, August 24, 1987). Tentative discussions are underway between the FWS and interested parties for identifying the dispersion of the five snails in a section of the river above Kanaka Rapids.

3.5.1 Shoshone Sculpin

The Shoshone sculpin has been collected in springs, in spring-fed streams along the Snake River, and in rapids in the mainstem of the Snake River near Bliss Bridge (Federal Energy Regulatory Commission, 1982). The dispersion of the species is more widespread than was suspected in 1982, and for this reason, the Shoshone scuplin will not be included in the FY 88 listing package with the four snails previously mentioned. IDFG stated that the Shoshone sculpin is not found upstream from Shoshone Falls (B&C Energy, Inc., 1984), and recent information confirms

that the species does not occur in the study reach (personal communication, Craig Groves, Staff Biologist, Nongame Program, Idaho Department of Fish and Game, Boise, Idaho, August 25, 1987, Wallace and Griffith, 1982). The Shoshone sculpin is also listed as a species of special concern by the IDFG (1978). The white sturgeon and the cutthroat trout are two other fish identified by the state of Idaho as species of special concern, because of dwindling populations, habitat losses, and pending losses of the genetic integrity of the species.

3.5.2 White Sturgeon

The white sturgeon is a state species of special concern. In 1970, the state established, and continues to enforce, a catch and release fishery for the species in the entire Snake River drainage. The white sturgeon population between Shoshone Falls and Bliss dam is severely depleted (Lukens, 1981). The only sturgeon captured in the study reach were incidental catches of 6 to 8 adult fish by a baitfish seiner at Auger Falls in the mid-1970's (personal communication, Bob Bell, Fishery Manager, Idaho Department of Fish and Game, Jerome, Idaho, August 24, 1987), and one fish captured by Lukens (1981) near Rock Creek in the early 1980's.

Anglers caught adult sturgeon downstream from the study reach in a pool below Kanaka Rapids in July 1987; these fish have unimpeded access to Auger Falls (personal communication, Fred Partridge, Senior Fishery Research Biologist, Idaho Department of Fish and Game, Jerome, Idaho, August 24, 1987). The proposed Auger Falls Project is the only project that would directly affect the sturgeon; adverse cumulative affects would occur to the population if the four proposed projects reduce water quality between Shoshone Falls and Bliss dam. The proposed Auger Falls Project would reduce flows over Auger Falls, making sturgeon passage upstream difficult or impossible during certain times of the year, and any project-related reductions in water quality or changes in the structural configuration of the deep pool at the powerhouse site would adversely affect the sturgeon.

3.5.3 Cutthroat Trout

Cutthroat trout are scattered throughout the study reach wherever there are favorable habitats. Spawning habitat has been identified at Vinyard Creek, about half a mile upstream from Twin Falls dam; other specific spawning sites have not been identified in the study reach. Cutthroat trout interbreed with rainbow trout and their progeny, rainbow-cutthroat trout hybrids, occur throughout the project reach, wherever water conditions are favorable. Anglers caught two cutthroat trout or rainbow-cutthroat hybrids in 20 hours of fishing in Twin Falls reservoir in 1982 (Idaho Power Company, 1983). The cutthroat trout and rainbow-cutthroat trout hybrids are subject to project-related reductions in water quality, habitat losses caused by reduced flows, and

entrainment and impingement losses at the proposed hydropower facilities.

3.5.4 Candidate Snail Species

Five candidate snail species favor a variety of habitats, including the quiet, clean, good water quality of springs, rapids in the mainstem of the Snake River, spring-seeps, and spring-fed streams emptying into the Snake River, all habitat types that are found in the study reach. The Columbia River limpet is the only snail species that has ever been collected near the study reach, and that specimen was collected in the Snake River near Burley, Idaho, in 1916 (personal communication, Craig Groves, Staff Biologist, Nongame Program, Idaho Department of Fish and Game, Boise, Idaho, August 25, 1987).

3.5.5 Giant Hellinore

The Giant hellinore (Epipactus gigantea), an orchid, is the only plant species that has been mentioned for the study reach. BLM suggested that an inventory be made in the study area to determine the status of this species (letter from Jon H. Idso, District Manager, Shoshone District, Bureau of Land Management, Department of the Interior, June 9, 1987). The study reach is outside the known range of the orchid, and there appears to be no suitable habitat at any of the four proposed project sites as the orchid is normally found in wet, grassy areas near warm or hot springs.

3.5.6 Bald Eagle

The bald eagle (Haliaeetus leucocephalus), a federally listed endangered species, is an occasional winter visitor to the project area. The number of bald eagles that use the reach of the Snake River between Milner dam and Auger Falls is limited, and the use is sporadic, because of a lack of suitable perch sites and a lack of an abundant food supply (table 3-7). Eagles occasionally are sighted perching on trees within the canyon. No resident eagle population, no traditional eagle night roost, and no eagle concentration is known to occur within the project areas. Eagles concentrate near reservoirs where substantial numbers of waterfowl also winter, such as at the C.J. Strike reservoir, downstream from the study reach, and at the Lake Walcott and American Falls reservoirs, upstream from the study area. Because use of the project reach is considered incidental, no threatened or endangered species are considered to inhabit the project reach (letter from John P. Wolflin, Field Supervisor, Boise Field Office, U.S. Fish and Wildlife Service, Department of the Interior, Boise, Idaho, January 14, 1987).

Table 3-7. Midwinter bald eagle counts for the Snake River from Minidoka dam to Bliss, Idaho, 1980 to 1986 (Source: Bureau of Land Management, unpublished data).

River reach	Year						
	1980	1981	1982	1983	1984	1985	1986
Minidoka dam to Milner dam	18	5	2	1	2	-	9
Milner dam to Murtaugh Bridge 1/	0	0	0	1	0	-	0
Murtaugh Bridge to Auger Falls 2/	0	0	0	0	0	-	0
Auger Falls to Bliss	-	2	0	0	0	-	6

1/ Includes the sites of the Milner and Star Falls Projects.
2/ Includes the sites of the Twin Falls and Auger Falls Projects.

The potential impacts to the few bald eagles that occasionally pass through the project areas might include the loss of some perch trees and death from the hazards of collision and electrocution associated with the transmission lines. These potential effects would be minimized, because suitable alternate perch sites would be available and because the design of the transmission line would ensure that collision and electrocution hazards are minimized. Bald eagles that move through the canyon during the construction season would avoid areas of construction noise and human activity.

Based on the low numbers of bald eagles that use the 32-mile-long reach of the Snake River from Milner dam to Auger Falls, and on the minimal effects of the projects on eagle habitat, the staff concludes that the construction, operation, and maintenance of the proposed projects, either individually or collectively, would not adversely impact the bald eagle. Section 7 consultation under the Endangered Species Act therefore is not required.

3.5.7 Cumulative Impacts on Threatened and Endangered Species

The staff believes that it is unlikely that any threatened or endangered species would be subjected to significant cumulative adverse impacts from the four proposed projects.

3.6 SOCIOECONOMIC FACTORS

Construction and operation of the four proposed hydropower projects would affect employment, income, housing, and local governmental finances within four south-central Idaho counties, Twin Falls, Jerome, Cassia, and Minidoka. A discussion of the major socioeconomic characteristics of the counties follow.

3.6.1 Demographic Considerations

The 1980 Census of Population shows that on April 1, 1980, 106,912 persons resided within the four-county area (table 3-8).

Table 3-8. Actual and projected population of Twin Falls, Jerome, Cassia, and Minidoka Counties, Idaho, for 1960, 1970, 1980, 1985, 1990, and 2000 (Source: the staff, from Bureau of the Census, 1986, and the Idaho Department of Water Resources, 1986).

County	Total Population					
	1960	1970	1980	1985 1/	1990	2000
Twin Falls	41,842	41,807	52,927	56,100	66,311	79,990
Jerome	11,712	10,253	14,840	15,600	20,479	26,329
Cassia	16,121	17,017	19,427	20,700	21,853	23,683
Minidoka	14,394	15,731	19,718	21,200	21,600	22,800
Total	84,069	84,808	106,912	113,600	130,243	152,802

1/ Estimated population as of July 1, 1985.

About 60 percent of the area's 1980 population lived in either the Twin Falls-Jerome or the Burley-Rupert areas. The Twin Falls-Jerome area includes the area's largest population center, the city of Twin Falls, which had 26,209 residents in 1980. The city of Burley, which had 8,761 residents in 1980, is the area's second largest urban center (table 3-9).

During the 1970's, the combined population of Twin Falls, Jerome, Cassia, and Minidoka Counties increased by 26 percent (22,104 persons). An expansion of the area's farm and food processing sectors, the establishment of two new major manufacturers, Tupperware Company and Moore Business Forms, and the emergence of the city of Twin Falls as the primary retail trade, financial, and services center in south-central Idaho and northern Nevada, caused this significant population gain (personal communication, Lon McDonald, Statistician, Idaho Job Service, Twin Falls, Idaho, November 4, 1986).

Table 3-9. Population change by sub-area in Twin Falls, Jerome, Cassia, and Minidoka Counties, 1970-80, and 1980-84 (Source: Bureau of the Census, Department of Commerce 1981; 1986).

Geographic Area	Total population 1970	1980	1984	Population change 1970-80	1980-84
Twin Falls County					
Twin Falls city	21,914	26,209	28,168	4,295	1,959
Twin Falls suburbs	NA	5,952	NA	NA	NA
Twin Falls area	NA	32,161	NA	NA	NA
Buhl city	2,975	3,629	3,775	654	146
Filer city	1,173	1,645	1,636	472	-9
Rest of county	NA	15,927	NA	NA	NA
County total	41,807	52,927	56,128	11,120	1,106
Jerome County					
Jerome city	4,183	6,891	7,294	2,708	403
Jerome suburbs	NA	5,041	NA	NA	NA
Jerome area	NA	11,932	NA	NA	NA
Rest of county	NA	2,908	NA	NA	NA
County total	10,253	14,840	15,946	4,587	1,492
Cassia County					
Burley city	8,079 1/	8,525 2/	8,914 3/	446	389
Burley suburbs	3,179	3,830	NA	651	NA
Burley area	11,258	12,355	NA	1,097	NA
Rest of county	5,759	7,072	NA	1,313	NA
County total	17,017	19,427	20,919	2,410	1,492
Minidoka County					
Rupert city	4,563	5,476	5,600	913	124
Rupert suburbs	3,650	4,338	NA	688	NA
Rupert area	8,213	9,814	NA	1,601	NA
Rest of county	7,518	9,904	NA	2,386	NA
County total	15,731	19,718	21,179	3,987	1,461

1/ Excludes 200 residents of the city of Burley in Minidoka County.
2/ Excludes 236 residents of the city of Burley.
3/ Excludes 257 residents of the city of Burley.

In the early 1980's, population growth in the four-county area tapered off. The closing of a sugar beet processing plant in Twin Falls County in 1980, together with depressed farm prices and incomes, caused total employment in Twins Falls County to decline by about 1,000 jobs. Data provided by the Bureau of Economic Analysis (1986) indicate that employment decreased in Minidoka County, but remained relatively constant in Jerome and Cassia Counties during the same period of time. Consequently, the net migration of persons into the four-county area slowed, and the area's average annual rate of population growth declined from 2.6 percent in the 1970's to 1.25 percent during the 1980-85 period. The city of Twin Falls, however, continued to experience modest population gains (table 3-9).

3.6.2 Employment and Income

In 1984, the economy of the study area generated an average of 53,908 jobs. This number includes full-time and part-time employees of private establishments and government agencies, as well as proprietors. As shown in table 3-10, agriculture, services, retail trade, and manufacturing provide the largest numbers of job opportunities for area residents.

The economic growth of a region usually depends on the expansion of its basic industries (those that sell goods and services primarily to persons and establishments located outside the region or to federal or state government agencies).

Agriculture and processing of farm products are the major basic industries in the four-county area. In 1982, the area's 4,301 farms received $507,378,000 from the sale of agricultural products (table 3-11). Potatoes, beans, sugar beets, wheat, barley, and hay are the area's most significant agricultural crops; cattle, calves, dairy products, sheep, lambs, and wool are the primary sources of livestock revenue. Most of the cultivated land requires a continuous supply of irrigation water from the Snake River (table 3-12).

In addition to direct employment, the region's farms generate considerable jobs and income for business establishments that provide commodities and services to farms or to businesses that store and transport farm products. These ancillary business establishments include the following: distributors of livestock feed, seeds, bulbs, plants, commercial fertilizer, and other agricultural chemicals; farm machinery and equipment dealers; suppliers of gasoline and oil; lumber dealers; hardware and building supply stores; commercial construction contractors; financial institutions; and livestock dealers.

Table 3-10. Employment trends for Twin Falls, Jerome, Cassia, and Minidoka Counties, Idaho, for 1974-1984, by industrial sector (showing average yearly full-time and part-time wage and salary employment, plus proprietors, by place of work, and excluding limited partners, volunteers, and unpaid family workers) (Source: Bureau of Economic Analysis, 1986).

Industrial sector	Employment in Twin Falls County			Employment in Jerome County			Employment in Cassia County			Employment in Minidoka County		
	1974	1984	Change	1974	1984	Change	1974	1984	Change	1974	1984	Change
Argriculture	3,277	3,912	635	1,641	1,473	-168	2,220	1,935	-285	2,361	2,101	-260
Farm services, forestry, and fishing	330	645	315	130	316	186	269	351	82	253	413	160
Mining	19	38	19	5	10	5	24	45	21	12	8	-4
Construction	1,532	1,421	-111	275	298	23	464	449	-15	416	353	-63
Manufacturing	2,723	3,271	548	1,064	993	-71	2,068	1,440	-628	1,673	2,049	376
Transportation and public utilities	1,454	1,524	70	193	307	114	328	287	-41	281	252	-29
Wholesale trade	1,532	1,748	216	363	349	-14	238	578	340	219	597	378
Retail trade	4,581	4,855	274	635	881	246	1,733	1,468	-265	985	1,033	48
Finance, insurance, and real estate	1,224	1,905	681	213	313	100	339	528	189	169	258	89
Personal, repair, business, medical, legal, educational, and tourist services	3,745	5,141	1,396	640	1,052	412	1,252	1,462	210	783	1,128	345
Federal civilian government	347	371	24	42	57	15	125	207	82	75	60	-1
Military personnel	406	266	-140	114	74	-40	169	97	-72	154	99	-5
State and local government	2,504	2,852	348	408	583	175	921	965	44	895	1,090	195
Total employment	23,674	27,949	4,275	5,723	6,706	983	10,150	9,812	-338	8,276	9,441	1,165

Table 3-11. Number of farms and market value of agricultural products sold in Twin Falls, Jerome, Cassia, and Minidoka Counties in 1982 (Source: Bureau of the Census, 1984).

County	Number of farms	Agricultural sales (in thousands of $'s) Crops	Livestock and Poultry	Total
Twin Falls	1,609	78,504	70,175	148,679
Jerome	867	48,327	82,260	130,587
Cassia	870	97,914	48,610	146,524
Minidoka	955	57,522	24,066	81,588
Total	4,301	$282,267	$225,111	$507,378

Table 3-12. Total irrigated and harvested acreage for major crops grown in five counties in Idaho in 1982 (Source: Bureau of the Census, 1984).

Crop	County Minidoka County	Jerome County	Lincoln County	Cassia County	Twin Falls County	Total area	Percent of all crops
Irish potatoes	10,924	12,230	3,794	29,766	8,994	65,708	6.5
Sugar beets for sugar	28,362	5,345	4,727	20,823	8,179	67,436	6.7
Wheat for grain	43,127	33,124	14,015	83,594	45,187	219,047	21.7
Barley for grain	35,755	17,759	14,260	39,938	35,166	142,878	14.1
Oats for grain	78	394	444	1,188	938	3,042	0.3
Corn for grain or seed		3,289	420	444	12,441	16,594	1.6
Hay-alfalfa, grass silage	23,516	43,432	25,798	52,779	60,558	206,083	20.4
Alfalfa hay	21,456	40,126	22,848	43,101	55,640	183,171	18.1
Dry edible beans	7,000	21,636	1,034	15,144	62,912	107,726	10.6
Total	170,218	177,335	87,340	286,777	290,015	1,011,685	100.0

There are 20 major manufacturing establishments in the four-county region (table 3-13). Significantly, all of these establishments but three (Tupperware Company, Idaho Norland, and Moore Business Forms) are closely linked to the area's farms. Table 3-13 also shows the following: five establishments in the region (Universal Frozen Foods, Ore-Ida Foods, J.R. Simplot Company, Magic Valley Foods, Inc. and Rolland Jones Company) convert potatoes into frozen or dehydrated products; two establishments (Green Giant and Del Monte Corporation) process corn and beans; two establishments (Amalgamated Sugar Company in Twin Falls and Minidoka Counties) extract and package sugar from sugar beets; one establishment (Independent Meat Company) processes and packs beef and lamb; two establishments (Clear Springs Troat Company and Blue Lake Trout Farm) raise and package trout; one establishment (Kraft) produces cream cheese and Swiss cheese; one establishment (Rogal) processes seed; two firms (Longview Fiber Company and Boise Cascade Corporation) manufacture corrugated boxes 0or the area's food processors; and one establishment (Acme Manufacturing Company) manufactures farm implements.

In 1984, the residents of Twin Falls County only had a mean income equal to or greater than the $10,530 per capita income estimated for the residents of the state of Idaho, and none of the four counties had a mean income that equaled or exceeded the country's $13,114 per capita income level (table 3-14).

The relatively low per capita incomes in the four counties reflect a heavy dependence on relatively low wages, a seasonal employment in agriculture and food processing, and a relative shortage of better paying manufacturing, technical, and professional job opportunities.

3.6.3. Rental Housing

The work force of construction personnel who currently reside in Salt Lake City, Boise, or Idaho Falls, and who are likely to become employed at any of the proposed projects would prefer moderately priced rental housing situated less than 30 minutes from their new job site. The 1980 Census of Housing listed 584 vacant housing units available for rent in the four-county area, including 297 units in Twin Falls County (table 3-15).

Table 3-13. Major manufacturing establishments in Twin Falls, Jerome, Cassia, and Minidoka Counties for 1986 (Source: the staff, from University of Idaho, 1985; Idaho Job Service, 1986; Burley Area Chamber of Commerce, 1986).

Name of establishment	Location	Products	No. of workers 1/ Year-round	Seasonal
Green Giant	Buhl	Canned and frozen corn and beans	77	765
Blue Lakes Trout Farm	Buhl	Packaged fresh frozen trout	90	--
Clear Springs Trout Co.	Buhl	Packaged fresh frozen trout	250	--
Universal Frozen Foods	Twin Falls	Frozen potato products	820	45
Amalgamated Sugar Co.	Twin Falls	Sugar, molasses, and livestock feed from sugar beets	220	130
Independent Meat Co.	Twin Falls	Processed beef and lamb	125	--
Longview Fiber Co.	Twin Falls	Corrugated boxes	105	--
Moore Business Forms	Jerome	Carbonized business forms	260	--
Tupperware Co.	Jerome	Plastic housewares	670	20
Ore-Ida Foods	Burley	Frozen potato products	986	10
Boise Cascade Corp.	Burley	Corrugated boxes	100	--
Idaho Norland	Burley	Snow plows	80	--
Delmonte Corp.	Burley	Canned vegetables	45	500
Magic Valley Foods, Inc.	Rupert	Dehydrated potato products	178	50
Kraft	Rupert	Cream cheese, Swiss cheese	100	--
J.R. Simplot Co.	Minidoka	Frozen potato products	1,200	70
Amalgamated Sugar Co.	Minidoka	Sugar, molasses, and livestock feed from sugar beets	235	500
Acme Manufacturing Co.	Filner	Farm implements	40	--
Rogal	Twin Falls	Processed seed	180	--
Rolland Jones Company	Burley	Fresh-packed potatoes	90	--

1 / The change in seasons causes a subsequent change in the numbers of workers needed to process agricultural products produced in the area.

Table 3-14. Per capita personal income by area for 1984 (Source: the staff, from Bureau of Economic Analysis, 1986).

Area	Per capita personal income
Twin Falls County	$10,578
Jerome County	8,452
Cassia County	9,866
Minidoka County	7,956
State of Idaho	10,530
United States	13,114

Table 3-15. Number of vacant for rent housing units by contract rental in Twin Falls, Jerome, Cassia, and Minidoka Counties for 1980 (Source: Bureau of the Census, 1982).

	Number of vacant for rent housing units				
Rent	Twin Falls County	Jerome County	Cassia County	Minidoka County	Four-County area
$100 to $119	67	19	28	20	134
$120 to $149	95	21	50	25	191
$150 to $169	88	20	32	29	169
$170 to $199	47	11	14	18	90
Total	297	71	124	92	584

Moreover, the area has a substantial number of older motels located along Route 30 that offer relatively low rates because of competition from newer motor hotels that were built adjacent to Interstate 84, and very seldom are filled. As shown in tables 3-16 and 3-17, 23 older motels with a total of 672 rooms are located in the Twin Falls-Jerome area, and 11 older motels with 253 rooms are in the Burley-Rupert area. Thus, there are 925 lower-priced, transient housing units in the four counties that would be available to handle a construction work force assigned to the four proposed projects.

Table 3-16. Inventory of lower-priced motel lodging facilities in the Twin Falls-Jerome area for November 1986 (Source: the staff, from Region IV Development Association, Inc., 1986; Idaho Travel Council, 1986).

Name of motel	Location	Single room rate	Total number of units
Oregon Trail	Buhl	Under $30/night	7
Siesta	Buhl	Under $30/night	12
Rock Lodge	Hogerman	Under $30/night	6
Lincoln Inn	Gooding	Under $30/night	10
Evergreen	Gooding	Under $30/night	16
Alley	Twin Falls	$103/week	32
AA	Twin Falls	$35-50/week	7
Weston Inn	Twin Falls	$28/night	97
Branding Iron	Twin Falls	$89/week	10
Capri	Twin Falls	Under $30/night	20
De Luxe	Twin Falls	$60 to $80/week	18
Dunes/Sands	Twin Falls	NA	42
El Rancho	Twin Falls	$25/night	14
Imperial 400	Twin Falls	$22/night	40
Holiday	Twin Falls	$16/night	18
Monterey	Twin Falls	Under $30/night	28
Motel 6	Twin Falls	$19/night	155
Twin Falls Motel	Twin Falls	$125/week	8
Wagon Wheel	Twin Falls	$60/week	10
Western	Twin Falls	Under $30/night	15
Weston's Lamplighter	Twin Falls	Under $30/night	70
Holiday	Jerome	$15 to $25/night	23
Towles	Jerome	Under $30/night	14
Total in Twin Falls-Jerome Area			672

Table 3-17 Inventory of lower priced motel facilities in the Burley-Rupert area for November 1986 (Source: the staff, from Burley area Chamber of Commerce, 1986).

Name of Motel	Location	Single room rate	Total number of units
Budget	Burley	$20/night	100
Carlos	Burley	$42/week	17
East Park	Burley	$126/week	14
Evergreen	Burley	$16/night	6
Greenwell	Burley	$100 to $120/week	31
Lampliter	Burley	$75/week	17
Parish	Burley	$102 to $114/week	15
Powers	Burley	$80/week	15
Starlite	Burley	$85/week	7
Tops	Heyburn	$16/day	16
Flamingo	Rupert	$85 to $100/week	15
Total in Burley-Rupert area			253

3.6.4 Outdoor Recreation and Tourism

The four-county area traditionally has served as an overnight stop for vacation travellers headed to or from central Idaho, Yellowstone and Grand Teton National Parks, Craters of the Moon National Monument, and Sun Valley. State and local chambers of commerce have increased expenditures for publications and promotional activities designed to persuade visitors passing through the area to visit such local sights as Thousand Springs, Shoshone Ice Cave, Mammoth Cave, Shoshone Falls, Malad Gorge State Park (which is the only state-operated recreational facility in the four counties), City of Rocks, and other local attractions (table 3-18).

Table 3-18. Major tourist-recreation sites in south-central Idaho (Source: the staff, from Magicland Regional Travel Committee, undated).

Attraction	Location	Description
Malad Gorge State Park	5 miles east of Bliss in Gooding County	2-mile-long trail with views of gorge and waterfalls on the Malad River
Thousand Springs	Snake River between Hagerman and Twin Falls in Twin Falls County	Tours of commercial trout farms; trout fishing in the Malad River, Billingsley Creek, Riley Creek, Oster Lakes, and Anderson ponds
Niagara and Crystal Springs	Snake River north of Buhl in Twin Falls County	Sightseeing; picnic area
Salmon Falls reservoir	Southwest of Rogerson in Twin Falls County	12-mile-long reservoir offers excellent fishing and camping
Magic Mountain	East of Rogerson in Twin Falls County	Small downhill and cross-country ski area
Shoshone Falls	5 miles east of downtown Twin Falls on the Snake River	212-foot-high waterfalls viewed from a park; picnic area
Mammoth Cave and Shoshone Ice Caves	Off Route 75, north of Shoshone in Lincoln County	Self-guided tour through Mammoth Cave; guided tours through Shoshone Ice Caves
Magic reservoir	Blaine County	10-mile-long reservoir offers excellent trout fishing, water activities, and camping
Minidoka Museum	East of Rupert in Minidoka County	Displays of pioneer agricultural and household implements; turn-of-the-century ice-cream parlour
Oakley Historic District	17 miles south of Burley in Cassia County	Historic log cabins and homes
City of Rocks	West of Almo in Southern Cassia County	Trail with views of rock spires

The Thousands Springs area of the Snake River is a moderately-priced, year-round vacation area of particular interest to campers.

Recreational rafting activities in the Snake River between Milner dam and Auger Falls presently have two limitations: loss of river flows because of diversions of water from the river for irrigation, and cold weather. From about mid-October to mid-April, water is not removed from the river for irrigation. Unfortunately, some of the coldest temperatures and icing conditions also occur during this 4-month period, making rafting activities infeasible.

Commercial whitewater rafting takes place in a segment of the study reach of the Snake River between Murtaugh Bridge and Twin Falls. Currently, five outfitters conduct raft trips there, usually during 1 period of 6 weeks yearly, from about the first of March through April 15. About 5,000 persons, including a large number of nonlocal customers, are guided down the Murtaugh section of the Snake River each year. Experienced kayakers also run a portion of the Snake River between Milner dam and Star Falls. The white-water enthusiasts who visit the Twin Falls area each year during the off-peak or nonsummer tourist season are important to some area motels, restaurants, gasoline service stations, gift shops, and other tourist-oriented establishments; unfortunately, survey data are unavailable to establish the magnitude of their local expenditures.

3.6.5 Local Government Revenues and Expenditures

The combined revenues and expenditures for FY 1981-82 for all local government entities in the four-county area are displayed in table 3-19. The data reflect the aggregate revenues and operating expenditures of each county government, of the city of Twin Falls and other incorporated places, school districts, fire districts, irrigation districts, and other special districts.

State aid represents the most important source of revenue for local governmental entities in Jerome and Cassia Counties. The charges and expenditures of Magic Valley Memorial Hospital in Twin Falls County and of the irrigation districts serving the four-county area inflate the amount of revenues from charges as well as the amount of expenditures for hospitals and natural resources. Excluding these, education, sewerage collection and treatment, and highway maintenance absorb the largest portion of local government spending.

Table 3-19. Total and per capita local government revenue by source and noncapital expenditures by type for selected Idaho Country Areas 1981-82 (Source: Bureau of the Census 1984).

County area	Twin Falls County total in thousands of $'s	Twin Falls County per capita	Jerome County total in thousands of $'s	Jerome County per capita	Cassia County total in thousands of $'s	Cassia County per capita	Minidoka County total in thousands of $	Minidoka County per capita
General Revenue by source:								
Local property tax revenue	$ 11,681	$ 220.70	$ 2,865	$ 180.93	$ 3,750	$ 193.03	$ 3,540	$179.53
Sales and other tax revenue	384	7.26	445	29.99	122	6.28	135	6.85
Charges and misc. general revenue	30,820	582.31	2,505	168.80	3,472	178.72	7,598	385.33
Federal grants and other federal aid received	4,695	88.71	1,418	95.55	1,821	93.74	566	28.70
State grants and other state aid received	21,117	398.98	5,277	355.59	7,408	381.33	6,299	319.45
Total	$ 68,697	$ 1,297.96	$ 12,330	$ 830.86	$ 16,573	$ 853.10	$18,138	$919.86
Expenditure by type:								
Education	$ 27,214	$ 514.18	$ 5,196	$ 350.13	$ 7,988	$ 411.18	$ 8,213	$416.52
Libraries	490	9.26	40	2.70	42	2.16	4	.20
Public welfare	91	1.72	30	2.02	94	4.84	208	10.55
Hospitals	16,927	319.82	---	---	310	15.96	2,949	149.56
Health	151	2.85	45	3.03	117	6.02	58	2.94
Highways	3,940	74.44	1,127	75.94	2,169	111.65	1,064	53.96
Other transportation	555	10.49	187	12.60	90	4.63	---	---
Police protection	2,103	39.73	569	38.34	839	43.19	670	33.98
Fire protection	1,153	21.78	104	7.01	250	12.97	80	4.06
Correctional facilities	77	1.45	---	---	18	.93	92	4.67
Natural resources	584	11.03	1,566	105.53	1,212	62.39	2,297	116.49
Parks recreation	527	9.96	48	3.23	363	18.69	115	5.83
Housing and community development	230	4.35	---	---	---	---	---	---
Sewerage	5,009	94.64	1,509	101.68	139	7.16	120	6.09
Sanitation other than sewerage	805	15.21	75	5.05	859	44.22	216	10.95
Government administration	2,401	445.36	632	42.59	1,062	54.67	1,079	54.72
Other general expenditures	893	16.87	892	60.11	445	22.91	228	11.56
Total	$63,150	$1,193.15	$12,020	$809.96	$15,997	$823.47	$17,393	$828.08

3.7. LAND USE AND RECREATIONAL RESOURCES

3.7.1. Recreational Resources

Water, particularly moving water, is the focus of many outdoor recreational activities in the Snake River Plain of south-central Idaho. Although the highest falls of the Snake River are now the sites of dams that provide irrigation and hydropower, the powerful river retains its ancient character in the unimpounded reaches. The gravity-flow irrigation developments that make agriculture possible in this area of scarce moisture also provide dozens of reservoirs and miles of canals. The aquifer discharges along the canyon walls and the emergence of springs and seeps provide diverse aquatic and terrestrial habitat. The presence of surface water in this desert-like environment, particularly where spring flows occur, offer excellent varied habitats that support fish, especially trout species, and provide habitats that concentrate wildlife. The agricultural operations in the area help attract waterfowl and enhance conditions for upland gamebirds, notably ring-necked pheasant.

The availability of water and associated habitat tends to increase as one follows the Snake River gorge downstream from Milner dam. Except for the area of Auger Falls, the gorge is relatively steep and narrow, with limited riparian vegetation and with insufficient groundwater inflows to offset the severe reductions in summer flows caused by irrigation withdrawals at Milner dam. The steep terrain and relative lack of access inhibit public use. Downstream of Rock Creek, and outside the study reach near Hagerman, Idaho, the gorge widens and contains wide bottomlands, canyon walls that are less steep, and riparian vegetation that is extensive, particularly in the Thousand Springs area, and numerous springs. Consequently, the 32-mile-long study area presents a very different perspective of Snake River recreational opportunties than those found in the Hagerman area. From Milner dam downstream past Rock Creek, there is very little summer recreational use of the river, except at reservoirs, and limited fishing activity except in a few deep holes where inflow from springs supports trout populations. Between Rock Creek and Bliss, Idaho, the whole character of the river changes abruptly. There are numerous large springs and irrigation return waters entering the river to increase the flow of the river. There is an increase in fish populations, access to the river is more readily available, and the habitat diversity created by the springs and wide river bottomlands makes the area suitable to fish and wildlife resources and more attractive to those persons seeking recreational opportunities. The river of this Rock Creek to Bliss reach offers year-round recreational opportunities.

In 1983, IPC conducted a telephone survey of public use of the Snake River recreational opportunities between Minidoka dam and Twin Falls dam for residents of Twin Falls, Jerome, Minidoka, and Cassia Counties, the four counties surrounding the area. IPC (1983) found that over 75 percent of the residents made no use of the Snake River for recreational purposes.

In contrast, a IPC survey in 1981 showed that the portion of the river below Lower Salmon Falls received a significant amount of local use, primarily for fishing and river-running with non-powered watercraft (Federal Energy Regulatory Commission (1982).

The reservoirs in the study reach of the Snake River receive most of the public use because of the facilities provided by the IPC at its hydropower projects and because of federal management activities by the BLM at Milner reservoir. With respect to other recreational developments in the area, the Hagerman Wildlife Management area (WMA) in the vicinity of Thousand Springs provides public access as well as fishing opportunities at ponds located on the WMA. The Malad Gorge State Park, located on the rim above the Malad River, near Bliss, Idaho, provides hiking trail access into the gorge upstream of the IPC's Malad River hydropower development, but the primary emphasis is directed towards travelers on Interstate Highway 80 (I-80).

The Shoshone District Office of the BLM manages public lands on the north side of the Snake River between Milner dam and Perrine Bridge crossing at Twin Falls. Public lands in this area are designated as components of the Snake River Rim Recreation Area (SRRRA). The SRRRA boundaries include all the BLM lands within the Snake River Canyon between the road crossing immediately below Milner dam (county road 1300S) and Hansen Bridge. From Hansen Bridge west to Perrine Bridge, the SRRRA includes all the BLM lands from the river banks north to I-80. The Shoshone District Office places the SRRRA lands in the "special" recreation category, which indicates a priority in the use of funds to emphasize such purposes as visitor services, patrol, clean-up, and facility development (personal communication, Jeff Jarvis, Recreation Planner Bureau of Land Management, Department of the Interior, Shoshone, Idaho, May 7, 1987).

In addition to fishing, hunting, hiking, picnicking, camping, sightseeing, nature appreciation activities, and other such dispersed recreational activities that do not require the development of specific recreational facilities, the free-flowing sections of the Snake River in the study area offer three distinct whitewater boating experiences. Whitewater boating opportunities are limited in Idaho because of water resource development and management of flows. The Idaho Statewide Outdoor Recreation Plan indicates that in the Springs Region, which includes the Magic Valley (where the study reach is located), Thousand Springs, and Sun Valley-Ketchum areas, river boating opportunities amount

to less than 40 stream miles. In comparison, nearby lakes and reservoirs provide nearly 40,000 surface acres of flatwater recreational opportunities (Idaho Department of Parks and Recreation, 1978). During the EIS study period, the study reach was suffering from a drought, and surveys to monitor whitewater activities could not accurately reflect the use of the river.

The 32-mile-long study reach contains some impressive whitewater areas (figures 3-11 and 3-15). Whitewater is rated from Class I to Class VI on the International Scale of River Difficulty. The scale is accepted by virtually all paddling organizations, is part of the Safety Code of the American Whitewater Affiliation, and is recognized as the standard reference for describing individual rapids as well as sections of rivers (American Red Cross, 1981). The classes are defined as follows:

> Class I. Moving water with a few riffles and small waves. Few or no obstructions.
>
> Class II. Easy rapids with waves up to 3 feet, and wide, clear channels that are obvious without scouting. Some maneuvering is required.
>
> Class III. Rapids with high, irregular waves often capable of swamping an open canoe. Narrow passages that often require complex maneuvering. May require scouting from shore.
>
> Class IV. Long, difficult rapids with constricted passages that often require precise maneuvering in very turbulent waters. Scouting from shore is often necessary, and conditions make rescue difficult. Generally not possible for open canoes. Boaters in covered canoes and kayaks should be able to Eskimo roll. 1/
>
> Class V. Extremely difficult, long, and very violent rapids with highly congested routes which nearly always must be scouted from shore. Rescue conditions are difficult and there is a significant hazard to life in event of a mishap. Ability to Eskimo roll is essential for kayaks and canoes.
>
> Class VI. Difficulties of Class V carried to the extreme of navigability. Nearly impossible and very dangerous. For teams of experts only, after close study and with all precautions taken.

1/ The Eskimo roll is a self-rescue technique that allows the boater to roll a capsized boat upright while remaining seated in the boat. Tightly sealed decks or full disreplacement flotation is required to keep water from filling the capsized boat.

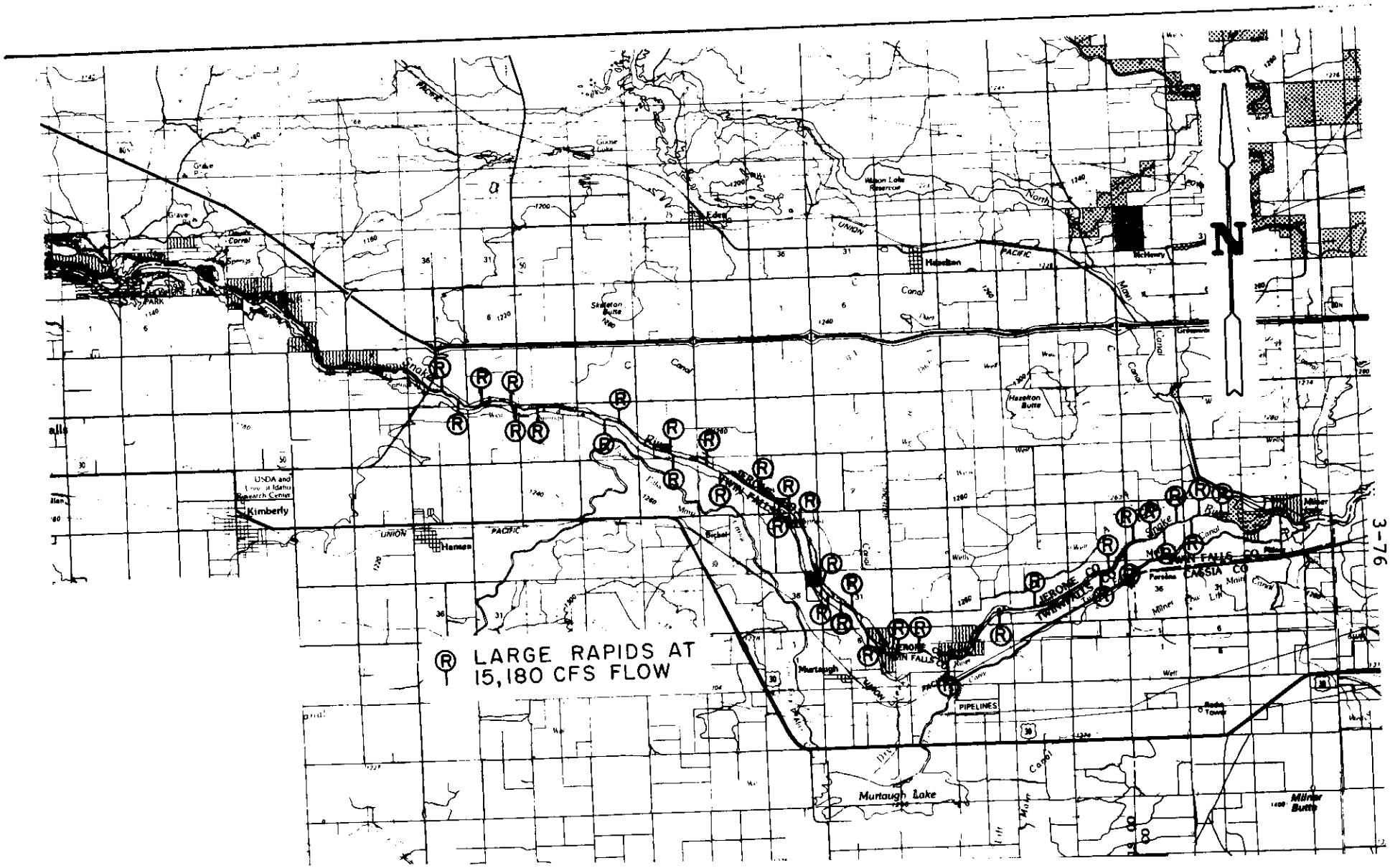


Figure 3-15. Location of large rapids on the Snake River betwee Milner dam and Twin Falls reservoir at flows of 15,180 cubic feet per second (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

In the 1.6-mile-long section of the Snake River, immediately below Milner dam, in the early spring before the irrigation season begins, and in the late fall after the irrigation season ends, but before cold weather sets in, expert boaters can run over a mile of continuous class V whitewater; boaters can make their run in flows up to 15,500 cfs (figure 3-11). The huge waves have been run at flows up to 15,500 cfs (personal communication, Rob Lesser, Idaho Whitewater Association, Boise, Idaho, November 3, 1986). This short stream segment provides some of the most turbulent, high-flow whitewater available to boaters in the Pacific Northwest. Boaters are able to put in at a bridge located immediately downstream of Milner dam. After running the rapids, some boaters take out at an undeveloped site located on private property a short distance downstream, although most boaters use an undeveloped take-out site on the BLM land at Star Falls, about 6.5 miles downstream, where there is an unimproved public access road to the river. Continuing the trip to the Star Falls take-out allows the boaters to run four widely spaced class II to class III rapids in the interviewing reach of river. Boaters can portage around Star Falls and run the Murtaugh reach (a 14-mile section of river generally defined as the area between Murtaugh Bridge and Twin Falls where commercial outfitters operate) or they can leave the river at Star Falls.

Approximately 200 visitor-days of use occurred on the Milner reach in 1986 (letter from Delmar D. Vail, State Director, Bureau of Land Management, Department of the Interior, Boise, Idaho, January 20, 1987). The number of boaters using the Milner reach is small because of the power of the river and expertise needed, the limited season due to water management, and the general lack of knowledge about the existence of the site. Although the Snake River has a different character from other rivers in the state, the skills needed to navigate the Milner reach are similar to those required for the internationally known class V reach of the North Fork of the Payette River, north of Boise (personal communication, Rob Lesser, Idaho Whitewater Association, Boise, Idaho, November 3, 1986.

The Murtaugh section of the Snake River begins at Star Falls. This 14-mile stretch of the river contains numerous class III, IV and V rapids (figure 3-15). Most of the rapids are primarily class IV, but the reach also includes one class VI drop located immediately upstream of Hansen Bridge. Whitewater boaters are able to float the Murtaugh section at river flows of from 3,500 cfs to 20,000 cfs; the preferred range is 8,000 to 16,000 cfs. At the preferred flows, a whitewater boating or rafting trip on the Murtaugh reach generally takes about 5 hours. Boaters may put in at the undeveloped site at Star Falls or use the more conveniently developed put-in site at Murtaugh Bridge. Boaters selecting Murtaugh Bridge entry point will miss two whitewater rapids, Amnesia Falls and Basalt Falls, a short distance upriver from Murtaugh Bridge. Most of the river is bordered by steep canyon walls along the 14-mile-long Murtaugh reach and the only readily

accessible take-out point is at the Twin Falls Park adjacent to Twin Falls dam (Bureau of Land Management, no date).

The Murtaugh reach drops an average of 25.8 feet-per-mile within the 300 to 400-foot-deep canyon, about 368 feet over the total 14-mile distance (Feldman and Mclaughlin, 1986). The Murtaugh trip has been compared to Grand Canyon raft trips on the Colorado River, where rafters run 24 difficult rapids during a 22-day trip. On the Murtaugh reach, boaters can run 19 major rapids of comparable difficulty between Star Falls and Twin Falls Park in a single day (figure 3-15) (Brown, 1986).

The Murtaugh reach is suitable for commercial rafting operations. The Idaho Outfitters and Guides Board allocates five permits for licensed outfitters to offer rafting trips to the public. To date, the BLM has issued permits to four outfitters to operate on the Murtaugh reach. While this reach of the Snake River may be comparable to Grand Canyon raft trips in some ways, a major difference is that the number of rafters on the Grand Canyon trips are determined by an allocation reservation system, with long waits for a trip permit. The Murtaugh reach has no such restrictions, because commercial rafting operations are just beginning and the availability of commercial rafting trips is little known outside the immediate commuting area.

The Murtaugh reach experiences a boating season similar to that occurring at the Milner reach because of the control and use of the Snake River water for other purposes. The boating season is primarily from late March, when the water starts to warm, until the beginning of irrigation season in June, when diversions at Milner dam reduce the flow of the river to a trickle, particularly during those years having little snowfall. There is a secondary boating season that occurs in the late fall, between the end of the irrigation season and the beginning of cold weather when water is not diverted from the river or held in storage. Approximately 2,000 visitor-days of private boating use occur annually on the Murtaugh reach. In addition, three commercial outfitters provided trips for about 434 customers in 1986 (letter from Delmar D. Vail, State Director, Bureau of Land Management, Department of the Interior, Boise, Idaho, January 20, 1987). A study conducted for Idaho Department of Parks and Recreation (IDPR) indicates that about 70 percent of the private boaters are Idaho residents, with the remainder coming from other Mountain Region states, primarily Utah. A majority of the boaters rated themselves as advanced or experted in boat handling skills; 77 percent had been boating on rivers for 4 years or more (Feldman and McLaughlin, 1986).

In the Idaho portion of the Pacific Northwest Rivers Study, the stream segments of the Snake River from Twin Falls reservoir upstream to Milner dam are rated as outstanding recreational resources. Less than 5 percent of all the river segments assessed in Idaho achieved this highest value classification. The study assessed rivers to determine the significant environmental parameters of each stream and the potential of these stream resources to be impacted by hydroelectric development. The study is being conducted by the four Columbia River Basin states, federal land management agencies, Indian tribes, and others, with coordination and funding provided by the Bonneville Power Administration (Allen, Putera, and Jazdzewski, 1986).

Further downstream from the study reach, the 9-mile-long Wiley reach of the Snake River, located between Lower Salmon Falls dam and Bliss dam near Bliss, Idaho, offers opportunities for family boaters, rafters, canoeists, and tubers to float on more gentle whitewater. The Wiley reach contains a series of eight rapids rated at Class I and Class II+. Boaters put-in below the Lower Salmon Falls dam and float downstream to Shoestring Bridge. The flows in Wiley reach are sufficient for year-round use (Federal Energy Regulatory Commission, 1982).

The Wiley reach is listed in the Nationwide Rivers Inventory. The inventory identifies outstanding rivers and river segments, still free-flowing, that meet the minimum standards and criteria of the recreational rivers classification under the Wild and Scenic Rivers Act. The values of the Wiley reach of the Snake River identified in the inventory include critical habitat, "big river" fishing, and whitewater boating opportunities (National Park Service, 1982).

Access to the recreational opportunities provided by the Snake River in the 32-mile-long study reach is relatively limited. Factors influencing accessibility to the recreational opportunities include: a general lack of dedicated public access across private lands to the river; limited access to public lands, including parcels on the river; public land tracts isolated by private landholdings; a limited number of roads into the canyon or across the river (figure3-2); the rugged topography of the Snake River gorge; and an apparent lack of local demand to increase the availability of recreational opportunities in the area. Between Milner dam and Auger Falls, the public right of access to the Snake River resources, whether for hunting, fishing, hiking, boating, camping, or other recreational purposes, are limited to the recreational facilities provided by the IPC at its licensed projects (Shoshone Falls and Twin Falls), by an unimproved road on the BLM land on the north side of the river at Star Falls, by a boater put-in site at Murtaugh Bridge, by public road rights-of-way where the bridges cross the river and by public land directly accessible from public roads such as the BLM land areas located on the north side of the river downstream

of Milner dam and at Star Falls. (Only two bridges, Murtaugh and Milner bridge [county road 1300S] located immediately below Milner dam, offer this opportunity because the other two bridges are hundreds of feet above the river and have steep cliffs ending at the water edge.) Some limited access to the river occurs near Perrine Bridge at the municipal wastewater treatment plant and public and private golf courses, but the nature of these facilities restrict the range of alternative uses that can be accommodated. Private roads provide access to the public lands located on both the north and south side of the river between Perrine Bridge and Rock Creek. The numbers of persons seeking and obtaining permission to cross private lands to reach the public and privately owned land parcels for recreational purposes is unknown.

Although the Snake River is an important recreational resource in Idaho that receives a significant amount of public use, the Thousand Springs area located downstream of the study area near Hagerman, Idaho, and the Wood River Valley, located on the south slope of the Sawtooth Mountains about 60 to 85 miles north of Twin Falls near Ketchum, Idaho, are two more established recreational areas enjoyed by local residents and tourists.

The railroad is generally credited with opening the Wood River basin to settlement, but it was not until Sun Valley was developed in the 1930's, as a winter resort for the rich and famous, that this part of Idaho gained national and international attention as a recreational center. Ernest Hemingway, in particular, helped to promote the area for upland game and waterfowl hunting, and trout fishing, in addition to the established winter sports activities (Thompson, 1986). The nearby Big and Little Wood Rivers, and the Fish Creek, Magic and Little reservoirs, offer abundant trout fishing opportunities. Silver Creek, a large spring creek about 30 miles south of Sun Valley, is internationally known for the its large, difficult-to-catch trout, has about 800 acres of public access provided by the Nature Conservancy (Idaho Department of Fish and Game, 1986). Also located within the nearby Sawtooth National Forest are the Sawtooth National Recreation Area and Sawtooth Wilderness Area, both which provide thousands of acres of recreational activities.

In 1986, the Nature Conservancy purchased 425 acres of land on the Snake River at Niagara Springs, near Hagerman, Idaho, about 20 miles downstream from Rock Creek. It is unknown what plans for public use will be implemented by the Nature Conservancy on this tract.

3.7.2 Existing Land Use

The predominant use of land along the Snake River plain is for agricultural purposes, primarily irrigated crop production and grazing. Much of this land use is fostered by the irrigation water provided by the canal system originating at Milner dam.

This "blooming of the desert" is the influence for the Magic Valley name given the region. At the upper end of the study area, farming activities are tied to the irrigation canals, with grazing use more prevalent adjacent to the river. More mixed land use appears as one travels west through the study area, associated with the increase in water availability caused by the springs that discharge at the canyon wall, inflows from rivers and springs, and the expanding floodplain. Some residential development along the canyon rim becomes apparent starting near Twin Falls and continuing downstream. The limited amount of land in the canyon, in the form of benches formed along the river, provides for residential and some agricultural uses, including grazing, particularily in the Thousand Springs area and downstream.

The Snake River is the dividing line between Jerome County to the north and Twin Falls County to the south. The counties are the principal governmental units affecting land use in the area of the proposed projects. Jerome County has established a preservation zone along the north side of the Snake River Canyon. Present building regulations require a 500-foot scenic setback from the canyon rim (one-half mile on public land), and activities within the canyon are closely regulated. Development of hydropower in the Jerome County Preservation Zone requires a special use permit from the county. Twin Falls County zones land within the canyon for outdoor recreation, but almost any use except industrial or commercial development, is permitted under this classification, including hydropower development. The county requires a 100-foot building setback from the canyon rim, unless an engineer certifies that the rim is stable, in which case a 30-foot setback is permissible.

Although there are discontinuous parcels of land remaining in federal and state ownership, the most productive land with a source of water and easy access has been converted to private ownership. The Snake River also forms the north-south boundary between the BLM Shoshone and Burley Districts. While many of the BLM public land parcels are leased for grazing, a number of parcels are included in the Isolated Tract Wildlife Management Area program. Management objectives for these tracts include the establishment of habitat that provides food and cover for wildlife, enhancement of wildlife populations, designation of areas for public recreation, and the protection of the tracts from unauthorized uses, including grazing, agricultural use, dumping, and other habitat disturbances. Similarly, the state-owned lands provide grazing leases, public access, and wildlife habitat. State ownership also includes the bed of the Snake River below the mean high water mark and the islands located in the river.

The Snake River Canyon greatly influences the road network in the area. Within the area of the proposed projects, highway bridges cross the canyon to provide access from Murtaugh, Hansen, and Twin Falls on the south to I-80 on the north side of the river. Also, an unpaved improved road crosses the river immediately down-

stream of Milner dam. West of Perrine Bridge at Twin Falls, a bridge was constructed within the canyon for a haul road used to transport gravel from pits near Rock Creek across the river for construction of I-80; a portion of the haul road bridge has washed away. West (downstream) of the study reach, State Highway 30, the primary east-west highway prior to the construction of I-80, crosses the river near Hagerman. Between Hagerman and Twin Falls, there are two other bridge crossings, one from Buhl to I-80 and northwards, and one at Bliss.

3.7.3 Site-specific Recreation and Land use

3.7.3.1 Milner Project

Land use in the proposed project area, and indeed throughout the Magic Valley area, is primarily determined by Milner dam and its associated irrigation canals. The headworks at the dam provide water to the Milner-Gooding and North Side Main Canals on the north side of the river and the Twin Falls Main Canal on the south side of the river. A significant amount of land in the vicinity is in public ownership (figure 3-16), including the north side of the river in the proposed project area downstream of Milner dam. A large tract managed by the BLM for wildlife habitat and public access is located on the south shore of the reservoir just upstream of the dam. A BLM isolated tract is located generally between the canal and the river on the south side of the gorge between the dam and the proposed powerhouse location. County road 1300S crosses the Snake River just downstream of the dam. The remainder of the proposed project area is undeveloped, and is used primarily for grazing.

There are no recreational facilities at Milner dam, or downstream in the proposed project area. At present, the only developed facilities are located at the wildlife management area provided by the BLM on the south shore of the reservoir. The Milner Bicentennial Site has a boat ramp, picnic areas and shelters, toilets, a nature trail, and historical interpretation markers. A portion of the Oregon Trail passed through the area.

Public use in the area is primarily for hunting, boating, and fishing at the reservoir. Some fishing use occurs at the dam and in the river immediately downstream of the dam. The Milner Bridge, located immediately downstream of the dam, provides a point of access for anglers and is the put-in for whitewater boaters who run the Milner section of the Snake River.

3.7.3.2 Star Falls Project

The land use in the vicinity of the proposed project is predominately agricultural, including grazing. The BLM has an isolated tract on the north side of the river at Star Falls, that extends from the falls upstream. A corner of the BLM parcel is

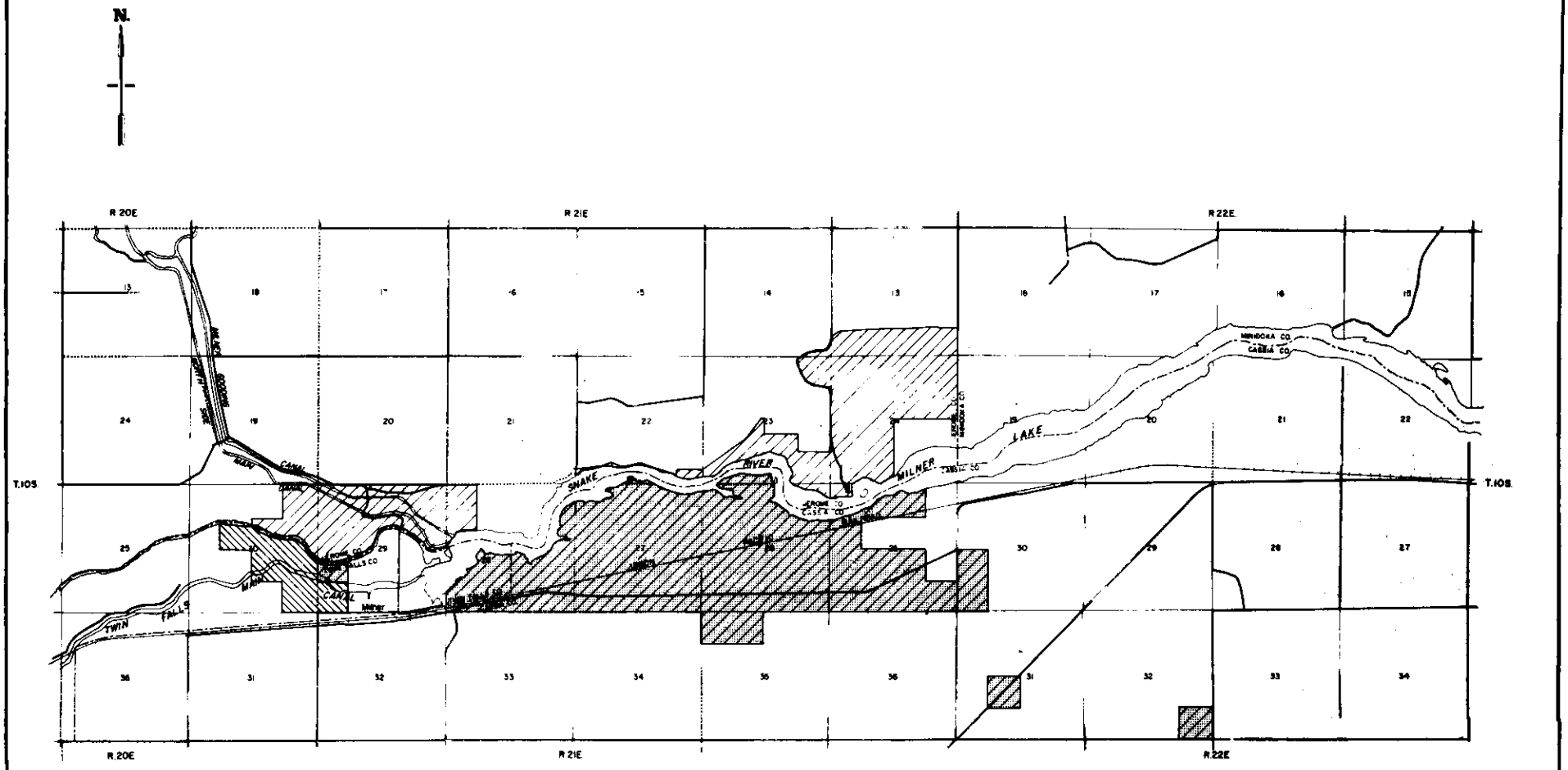


Figure 3-16. Location of public lands in relation to the proposed Milner Project (Source: Twin Falls Canal Company and North Side Canal Company, Ltd., 1984).

LEGEND

- Federally Managed Lands
- Wildlife Management Areas
- Private Lands Subject to Power Site Reserve
- Private Lands–Agriculture and Range

located on the south side of the river upstream from the proposed project site. Further downstream from the project site, and below the Murtaugh Bridge, the BLM controls a tract of land that extends to both sides of the river (figure 3-17).

The benches formed on both sides of the canyon at Star Falls are undeveloped. A rough jeep trail traverses the north canyon wall at Star Falls, providing a connection to the nearby road from I-80 to Murtaugh. Prior to development of the boating put-in at Murtaugh Bridge, the jeep trail provided the only dedicated public access to the Snake River within the 32-mile study area, with the exception of the public access provided by the IPC at its hydroelectric projects at Twin Falls and Shoshone Falls.

There are no developed recreational facilities at Star Falls; the jeep trail and a sign that identifies the site as Star Falls are the only accommodations to the public. The site provided the primary access to boaters running the whitewater from Star Falls downstream to Twin Falls reservoir, the Murtaugh section of the Snake River. However, a boater put-in was developed in conjunction with the replacement of Murtaugh Bridge, and boater use at Star Falls has declined in favor of the much more convenient access. A few boaters still attempt to launch at Star Falls in order to run the two rapids located between the falls and Murtaugh Bridge. In addition, boaters arriving at Star Falls from the upstream Milner reach portage the impassible falls on the north side or take-out at this point. The practicality of either putting-in or taking-out at Star Falls is primarily related to the condition of the jeep trail in contrast to the graded area beside the highway bridge. Boaters putting-in or portaging around Star Falls must lower their rafts or boats over the rim of the bench, and scramble down the steep embankment to the river. Although the two rapids located between Star Falls and Murtaugh Bridge are as good or better than any other rapids on the Snake River, including the popular Hells Canyon Section (personal communication, Rob Lesser, Idaho Whitewater Association, Boise, Idaho, November 3, 1986), the site conditions and the extra time required to include this short reach in a trip require an extra degree of dedication on the part of the boaters.

Additional recreational uses at Star Falls include fishing, hunting, exploring the area, and experiencing a part of the history of the northwest, and Idaho in particular.

A visitor to Star Falls can experience, in much the same way as early fur traders (section 3.9), the power and turmoil of the Snake River as it crashes through the narrow passage over Star Falls into Caldron Linn.

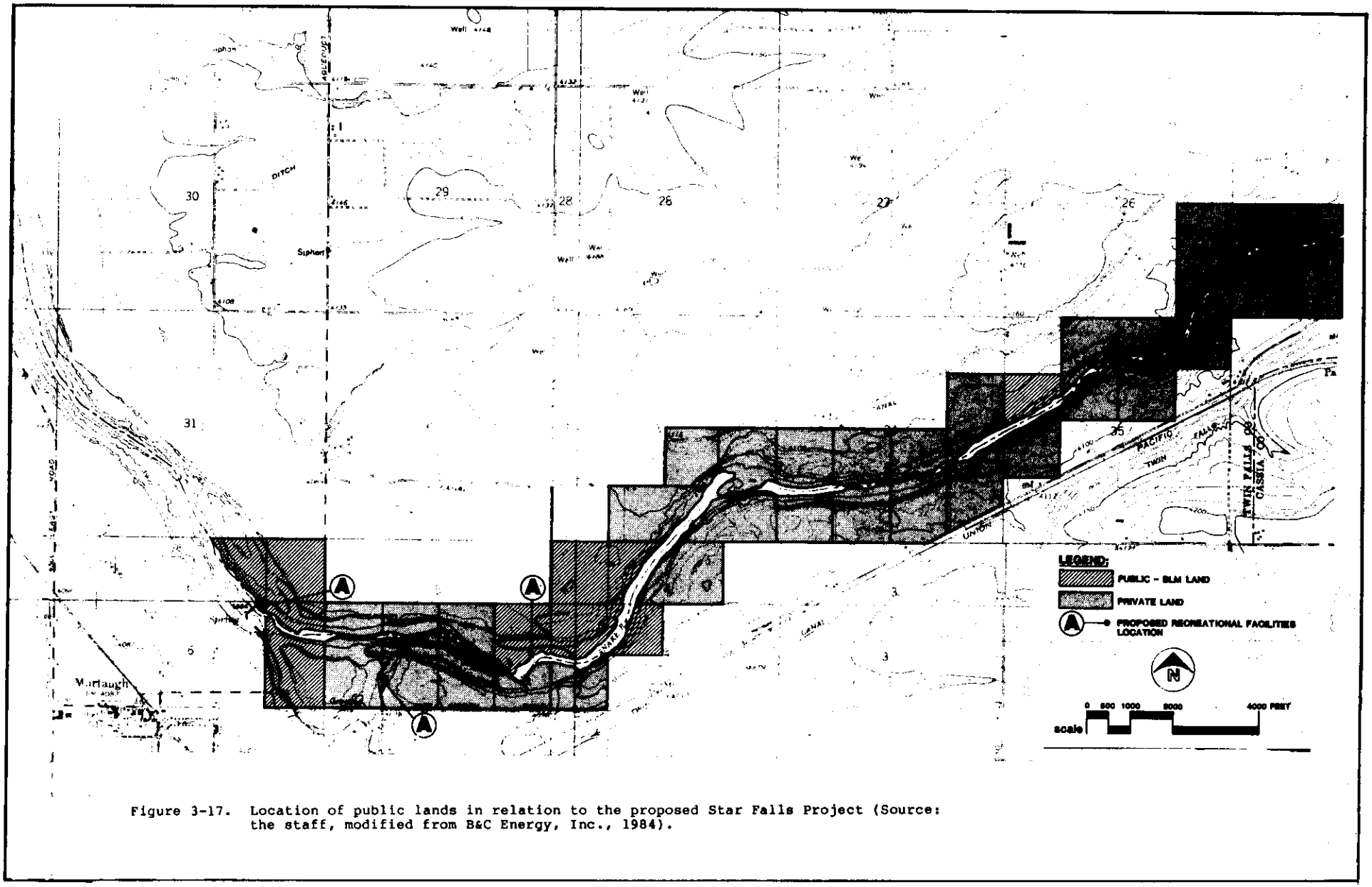


Figure 3-17. Location of public lands in relation to the proposed Star Falls Project (Source: the staff, modified from B&C Energy, Inc., 1984).

3.7.3.3 Twin Falls Project

The existing hydroelectric facilities and reservoir limit the amount of land available for use within the canyon, except within the canyon of Vinyard Creek on the north side of the river. The south side of the reservoir at the dam is generally devoted to project recreational facilities and housing for IPC employees at the project. The canyon associated with Vinyard Creek shows evidence of past homesteading activities, but the area has since revegetated and provides important fish and wildlife habitat.

The Twin Falls Project is similar to other IPC projects on this part of the Snake River; relatively long, narrow impoundments confined by the canyon walls, with well-developed public access, and day-use recreational facilities. A 10-acre park is sited on bluffs overlooking the south side of the dam. Facilities include picnic areas, shelters, permanent toilet facilities, a scenic overlook of Twin Falls, a boat ramp and dock, and appropriate parking facilities. No overnight facilities are provided. Records of average visitation to the park for the period from 1978 through 1982, indicate that use averages less than 2,000 visitors for the months of October through February, builds to between 5,000 and 6,000 visitors in May and June, sharply peaks at over 8,000 visitors during July and August, and drops off quickly in September. A survey of users indicated that the most popular activities at the project include picnicking, fishing, water skiing, boating and sightseeing (Idaho Power Company, 1983).

A 2.7-mile section of river with a single rapid exists between the tailwaters of the Twin Falls Project and the Shoshone Project (FERC No. 2778). No use data exists for this section of river, but the difficult access, and small amount of water suggests that any use, primarily fishing, would be limited.

3.7.3.4 Auger Falls Project

A significant amount of land formed on the initial part of the bench along the south side of the river downstream of Perrine Bridge is dedicated to public uses, including the Twin Falls Golf Course and a municipal sewage treatment facility. The public road servicing the facilities ends at a gate. A private road continues along the bench, between the old river channel and the river, providing access to the Rock Creek I Project (FERC No. 6450) and a residence near the downstream end of the bench. The abandoned haul road, used to transport gravel from pits near Rock Creek Canyon over the Snake River to the north side for the construction of I-80, intersects with the private road, and provides access to the Rock Creek I Project diversion works. Until the haul road bridge washed out, the abandoned road provided access to the area from the north side of the Snake River. The private road also provides access to two

parcels of public land, a tract managed by the BLM in the area where the Snake River begins the S-bend away from the old river channel, and a state-owned tract located about one-half the distance between the beginning of the old river channel and Rock Creek (figure 2-5).

With the exception of the Rock Creek Project and the homestead near the end of the bench, the remainder of the land is undeveloped and used primarily for grazing. Most of the private land, previously owned by the Idaho Frozen Foods, Inc., was intended as a disposal site for wastewater produced by a food processing plant in Twin Falls. A series of treatment lagoons located between the old river channel and the river were constructed, but the company changed its plans, and the area is to be reclaimed.

There are no developed recreation facilities in the vicinity of the proposed project. Bluegill Lake formerly existed on the site for a number of years before the dam washed out. The small lake was stocked with warmwater fish and received about 350 visitor days of angler use in 1979, the last full year of record (J-U-B Engineers, Inc., 1983). Because of access restrictions, public use of the area is limited to informal day use activities such as hunting, fishing, and exploring the area.

3.8 VISUAL QUALITY

Several manmade developments are scattered in the canyon study reach. The overall character of the canyon, however, remains relatively rural and natural throughout because of the types and frequency of manmade structures in the canyon. Commercial development is physically limited in most of the canyon to an area below Perrine Bridge, where the canyon widens considerably providing ample space for constructing facilities. Three large manmade structures exist in the canyon above Perrine Bridge: Milner dam, the Twin Falls hydropower facility, and the Shoshone Falls hydropower facility. Below Perrine Bridge, on the broad river floodplain, there are several major facilities and commercial developments, including the Twin Falls Municipal Wastewater Treatment Plant, three fish hatcheries, a country club, two 18-hole golf courses, abandoned settling basins, the Twin Falls water supply pumping station and pipelines, an abandoned bridge, two 138-kV transmission lines crossing the canyon, and a small hydropower facility at the mouth of Rock Creek. The overpowering visual impacts associated with the natural features dwarf the presence of these commercial developments in the canyon, as seen from the Perrine Bridge. The views of the middleground (3 to 5 miles), the background (5 miles to infinity), and the foreground (less than 3 miles), are relatively unaffected by the manmade features.

The rural atmosphere in the study reach includes cultivated farmland above the canyon rim, unimproved roads into the canyon, farm buildings and farm equipment scattered along the rim, discarded debris pushed over the canyon wall (e.g., old cars, irrigation pipes, lumber), bridges, transmission lines, and recreational developments (golf courses, picnic parks at Shoshone and Twin Falls, and camping and swimming facilities at Dierkes Lake (figure 3-2) near Shoshone Falls).

The river canyon in the study reach makes an individual feel small in comparison to the towering structures. The sheer canyon walls, colorful rock formations, bubbling springs, and hanging and mainstem waterfalls, scattered throughout the 32-mile-long study reach, are enjoyed by visitors viewing the canyon from the rim or travelling through it by raft or boat. The canyon varies in width from 600 feet from rim to rim near Milner dam to about 4,800 feet from rim to rim near Auger Falls. Some of the canyon walls have steep talus slopes, while others are sheer cliffs that end abruptly at the river's edge. The canyon ranges in depth from nearly 130 feet deep at Milner dam to about 486 feet deep at Perrine Bridge. Talus slopes at the base of the cliffs account for more than half of the height of the cliffs in the lower 5 miles of the study reach below the Perrine Bridge. The talus slopes consist of poorly sorted, weathered, lava boulders 10-feet in diameter, to much smaller gravels. These talus slopes provide a rugged texture compared to the vertical, sinuous texture of the 200-foot-high

walls extending above the talus slopes. In the area below the Perrine Bridge, the talus slopes contrast sharply with the surrounding canyon floor that is sparsely vegetated. The entire canyon offers a sharp contrast to the gently rolling plain above and outside the canyon rim where the vegetation has been cleared for agricultural production or where the semiarid climate and barren, rocky land limits vegetative growth to sparse shrubs and sagebrush.

There are few access points into or across the canyon in the 32-mile-long study reach; some of the entry routes are private (figure 3-2). Four bridges cross between Milner dam and Auger Falls: (1) a bridge about 1/2 mile below Milner dam (county road 1300S); (2) Murtaugh Bridge, (3) Hansen Bridge (a post and lintel type); and (4) Perrine Bridge (an arch-style bridge). One can view the river and canyon from these bridges and at two other sites: overlook sites at Shoshone Falls and Twin Falls.

The river is generally unimpressive and is subordinate to the overpowering canyon vistas throughout much of the study reach, unless one is on the river surface or standing on the shoreline in the canyon. The river is nearly invisible unless viewed from the canyon rim, the air, or at one of the bridges or overlook sites. Even in the 5-mile reach below Perrine Bridge where the river is exposed in a mile-wide canyon floor, the meandering river is hardly noticeable from the canyon rim.

Very few homes are situated along the canyon rim throughout the study reach; those on the north canyon rim near Auger Falls are the closest.

3.8.1 Milner Project

The plateau of flat to gently rolling terrain surrounding the Milner Project area is punctured by the craggy, chute-like Snake River Canyon, where the chasm is about 150 feet wide and 130 feet deep (figure 3-11). The vertical basalt cliffs end directly at the river's edge, creating a striking geological feature. The river churns and boils through a 1.6-mile-long chute located a short distance below Milner dam. The whitewater and the noises from the river rushing through this narrow chute during the nonirrigation season become audible as one approaches the canyon rim, where the noises become a din. The sharp contrast between the flat, calm plateau located above the canyon and the abrupt turmoil and noise of the canyon below creates an aesthetic beauty that is not experienced in any other segment of the study reach.

The water cascading over Milner dam is impressive at peak flows, but the manmade features associated with Milner dam and its associated irrigation canals mar the overall visual impression and charm of the area. Milner reservoir creates a

pleasant atmosphere that contrasts with the nearby agricultural lands and scrub-sagebrush habitats. Hunters and fishermen consumptively use the resources associated with the lake.

3.8.2 Star Falls Project

The canyon widens to about 3/4 mile from rim to rim at Star Falls with a bench or terrace located on both sides of the river near and below Star Falls. Exposed basalt formations across the river bottom at Star Falls create a natural dam, where the river narrows from about 40 yards to about 40 feet at Star Falls and creates an impoundment that extends upstream for about 1.5 miles. Except for some undeveloped foottrails scattered along the bench on the south side of the river, and a rugged access road on the north side of the river, the area is totally natural and remains as it has been for nearly 115 years. The cultural vestiges of the 1870's gold rush era, scattered on both banks of the river below Star Falls, are not apparent to the untrained visitor. The remnants of occasionally active gravel mining activities along the north side of the river are hardly noticeable.

Star Falls is difficult to see from either rim of the canyon, unless the viewer is downriver from the falls, with the north rim offering the best view. The river has incised a second smaller canyon into the land that hides the falls from view until the viewer is nearly upon the shore of the river at the falls. Those persons seeking a view of the falls encounter a lack of access on the south side of the canyon where all the property along the river is private; and the entry point on the north side of the canyon is unmarked and provides a sometimes difficult passageway down into the canyon. BLM provides public access to Star Falls on the north side of the canyon through a right-of-way to properties located below the rim (See section 3.7.3.2 for Land Use). An unimproved road down the north face of the canyon wall is subject to weathering, and the road occasionally poses difficult passage to the canyon floor and to Star Falls. Passage down the road in November 1986 was impossible without a 4-wheel drive vehicle, but the road was improved by the spring of 1987. Better access to Star Falls likely would increase the number of visitors to the site; however, difficulty in reaching the site may attract certain visitors who like exploring new areas. The limited access to Star Falls might also protect the area from overuse and might enhance visitors total experience in visiting and viewing the beautiful falls without experiencing the crowds and commercial development associated with other mainstem falls such as Shoshone Falls and Twin Falls.

Star Falls is an attractive falls in a beautiful setting and the focal point in the canyon (figure 3-8). It is one of two remaining falls in the mainstem of the Snake River that remains relatively undisturbed by commercial development. The whitewater created by Star Falls provides a striking contrast to the black basaltic canyon walls and the reds and gray-greens of the soils

and juniper-sage vegetation along the river banks. The decibel level associated with roar of the water rushing over the falls, and the spray, mist, and rainbows created by the falls, are all features that make Star Falls attractive to viewers.

The roar of water flowing over Star Falls into a pool immediately below it is an impressive sound. Standing waves, fountains of water that stack up vertically, are present in the pool below the falls during high flows. Clouds of spray and mist are formed in the air by the water cascading over the falls. Rainbows appear under the right lighting conditions. Other smaller falls adjoin the main waterfall from the 20 to 30-foot tall basalt bench found along the south side of the river (figure 3-8); these cascades may seasonally increase in size with increasing water flows and create a larger, more impressive falls and caldron effect than was observed by the staff during a November 1986 inspection of the site when flows in the river were around 2,500 cfs, and during a June 1987 visit, when the flows over the falls reflected leakage flows of about 39 cfs from Milner dam (figure 3-9).

The seasonal variation of runoff in the region causes flows in the river to vary greatly. During periods of high water flows (February through April), the falls are partially obscured by the volume of water, but the overall effect of whitewater cascading over the falls and off the basalt bench on the south side of the river illustrates the river's tremendous force. During the irrigation season much of the flow of the Snake River is diverted for irrigation at Milner dam and the river channel can be nearly dry with little flow over Star Falls; this little flow situation can be greatly accentuated whenever it is a dry year and little water is available in the basin from snowmelt. Flows over Star Falls in figure 3-9 are illustrative of what a dry year flows looks like because 1987 is very similar to the 1977 drought.

3.8.3 Twin Falls Project

Prior to construction of the existing hydropower facility at Twin Falls in 1935, there were two nearly identical falls at the site (figure 3-5). These falls were formed by a massive rock formation in the middle of the river that equally divided the flows. After construction of the Twin Falls Project, the aesthetic beauty of the area changed considerably. A concrete dam stopped all water from passing over the falls nearest the south shore (figures 3-6 and 3-7). Elaborate concrete-arched dams and dikes were built across the entire river to control all the water flowing over the remaining falls. Transmission lines, with bright fluorescent balls attached to them, and steel transmission towers were constructed to transport electricity from the area. All these manmade structures mar the natural beauty of the area. Despite these manmade accoutrements at Twin Falls, the whitewater cascading 130 feet over the main falls and the numerous other smaller cascades located between the main falls and the arched dams create

a spectacular contrast to the dark and barren rock of the canyon walls.

Flow of water over the falls is affected by upstream storage and diversion practices for irrigation needs at Milner dam and by operating procedures of the existing hydropower facility at the falls (figure 3-7). Under normal operating procedures, monthly flows of the Snake River at the existing site range from a minimum of 310 cfs to a maximum of 19,340 cfs. More bedrock is exposed during the low flows; quality viewing occurs when a large volume is passed over the falls such as occurs during the spring and winter (figure 3-6). The amount of whitewater during periods of high flow, the decibel level associated with the roar of the falls, the spray, mist, and rainbows created by the falls are all features that make the falls attractive to viewers. Thousands of visitors view Twin Falls each year (See section 3.7.3.3).

Twin Falls dam forms a pleasant flatwater lake that extends about 1 1/2 miles upstream. A boat-launching site on the reservoir provides water enthusiasts access to the river for fishing, hunting, sightseeing, or swimming. Vinyard Creek, cover photograph, is a scenic tributary that enters the reservoir about 1/2 mile upstream from the Twin Falls dam. Numerous springs can be seen emerging from the canyon walls as one travels upstream from the Twin Falls dam. A large springs complex is on the south side of the canyon immediately across from the mouth of Vinyard Creek. Some irrigation return waters entering the river, upstream from the dam, form impressive hanging waterfalls. No residences can be seen from the water surface while travelling in either an upstream or downstream direction from the project reservoir area.

3.8.4 Shoshone Falls

Shoshone Falls (figures 3-3 and 3-4), a 212-foot-high and a 1,000-foot-wide waterfall, is about 2.7 miles downstream from the Twin Falls Project. Although not affected by any of the proposed projects, the falls is within the 32-mile-long study reach and should be mentioned briefly to better comprehend the aesthetic resources and comparison of these resources with other features in the area. Shoshone Falls has undergone changes similar to those that have occurred at Twin Falls. A hydroelectric facility, with its dams, powerhouse, transmission lines and towers, and other structural accessories, have been built at Shoshone Falls and has changed the natural beauty of this spectacular falls that is 52 feet higher than Niagara Falls. The sheer size of Shoshone Falls dwarfs many of the existing hydropower facilities and creates a spectacular view during the nonirrigation season. Like all the falls in the study reach, removal of water for irrigation purposes at Milner dam, seasonally changes the amount of water flowing over the face of Shoshone Falls as does passing water through the generators rather than over the falls (figures 3-3 and 3-4). The falls is most impressive during the spring

when there is plenty of water from the melting winter snowfall. Overlooks, picnic areas, a boat-launching facility on the reservoir, and swimming and camping facilities on nearby Dierkes Lake (figure 3-2) are all features associated with Shoshone Falls that make the site aesthetically pleasing to visitors. Many visitors visit the falls and use the facilities annually.

3.8.5 Auger Falls Project

Portions of the proposed project area are barely visible from the turnout and scenic overlooks located at both ends of Perrine Bridge. Perrine Bridge is a popular canyon viewing location because it is readily accessible to thousands of travelers that pass over it each day during the peak tourist season. The project area is also visible to residents with homes on the north and south rims of the canyon. The homes on the north rim of the canyon are located very near the rim to take advantage of the expansive views and are directly above the proposed project site; homes on the south rim of the canyon are nearly a mile away from the project. Public access to the floodplain or to other viewing areas in the project vicinity is very limited; most of the property along the canyon rims is privately owned. Plumb (1983) stated that public views along the north rim of the canyon were rapidly dwindling, and sightseers would be lucky to find an undeveloped lot that overlooked Auger Falls. The public can enter the canyon via a public road, Canyon Springs Road, which leads to the public golf course and the Twin Falls Wastewater Treatment Plant on the south bank of the river near Perrine Bridge; the road extends to the Auger Falls Project area, but visitors cannot proceed much beyond the Twin Falls Wastewater Treatment Plant because the road is privately owned and therefore visitors are unable to get mid-floodplain views of the canyon. There is a private access road on the north side of the canyon that leads to the Blue Lakes Country Club, Blue Lakes Fish Hatchery, and Blue Lakes Spring. There is also an abandoned haul road into the canyon about 3 miles downstream from Perrine Bridge on the north side of the canyon; both of these north entry roads are unavailable to the public. The bridge across the river at the haul road has been rendered inoperable by floods that have washed away the abutments on both ends of the bridge. Other unimproved roads winding across the floodplain to the proposed project sites and to the Rock Creek Project could provide a different view of the canyon to visitors, but these roads are unavailable to public use.

Wetlands, ponds, and springs, with their associated riparian habitats, occur throughout the project floodplain and break the visual monotony of the scrub-sagebrush communities occurring throughout much of the Snake River floodplain between Perrine Bridge and Rock Creek. The much smaller Rock Creek Canyon enters the Snake River Canyon about 5 miles downstream from Perrine Bridge. This smaller canyon adds an interesting visual

relief to the area. Blue Lakes Spring appears like an oasis in a desert when seen from the canyon rim or observation points at Perrine Bridge. The bubbling hot springs, located a short distance away from the cold, Blue Lakes Spring, attest to the geologic diversity of the area and create other interesting sites to visitors, but are not readily accessible because of limited access. The verdant golf courses on the floodplain seem out of place in relation to the semiarid scrub vegetation found throughout much of the scenery observed from Perrine Bridge, and add a fascinating patchwork of color to observers on the bridge. Hanging waterfalls emptying into the Snake River Canyon occur throughout the study reach and create scenic and aesthetic views that enrich the canyon scenery. The hanging waterfalls are formed by the collection of water that overflows the irrigated fields above the canyon and return to the Snake River by dropping directly over the canyon rim. These hanging waterfalls are most inspiring during the dry summers when irrigation activities are at their peak; Perrine Coulee Falls is an irrigation return waterfall that plunges nearly 197 feet, from the south canyon rim near Perrine Bridge, to the canyon floor. This waterfall is readily visible from Perrine Bridge during the irrigation season and has a natural pathway behind and underneath the cascade for closer views (Plumb, 1983). Numerous other smaller irrigation returns flows form hanging waterfalls along the north side of the canyon between Perrine Bridge and Rock Creek.

The Snake River makes a big S-shaped turn north about half way through the project area. Remnants of the former river channel are still visible as a straight depression across the floodplain. Bluegill Lake was formed in the former river channel when a dam was erected in the depression; the lake was destroyed by a breached dam around 1980 and recreated when the dam was rebuilt in the mid-1980's; a 2-acre pond formed behind the dam is one of two lakes proposed for the area. The two ponds proposed for the floodplain would provide visual diversity to the floodplain. The proposed Auger Falls Canal is an 80-foot-wide by 2-mile-long canal that would parallel the former river course and would be highly visible from the canyon rims. Abandoned waste disposal ponds formerly used by the Idaho Frozen Food Corporation are located on the floodplain near Rock Creek. These abandoned ponds have been overgrown with weeds and are clearly discernible as a dark, checker-board pattern to observers from the canyon rim.

Several large rapids exist above and below the proposed project diversion site. Auger Falls is the largest with a waterfall and cascade that is about 1,500 feet long (figure 3-10). Plumb (1983) describes Auger Falls as having 25 to 50 feet cascades. These whitewater areas are scenic and provide a visual attraction to the river. The roar of the rapids at Auger Falls is pronounced at the site but becomes muted when viewed from the north canyon rim about 375 feet directly above the falls. The spray and mist created by the falls forms rainbows under certain lighting conditions. Auger Falls is one of two waterfalls on the mainstem of the

Snake River that remains undisturbed by commercial development (letter from Todd Graeff, State Trails Coordinator, Idaho Department of Parks and Recreation, Boise, Idaho, to Margaret Johnson, Planner, CH_2M Hill, Inc., Boise, Idaho, November 4, 1984; personal communication, Stanley T. Allen, Data Management Coordinator, Pacific Northwest Rivers Study, Idaho Department of Fish and Game, Boise, Idaho, August 13, 1987).

A deep, spherical pool, estimated to be about 150 feet deep, is a short distance below Auger Falls and is immediately above the confluence of Rock Creek with the Snake River. The 70-foot-tall ledges surrounding the pool give it an almost fish-bowl-like appearance, especially with the dark waters contained in it. A powerhouse would be constructed on the south side of the point where the river enters the pool. The pool offers an interesting foreground to the view looking south across the canyon from the north rim. The pool is about 375 feet directly below the north canyon rim. Power transmission lines paralleling the canyon rim along the north side of the canyon are visible throughout most of the project area but do not create imposing structures when viewed from the canyon, floodplain. Two 138-kV transmission lines, owned by IPC, cross the canyon about 1 mile west of Perrine Bridge; their distance from the bridge and their size in relation to the canyon, do not obstruct the canyon views from the bridge.

Talus slopes, composed of weathered Melon Gravels, are all along both canyon walls throughout much of the project reach (figure 3-8). These talus slopes extend about half the height of the nearly 375-foot-tall canyon walls and offer rugged textures in comparison to the relatively smooth faces of the exposed cliffs and in comparison to the relatively flat, sparsely vegetated river floodplain below. These talus slopes extend nearly to the river's edge for about 2 miles downstream from the confluence of Warm Creek with the Snake River.

3.9 CULTURAL RESOURCES

3.9.1 Historic and Prehistoric Overview

Little systematically, collected data is available on the lifeway of prehistoric populations in the project area. Most of the archaeological research conducted in south-central Idaho has focused on technology and subsistence; very few data are available on prehistoric political, religious, and social systems.

Prehistoric populations may have occupied southeastern Idaho as long ago as 14,500 years. The earliest dated evidence of human occupation in this region consists of fluted Folsom-type projectile heads associated with extinct animals at Owl Cave, the Wasden site. These materials are thought to have been deposited about 11,000 years ago. Cultural material discovered at the Wilson Butte Cave, about 20 miles north of the town of Murtaugh, is believed to be between 14,000 and 15,000 years old. This material did not include diagnostic projectile heads. This period of prehistoric occupation is called PaleoIndian. Subsequent periods are called Early (Bitterroot), Middle, and Late Archaic; all are distinguished generally by technological changes in subsistence strategy.

Systematic surveys conducted have proven prehistoric cultural resources to be scarce along the canyon rim and in the canyon bottom from the Milner dam site to the vicinity of the Twin Falls powerplant. The scarcity of prehistoric sites in this segment of the Snake River is believed to be due primarily to the precipitous configuration of this particular portion of Snake River Canyon, and the generally arid landscape in the area above the canyon. Native food resources are extremely sparse. Salmon and other anadromous fishes did not occur this far up the Snake River because their ascent was blocked by Shoshone Falls a few miles downstream. Bison and other large game animals do not appear to have occurred here in significant numbers.

Fur trappers were drawn to the Snake River country in the early decades of the 19-Century by a large number of beaver. One of these trappers was a leader named William Price Hunt who led a band called the Overland Astorians. In 1811, only 6 years after Meriwether Lewis first crossed the Continental Divide into Idaho, the Overland Astorians were dispatched by John Jacob Astor's Pacific Fur Company from Saint Louis to trap along the Snake River. From there, they proceeded onto the company's new fur trade outpost at the mouth of the Columbia River near the present day site of Astoria, Oregon.

As the river leaves the present site of Milner dam, it descends into a narrow lava canyon. About 8 miles into this canyon, the river drops through the Star Falls into a swirling basin where it appears to boil furiously before resuming its way downstream. Hunt's party named this basin Caldron Linn. According to accounts, Hunt and his men arrived at Fort Henry on Henry's Fork of the Upper Snake on October 8, 1811. They left their horses at Fort Henry and began floating down the uncharted river in 15 cottonwood canoes. Their hopes for an easy boat trip to the Columbia River met with one misfortune after another. On October 28, "a day of disaster," according to Hunt, one of the men in their party was dashed on the rocks 4 miles upstream of Star Falls (Caldron Linn). All hope for the Hunt party was destroyed.

Price reported in his journal entry for October 28, 1811: "The river again became rough and impetuous, and was chafed and broken by numerous rapids. These grew more and more dangerous, and the utmost skill was required to steer among them. Mr. Crooks was seated in the second canoe of the squadron, and had an old experienced Canadian for steersman, named Antoine Clappine, one of the most valuable of the voyageurs. The leading canoe had glided safely among the turbulent and roaring surges, but in following it, Mr. Crooks perceived that his canoe was bearing toward a rock. He called out to the steersman, but his warning voice was either unheard or unheeded. In the next moment, the squadron struck upon the rock. The canoe was split and overturned. There were five persons on board. Mr. Crooks and one of his companions were thrown amid roaring breakers and a whirling current, but succeeded, by strong swimming, to reach the shore. Clappine and two others clung to the shattered bark, and drifted with it to a rock. The wreck struck the rock with one end, and swinging round, flung poor Clappine off into the raging stream which swept him away, and he perished. His comrades succeeded in getting upon the rock, from whence they were afterward taken off."

Shortly after the October 28 catastrophe, the Hunt party reached the Star Falls and saw for the first time the torrent of foam that removed any doubt about an easy boat ride to the Pacific, and the canoe wreckage lodged among its boulders. Leery of risking life and limb any further, they quit the river to proceed on foot to Astoria.

Caldron Linn and Star Falls are names associated with persons and events that figure importantly in local history. Caldron Linn, as already disclosed, received its name from the Overland Astorians. Linn, designating a pool at the bottom of a falls, is a Scottish word; Caldron, through its association with the devilish practice of sorcery, connotes evil. The name, Caldron Linn, seems to have symbolized for the Overland Astorians only toil and trouble everywhere safety and ease had been summoned. The calamity of

October 28, 1811, has secured for Caldron Linn a name that signifies calamity. Star Falls, the name designating the cascade of water that furnishes Caldron Linn with its seething effect, was named after George Star who had a cabin on the north side of Caldron Linn from 1910 until sometime in the mid-1900's

It is reported that Star recognized the potential for harnassing the falling water to produce electricity, but was unsuccessful in developing the falls' hydropower potential. Local residents named the falls in his honor.

Muskets and traps of the type that probably were carried by the Hunt party were discovered in 1938 just downstream of the big whitewater section below Milner dam, very likely the place that Hunt described as the scene of his party's calamity. The style of these artifacts is older than that of the guns and traps used by mountain men based from Saint Louis, and different from the kinds of traps and guns used by British trappers of the North West Company and the Hudson's Bay Company. Judging from the location in which they were found, if the artifacts indeed had belonged to the Hunt party, it seems likely that they would have been lost during the tragic events above Caldron Linn, from Ramsay Crook's canoe, rather than been among the gear that was cached at Caldron Linn once Hunt had resolved to quit the river and go on foot. These captured items are on display in the museum of the Idaho State Historical Society.

John C. Fremont, through his association with the Oregon Trail, which crosses the Snake River at Dry Creek near the present town of Murtaugh, is important in local as well as in regional and national history. In 1843, the Army dispatched soldiers commanded by Fremont to survey the Oregon Trail, the main route of which had been blazed by fur trappers along the south side of the Snake River from Fort Hall to Three Island Crossing near Glenn's Ferry. The extensive traffic of pioneers along the trail was soon brought to halt by the Whitman Massacre of 1847 and the California Gold Rush of 1849. The massacre marked the onset of violent resistance to American entry onto Indian lands that rendered perilous travel through Idaho. The Gold Rush diverted the "Forty-Niners" south to the gold fields.

The soldiers did not return to southwestern Idaho until 12 years later to punish the Indians responsible for the Ward Party Massacre on the Boise River. Friction between immigrants and Indians precluded even the British from relying on their traditional alliances with the Indians. The Hudson Bay Company withdrew from Fort Hall and Fort Boise, and the Mormons from Fort Lemhi. By 1860, except for an occasional immigrant passing through on the Oregon Trail, southwest Idaho was abandoned to the Indians until the 1862 discovery of gold in the Boise Basin.

With the removal of most of the Indians to reservations, occasional immigrants began homesteading the Snake River Canyon.

Gold was discovered at Twin Falls in 1869 by two unidentified stagecoach drivers. At that time, the Twin Falls was known as the Little Falls (figure 3-5) to distinguish it from the 212-foot-tall Shoshone Falls located a few miles downstream. With the discovery of gold and the growth of mining, several small settlements developed along the banks of the river. The first mining operation began at Dry Creek about 13 miles upstream of the Twin Falls. Dry Town (or Drytown) was located at the mouth of Dry Creek and consisted of several saloons, two stores, and several other buildings Springtown was located a few hundred yards below the present site of the Hansen Bridge. A third town, Shoshone, was located near the Twin Falls; it consisted of several saloons, dance halls, and two general stores. By 1872, about 3,000 miners were working the gravel bars of the Snake River in the 20-mile stretch of river between Milner dam and Mud Creek. The Gold Rush slowed to a crawl with the realization that recovery problems made the effort worth more than the gold; it was the exceptional company that could even pay its own way, although sporadic mining continued well into the great depression. Small herds of cattle were brought into the country to provide food for the Gold Rush. Livestock seems to have done well on the bunch grass growing among the sagebrush.

Development in these parts took an abrupt turn with construction of the Milner dam and the irrigation canal systems associated with it. These structures stimulated agriculture which, in turn, spurred the growth of several small communities to meet the needs of surrounding farmers. These communities created a demand for energy. The first hydropower development in the area was the Great Shoshone and Twin Falls Electric Light and Power Company, an undertaking ancestral to the present day Idaho Power Company. It was founded by J.S. and W.S. Kuhn.

There are altogether, nine cultural properties in the proposed four-project area (table 4-2) that are either listed on or eligible for listing on the National Register of Historic Places. Two properties are prehistoric, six are historic, and one property, China Cave, is both prehistoric and historic in character. Each of these properties is described below by project area.

3.9.2 Milner Project

The existing structures at the Milner dam consist of the dam with a gated spillway, the Twin Falls main canal, a concrete headworks that controls the flow of water from Milner reservoir into the main canal, and a timber bridge that crosses the canal at a point about 1,100 feet below the headworks. The existing dam-canal complex was constructed in 1905, and is eligible for listing on the National Register of Historic Places. A cultural resource survey conducted by Butler (1982) in the proposed project's area of potential environmental

impact resulted in three cultural features, in addition to the Milner dam itself being recorded; these cultural features are not eligible.

The three ineligible cultural features are designated as 10-TF-640, -641, and -642. They are all probably of fairly recent (early 20th Century) origin. Feature 10-TF-640 consists of two rectangular house foundations and connected garage and root cellar made of chunks of local basalt held together in places by cement mortar. The two foundations measure about 24 by 45 feet and 27 by 42 feet; their main axes are perpendicular to one another; they lay at least 50 feet apart on naked bedrock. Among the small amount of trash lying around and between the foundations were an aluminum coffee pot basket and parts of a cast iron stove. According to Butler (1982), "the buildings represented by these foundations were probably still in use at least through the 1940's."

Feature 10-TF-641 consists of three rectangular pits measuring fewer than 5 feet across; a larger rectangular pit at least 10 by 15 feet, with a rampway at one of the ends facing the river; and a large U-shaped trench at least 100 feet long and 3 or 4 feet deep. Sections of dry-laid, local basalt masonry lines the upslope side of the trench in various places. No nearby timbers or other objects offered a clue as to how the trench might have been used. Only a few rusting condensed milk cans and a fragment of sheet metal, made into a screen by perforating it with a nail, remained in association with the house pits. According to Butler (1982), this house pit was most likely constructed by American settlers after the turn of the century and was possibly still in use during the 1920's. The builder expended considerable effort into the dry-laid masonry; this indicates that the structure was probably more than merely temporary.

Feature 10-TF-642 is located near -641, but on a lower bench closer to the river. It lies among a field of large boulders, four of which were used in its construction. These four boulders were connected by walls of carefully laid basalt forming an L-shape. The walls are about 3 feet high and about 10 feet long. This might have been constructed by the same person or persons that built feature -641.

3.9.3 Star Falls Project

The area of potential environmental impact of the proposed Star Falls Project includes a stretch along both banks of the Snake River Canyon and a transmission line corridor following the north-south route of an existing aqueduct. In March 1984, all accessible portions of the area of potential environmental impact were systematically examined by archeologists under the supervision of B. Robert Butler. The inaccessible portions of the area of potential environmental impact consist primarily of vertical basalt rimrock and boulder strewn shoreline.

Extensive evidence of placer mining lies all along the south side of the canyon bottom in the area of potential environmental impact, including Caldron Linn. Associated with abundant placer mining tailings are the dry-laid rock walls of former dwelling structures and a walled-in rockshelter that appears to have been abandoned only recently. These dry-laid wall structures and placer mining tailings seem to be the only extant remains of the historic Drytown mining community.

Site 10-JE-50 is a rockshelter at the foot of the canyon wall on the north side of the river. The shelter measures 13 feet across, 6.5 feet from front to back, and a little more than 6.5 feet high at the drop line. Relic hunters have focused their efforts on the rear of the shelter. Undisturbed cultural deposits lie beneath the rock fall at the shelter mouth and on the terrace in front of the shelter. Four projectile points were recovered from the units; in all, 91 prehistoric artifacts were recovered during testing. Based on the artifacts recovered and the site's location on a broad terrace adjacent to the river, the site appears to have been used as a base camp for hunting and gathering activities in the canyon and may have been a winter occupation site. This rock shelter is eligible for listing on the National Register of Historic Places. It contains undisturbed cultural deposits, and could add a significant amount of information to the current understanding of prehistoric use and occupation of the Middle Snake River Canyon during the period between 7,000 and 150 years ago.

Site 10-JE-51 is a row of four rectangular depressions at the edge of the steep sandy loam riverbank. These depressions range from 9.8 to 25.6 feet across and from 1.6 to 6.5 feet deep. They are not significant and are probably related to gravel quarrying in the 1960's. No historic or prehistoric artifacts were evident. These depressions are not eligible for listing on the National Register of Historic Places.

Site 10-JE-52/10-TD-728 is Caldron Linn, a swirling basin at the feet of Star Falls into which the river drops so furiously that the water seems to boil as if in a caldron. This property gained historical significance as a result of an 1811 calamity that took the life of one of a party of fur trappers working in the Snake River area. It has two trinomials indicating that it sits astride the line dividing Jerome and Twin Falls Counties. Although Caldron Linn has no known cultural features visually associating it with the misfortunes of 1811, it is listed on the National Register of Historic Places. Only one sign is known to exist explaining the historical significance of Caldron Linn, and it is located about 50 miles upstream at American Falls.

Site 10-JE-67 is a large, open occupation site extending for 28,623 yards among basalt cliffs on the north, northeast, and northwest and among the Snake River on the south. Limited subsurface investigation has revealed two discrete activity areas at the site. One was a lithic workshop containing primary and secondary obsidian flakes and a few cryptocrystalline flakes. The other was an animal processing-butchering area consisting of crushed and broken bones (some spiral fractured); a cobble that exhibits end-battering; many small (about a half inch in diameter), round, water-worn and polished pebbles; a scraper; these latter items do not appear to be naturally involved in the site matrix. They may have been used as gaming pieces or counters. A third function identified at the site, plant processing, though not associated with a discrete activity area, is evident from the presence of stone grinding tools and a bowl fragment. Only about 5 percent of this site has been damaged by erosion and relic hunting. It contains information concerning prehistoric subsistence practices, including butchering patterns, lithic manufacture, and intrasite behavioral patterns. It has potential for significantly increasing current understanding of the prehistoric use of the Middle Snake River, and is therefore eligible for listing on the National Register of Historic Places.

Site 10-TF-724 is the remains of Drytown, the first placer mining community along the Snake River in south-central Idaho. The site includes several features: six dry-laid, rock walled structures, several dugouts, and the ruts of an access road from the south that descends into the canyon above the complex of structures and dugouts. These features are scatters over a 26,677-square-yard terrace strewn with gigantic boulders on the south side of the river downstream from Caldron Linn. Some of the structures were built to take advantage of the natural placement of boulders, either adjacent to or incorporating one or more of the boulders in walls. Structures' measurements range between 9.8 to 13 feet wide and 13 to 16 feet long. One in particular, larger than the others, consists of several adjoining rooms. The debris in this area is probably from post-Drytown era placer mining. Cultural materials associated with Drytown probably lie buried in and around the features.

Drytown structure 1 is in an area of large boulders, about 39 feet south of some placer tailings. A shallow ditch that begins on the south side, goes west, then northwest, is either a placer or an erosion feature from some past cultural feature. It was used as a refuse dump by occupants of the 1930's. It contains several condensed milk tin cans, lard cans, tobacco cans (pocket kind), spice containers, coffee can tops, "Clabber Girl's Double Acting Baking Powder" cans, gear oil cans, a lamp base, and various glass bottles and jar fragments. The structure's walls were made of angular basalt of irregular shapes and sizes.

Drytown structure 2 is associated with the remains of a stove. Walls are constructed of angular, irregular basalt. The floor plan of this structure varies from the other structures: it

is a complex rectangle with a small square structure added to the main rectangle, and an interior wall. The structure's long axis lies north-south; the north wall contains the entrance. An extension to the structure at its northeast corner has an east-west long axis that is shorter than the north-south long axis. The height of the walls ranges from just under an inch to 8.8 feet. The interior wall is 4.5 feet high.

Drytown structure 3 is located at the foot of a basalt south of structure 2. The structure's walls are of angular basalt rocks of sundry sizes. It is rectangular with a north-south long axis; the entrance is in the east wall, adjacent to the north wall. The walls are too decayed for an accurate measurement of its height. The scant remains of what may have been a similar structure that now amounts to nothing more than a dugout lie to the north.

Drytown structure 4 consists of two closely associated structures, plus structures 5 and 6, whose descriptions follow. Structure 4A, the larger one, is anchored on the northwest corner by a large boulder 8 feet long. Structure 4B, 4.5 feet to the west, is not large enough for human occupation. Entrances to both structures are in their northern walls. The angular basalt walls of 4A are from 5 to 5.7 feet high; the collapsed east and west walls of 4B are 3.6 to 5.9 feet high. Structure 4B is dug into the ground, making its interior walls higher than the exterior walls. Numerous condensed milk and other cans were scattered around, along with some glass fragments, tobacco cans, a grape-embossed section of a jug, and various pieces of metal.

Drytown structure 5 is part of the complex belonging to structure 4. It is a simple rectangle with a 1-meter-wide entrance in the west wall. East and south walls have collapsed. The walls are formed of angular basalt of various dimensions. External wall height is approximately 1.6 feet. A few tin cans and large can fragments were found inside the structure. A wash tub was found near the structure to the northeast.

Drytown structure 6 is also part of the complex belonging to structure 4. It is a simple rectangle with an entrance on the north side. Walls are of angular basalt of sundry sizes because the walls are generally collapsed and washed out; they were not accurately measureable.

Structures 2 through 6 seems to be arranged in a semi-circle with the open end to the north or facing the Snake River. The Drytown site appears t have been occupied during the mining period of 1870, and again during the depression of the 1930's. The Drytown remains retain significant integrity of design and workmanship, and provide substantial data concerning occupation of a Snake River mining camp. They are therefore eligible for listing on the National Register of Historic Places.

Sites 10-TF-725, -726, and -727 (structures 7 and 8) consist of placer mine tailings; China Cave, a rockshelter that has been improved with a dry-laid rock wall; and a dry-laid wall structure, respectively. All are eligible for listing on the National Register of Historic Places.

The placer mine workings extend from the Drytown complex upstream to Caldron Linn. On the western border and running along the river banks are stacks of angular basalt with consistent size ranges, some neatly arranged. These types of mine tailings have been associated with Chinese mining of the mid-1800's. Running through the area is an apparent canal presumed to have been used during mining activities to operate sluices. A flume would have had to have been constructed to carry water over a wide ravine formation. For instance, a 2.5- by 2.5- by 75-centimeter iron rod was found driven into a basalt cliff to anchor a structure in the ravine. Cultural debris is scattered over the placer mine workings, much of which--plywood riffle boards and plastic containers, for example--has a recent origin.

China Cave does not appear to have been disturbed by relic collectors, but it has been reoccupied from prehistoric to contemporary times. The surface of the rock shelter has been littered with contemporary refuse; however, 31 prehistoric artifacts and 35 historic artifacts were recovered during test excavations. The site appears to have been used by European and American miners in the early 1870's; they were shortly followed by Chinese miners. This site is part of the Drytown settlement.

The dry-laid wall structure 7, measuring 3.4 by 6.4 meters, was constructed in a fashion similar to the Drytown features, and may be contemporaneous with them. A piece of old, flat glass was recovered on the south side; it appears to be a piece of bottle glass from the 19-Century. Pieces of white porcelain were recovered 20 meters to the north. The porcelain is thin, white, and of good quality. It bears no identifying marks except for a small orange glaze mark, and appears to be from a small bowl, possibly Chinese in origin.

Structure 8 lies about 12 meters south of structure 7. Measurements at this structure are not accurate due to its collapsed condition. It is rectangular with a door opening to the north. The walls are covered with sand. An isolated obsidian flake was found to the north of the structure.

Structure 10 (not part of site 10-TF-727) is located on an island in the river channel; at low water it is accessible by foot. The structure is on the north side in a small embayment of basalt. It has rectangular walls; the north wall has a door. The walls are framed with angular basalt blocks of various dimensions. Wall heights range from .90 to 1.2 meters. The site is littered with broken glass, tin cans, boards, and a stove pipe. The structure had been covered recently by chicken wire.

It is not eligible for listing on the National Register of Historic Places.

3.9.4 Twin Falls Project

The existing Twin Falls Project is the only historic property in the area of the proposed project's potential environmental impact. Its historic components include a low concrete arch dam with an powerflow spillway, a nonoverflow concrete gravity dam, a power intake on the left side of the nonoverflow section, a power tunnel, a penstock, a powerhouse, a tramway, and a dike. It has been operating since 1935, and is eligible for listing on the National Register of Historic Places.

3.9.5 Auger Falls Project

The proposed route of the power canal for the Auger Falls Project was inspected between January 25 and 28, 1983, by Mark G. Plew, an archeologist from Boise State University. He reported four "localities" with cultural remains: three prehistoric and one historic. Additional field work was conducted at these localities between 10 and 17 February 1983. Plew (1983) identified the four localities as 10-TF-430, and field sites 2 (historic), 3, and 4.

The archeological component at site 10-TF-430 is a small lithic scatter covering an area about 98 by 98 feet and having a subsurface depth of about 24 inches. Relative dating of the site is not possible. Field site 2 yielded 12 wire nails from the upper levels of a test pit; and, from the surface, a few specimens of white crockery bearing the maker's marks, three solder top cans, and miscellaneous metal and wood debris. Of particular interest at this site is a quarried area about 33 feet from a stone structure that might be the source of the basalt building materials used in the stone structure. This site appears to date between the 1920's and the 1940's. Test excavations did not reveal extensive use of the area. No cultural remains were found at field site 3.

Additional testing at field site 4 resulted in the recovery of 22 pieces of lithic waste and 44 bone fragments. The test unit from which these materials were recovered is located on the periphery of a site heavily disturbed during construction of the Rock Creek Hydroelectric Project sometime prior to these investigations. According to Plew (1983), field sites 3 and 4 "should not be considered archeological sites."

3.9.6 Summary of National Register of Historic Places

The Milner dam and its associated Twin Falls Main Canal are listed on the National Register of Historic Places. No other properties at the Milner Dam Project are listed on or eligible to be listed on the National Register of Historic Places. The

existing Twin Falls Project, the dam, the tramway, and associated structures are eligible for listing on the National Register of Historic Places.

At the Star Falls Project, Caldron Linn is listed on the National Register of Historic Places. However, the most significant cultural resources within the proposed project's area of potential environmental impact are those connected with placer mining along the south side of the river below Caldron Linn. These cultural resources include the remains of Drytown; China Cave; the mining tailings, and the dry-laid rock walled structures 7 and 8, all of which may have been contemporaneous. The Drytown remains in particular retain significant integrity of design and workmanship, and provide substantial data concerning occupation of a Snake River mining camp. China Cave contains undisturbed cultural deposits and provides information on historic European-American and Chinese use and on occupation of this area, as well as prehistoric use of the area from about 3,130 years ago.

The rock shelter at the foot of the canyon wall on the north side of the river is eligible for listing on the National Register of Historic Places. It contains undisturbed cultural deposits, and could add a significant amount of information to understand prehistoric use and occupation of the Middle Snake River Canyon during the period between 7,000 and 150 years ago.

Only about 5 percent of the large open occupation sites has been damaged by erosion and relic hunting. It contains information concerning prehistoric subsistence practices, including butchering patterns, lithic manufacture, and intrasite behavioral patterns. It has potential for significantly increasing current understanding of the prehistoric use of the Middle Snake River, and is therefore eligible for the National Register of Historic Places.

The four rectangular depressions and structure 10 are not eligible for listing on the National Register of Historic Places.

The Auger Falls Project's area of potential environmental impact contains no properties that are listed on or eligible to be listed on the National Register of Historic Places.

4 ENVIRONMENTAL IMPACTS

In this section the staff discusses the impacts of the four proposed projects and alternative project designs on the environment. The staff assesses the project-specific and the cumulative impacts of the four proposed projects and design alternatives on the resources of the mainstem of the Snake River, an integral component of the Upper Snake River Basin.

NEPA requires that an EIS address all significant effects of the proposed federal actions. A precise definition of environmental "significance", valid in all contexts is not possible (Council of Environmental Quality (CEQ), 1973). Significant adverse effects include those that degrade the quality of the environment, curtail the range of beneficial uses of the environment, provide short-term solutions that are disadvantageous to long-term goals, may be associated with actions that also have beneficial effects, may include secondary effects, and that may vary with the setting (Council on Environmental Quality, 1973). The CEQ (1978) in subsequent findings elaborates on the meaning of significance, stating that its determination requires consideration of both context and intensity. To make a determination on the significance of the proposed actions, one should consider society as a whole, the affected region, the affected interests, and the locality. An impact may be significant in one context, but not in others. Intensity refers to the severity of the action and includes considering the beneficial as well as adverse effects of the action; the degree to which public health or safety is affected; the unique characteristics of the geographic area; the extent to which the effects are likely to be highly controversial; the degree to which the effects are highly uncertain or involve unique or unknown risks; the degree to which the action may establish a precedent for future actions, whether the action is related to other actions with individually insignificant but cumulatively significant effects; the degree to which the action may affect features listed or eligible as historic or cultural resources sites; the degree to which the action may adversely affect an endangered or threatened species or its habitat; and whether the action threatens a violation of federal, state, or local laws. All of these aspects of significance are relevant in this assessment of the four proposed projects. This suggests that although determining the significance of one or more impacts is ultimately a judgement call (Haug et al., 1984, Carpenter, 1983), the staff should be conservative in determining the significance of project-specific or cumulative impacts of the proposed hydropower developments in the Upper Snake River Basin.

Another important consideration in determining significance is the distinction between what is biologically (or ecologically) significant versus what is socially significant (Carpenter, 1983). Biological significance involves a statistically measurable change in a population, habitat, or ecosystem. Social significance involves

a subjective analysis of who cares about the impact and why, and to what extent the proposed action is the sole (or major) contributor to the impact. Biological significance is often difficult to determine and interpret, even with statistically measurable changes because man does not have all the answers to understanding complex interactions of natural law and a project impact might unknowingly cross a biological threshold that would not be apparent for a number of years. Consequently, the staff has done its best to assess both the biological and social impacts of the individual projects and the much broader analysis of the cumulative impacts of the four proposed projects on the resources of the Upper Snake River Basin.

As mentioned earlier, a threshold is defined as a maximum number, or other value, for an environmental impact on resource use which, if exceeded, causes that impact or use to take on new importance (Haug et al., 1984). It is often difficult to establish numerical values for thresholds. Identifying thresholds wherever possible is important to decision-makers in several ways: by helping to focus the analysis; by helping to establish monitoring needs; by helping to establish mitigation criteria; and by aiding in communication among interested parties (Haug et al., 1984). Established thresholds exist for a few environmental variables, usually physical parameters such as dissolved oxygen, gas supersaturation, water temperature, and concentration of some hazardous or toxic chemicals. Thresholds for populations or habitats are less common, less agreedupon, and usually more arbitrary. For example, the Forest Service (FS) uses various percentages of maximum population sizes (Thomas et al., 1979) or viable versus nonviable population sizes (Forest Service, 1986). To assess the effectiveness of habitats, the U.S. Fish and Wildlife Service (FWS) often uses the percentage of an area in various vegetative cover classes and assigns an effectiveness level from 0 to 10.0 (U.S. Fish and Wildlife Service, 1980).

The conservative criteria of the significance and thresholds used by the staff to judge the potential cumulative impacts to target resources from the proposed projects is reasonably consistent with the standards of social signficance established in and used by the state and federal resource agencies in their policies and management of these important resources.

4.1 LAND FEATURES AND GEOLOGY

4.1.1 Erosion, Sedimentation, and Slope Stability

4.1.1.1 Milner Project

4.1.1.1.1 Environmental Consequences of Project as Proposed

Project construction would disturb land surfaces and would produce minor to moderate levels of erosion and sedimentation and temporary increases in suspended sediment in the Snake River. Excavation for the forebay, powerhouse, and tailrace would produce spoil materials; spoil not suitable for use in constructing embankments for the power canal and forebay structure would have to be placed in appropriate spoil disposal areas.

Erosion and sedimentation caused by enlargement of the power canal and construction of the forebay and intake structure would be contained largely within the power canal and forebay excavation. As a result, excess sediment could be removed before water is diverted through the enlarged power canal. Construction would occur on relatively flat ground, which also would minimize the erosion hazard. Raising and widening the north canal embankment would produce flatter, more stable slopes. Enlarging the canal also would provide more uniform flows with a more constant velocity and would lessen erosion within the canal. The new canal bank consequently would be more stable than the existing canal bank. The CC's proposal to reseed disturbed vegetated areas along the power canal would further minimize the erosion and sedimentation caused by construction.

The proposed excavation on the south side of the power canal would provide the longest possible seepage path to the Snake River and would help minimize seepage losses. CC also proposes to reduce seepage losses by removing loose material from foundation joints and cracks and filling the joints and cracks with gravel or concrete.

Building the powerhouse and lower part of the access road in talus covered slopes could cause minor, localized failure of unconsolidated rock and soil, especially in cut slopes (figure 3-13). The blasting of bedrock might also cause localized rockfall and slope failure of nearby unconsolidated materials. Cut slopes that are made in talus materials would be subject to minor raveling and to localized bank failure during project operation. These areas would be minor, but would be chronic sources of rock and sediment for the Snake River.

CC proposes to place spoil materials between the lower part of the access road and the edge of the river. Placing rock fragments in the spoil disposal area would help protect the roadbed from the scour and erosion of high river flows. Any soil

or fines within the spoil materials would be eroded into the river; so this area could be a source of sediment to the Snake River for several years.

CC proposes to place a temporary rockfill cofferdam around the construction area for the powerhouse, the lower penstock, and the tailrace to prevent flooding of the excavation. A temporary cofferdam would not control the sediments generated by access road construction; these sediments would cause minor, temporary increases in turbidity and suspended sediments in the Snake River. CC would build a permanent concrete cofferdam and training wall near the tailrace. Diverting river flows away from the excavation by using the cofferdams would reduce erosion and would contain the rockfall and sediment that would be eroded from construction areas. Removing the temporary cofferdam would cause minor, temporary increases in turbidity and suspended sediments within the river.

Building the wasteway in the north power canal bank would produce minor, localized erosion and sedimentation. Operating the wasteway to sluice ice or to remove excess flows probably would accelerate erosion of the natural drainageway leading to the Snake River below the canyon rim. Drifting snow which would accumulate on ice sluiced through the wasteway, also could increase erosion by diverting flows away from the natural drainageway and by eroding adjacent land surfaces. Ice would accumulate between the wasteway and the forebay and would be sluiced through the proposed flow control structure that would be located on the Twin Falls Main Canal, just downstream of the proposed forebay for the powerhouse; if ice overtops the canal, sluicing ice through the flood control structure could increase the erosion of the canal bank or nearby land surfaces.

CC's proposed year-round, run-of-river project operation would keep the reservoir level more stable than under existing conditions, would help to stabilize existing shoreline erosion, and would minimize future bank erosion along the reservoir shoreline.

4.1.1.1.2 Environmental Consequences with Staff-recommended Mitigation

CC should develop a detailed, site-specific erosion, sediment, and slope-stability control plan which would prevent construction from causing excessive erosion and sedimentation, would stabilize slopes after construction, and would protect water quality. This plan should include the following: perimeter control measures, such as the use of straw bales and silt fences along the north power canal embankment; measures to divert runoff around disturbed land surfaces and to collect and filter runoff; provisions for dissipating energy when necessary; specific details of revegetation efforts, including types of species to be planted and seeding or

planting rate, and kinds of fertilizer and mulch to be used; and provisions for using riprap in the natural drainageway downslope of the wasteway, and on the canal banks just downstream of the control structure at the end of the power canal to protect these areas from accelerated erosion associated with the sluicing of ice.

CC should conduct a geotechnical investigation of the cut slopes along the access road leading to the powerhouse to identify any critical areas that might require long-term, slope stability control. The slope above the powerhouse likely would require stabilizing to reduce the probability of rockfalls which could damage the powerhouse during project operation. In the erosion control plan, CC should identify specific control measures and locations for drainage to keep the roadbed stable, temporary erosion control measures for building the access road, and measures to stabilize the spoil disposal area.

CC also should do the following: minimize and carefully control the blasting of hard rock areas; dispose of spoil materials, such as soil and other fines above the high water mark to reduce sediment input to the Snake River; and use clean gravel or sand in the temporary cofferdam to minimize sediment input.

If CC implements an erosion, sediment, and slope-stability control plan that incorporates their proposed mitigative proposals and the staff's recommendations, the effects on soil and geologic resources would be minor.

4.1.1.1.3 Unavoidable Adverse Impacts

During project construction, minor localized erosion and sedimentation and minor temporary increases in turbidity and suspended sediments would be unavoidable until disturbed land surfaces are stabilized. During blasting for the powerhouse and tailrace excavation, minor rockfall and localized mass movement of loose rock would be unavoidable. Localized slope failure in talus materials might be unavoidable during construction of the lower part of the access road leading to the powerhouse. Placement and removal of the temporary cofferdam would temporarily increase suspended sediments and turbidity within the Snake River.

4.1.1.2 Star Falls Project

4.1.1.2.1 Environmental Consequences of Project as Proposed

Project construction would produce moderate levels of erosion and sedimentation, and minor to moderate increases in turbidity and suspended sediment in the Snake River. Construction in talus, Melon gravels, and alluvium might cause localized slumping or mass movement of loose rock, gravel, and soil. Building the proposed dam, placing and removing the cofferdam upstream of the canal

entrance, and dewatering the construction area would temporarily increase suspended sediment and turbidity within the Snake River. Excavation in the river channel, which would be required during construction of the dam, would produce spoil materials consisting of rock fragments and gravel.

Most of the erosion and sedimentation caused by constructing the earth embankment on the north side of the canal, building the intake for the penstocks and excavating the power canal would be contained within the power canal; the relatively flat gradient of the power canal also would minimize erosion. The south canyon wall would serve as the side of the power canal. Excavations within the power canal would not undercut talus deposits.

B&C proposes no excavation along the south canyon wall because significant unloading of slopes for power canal construction could destabilize talus along the south side of the canal. If a slope failure occurs along the south canyon wall during project construction from blasting within the canal, debris would be contained in the power canal and would not reach the Snake River. A slope failure during project operation would temporarily increase turbidity and would elevate the levels of suspended sediment that would enter the Snake River from the power canal; rock debris would be contained within the canal.

Excavations for the penstock intake structure, penstock foundations, powerhouse and tailrace and construction of the access road would cause localized erosion and sedimentation, mass movement of unconsolidated talus, and rockfall from blasting. It would be difficult to prevent soil materials contained within the talus from entering the Snake River at points where construction occurs next to the river. When vegetation is removed, silt loam and fine sandy loam soils crossed by the access road would be especially susceptible to accelerated erosion. Fine sandy loam soils could be subject to localized slumping or cutbank failure and could be difficult to stabilize.

B&C's proposal to place a temporary cofferdam at the tailrace would limit increases in turbidity and suspended sediments; placing and removing the cofferdam and dewatering the construction area would cause minor, temporary increases in turbidity and suspended sediments in the Snake River.

Excavation for the dam, power canal, powerhouse, and access road would produce spoil materials. B&C proposes to use excavated rock and soil to construct the power canal embankment, the fill slopes for the access road, and the penstock intake structure and to use rock spoil from the blasting of steep walled mesas on the ledge within the power canal to fill adjacent erosion channels and to create a level surface for the canal bottom. B&C would mitigate the loss of riparian habitat by using excess soil and rock to construct islands upstream of the dam. To reduce

erosion during spring floods, B&C would place the islands in a relatively calm backwater area, would protect the islands with riprap, and would plant vegetation on the islands.

Filling the proposed reservoir probably would accelerate bank erosion along the reservoir shoreline. As slopes become saturated, it would be likely that talus deposits mixed with soil materials would slump, and chronic bank erosion would occur. Flood flows would accelerate the erosion of the reservoir shoreline. Rockfall from extensive cracking along the canyon rim also could be likely. Most of the material eroded along the shoreline would be deposited in the proposed reservoir. Fluctuations in water levels within the power canal could potentially destabilize talus along the south canal wall and cause rock debris to enter the canal.

B&C proposes general erosion and sediment control measures, including proper grading, use of check dams and sediment ponds to control runoff during access road construction, scheduling instream construction during the low-flow season, diverting runoff away from construction areas requiring dewatering, and grading and revegetating borrow areas. These measures would reduce the erosion and sedimentation of construction activities. When project operation begins, B&C proposes to reduce turbidity in the Snake River by flushing sediments slowly from the power canal. The small slumps near the diversion are not expected to be affected by the project, but B&C proposes to investigate these areas and if necessary, to remove or stabilize the slumps during project construction.

Potentially, excessive leakage through the dam and canal embankment closest to the river may occur. The vesicular basalt in this area tends to be porous and permeable, subject to seepage or subsurface flow. If the rock is excessively porous at the diversion site, water could flow under the dam or around the dam abutments. If subsurface flow occurs beneath the power canal to the river, water might leak underneath the embankment next to the river and might prevent the canal from holding sufficient water for power operations.

4.1.1.2.2 Environmental Consequences with Staff-recommended Mitigation

To prevent excessive erosion and sedimentation from construction activities, to stabilize slopes following construction, and to protect water quality, B&C should provide a detailed, site-specific, erosion, sediment, and slope-stability control plan. The plan should include the following: perimeter control measures, such as the use of straw bales and silt fences along the north power canal embankment; measures to divert runoff around disturbed land surfaces and to collect and filter runoff; provisions for energy dissipation, when needed; temporary control measures and

permanent drainage facilities for the access road and any control measures needed to stabilize slopes.

For land surfaces disturbed during project construction, B&C should provide a revegetation plan that specifies types of species to be planted, seeding or planting rate, and kinds of fertilizer and mulch to be used. B&C should use clean gravel or sand in the temporary cofferdams to minimize sediment input to the Snake River.

B&C should investigate the subsurface geology of the bedrock below the proposed diversion site and below the power canal alignment to assess the nature and extent of subsurface flow and the potential for seepage or leakage around the dam, below the dam, and underneath the power canal. Grout curtains might be needed at the dam and along the power canal, and the power canal might need to be lined to prevent excessive leakage.

B&C should not disturb talus slopes on the canyon wall along the south side of the power canal, and should keep construction activities as far from these areas as possible. Cut slopes along the access road leading to the powerhouse might require the use of stability control devices, such as rockbolts, to reduce the potential for rockfall. To help stabilize the roadbed and to prevent fines within the fill from eroding into the Snake River, B&C should place riprap along the base of the fill slope for the roadbed next to the river. Proper drainage would be needed to keep the roadbed stable. In the control plan, B&C should propose specific locations and types of control measures.

To minimize rockfall, blasting for excavation of rock should be minimized and carefully planned and controlled. Rockbolts or wire mesh might be needed to reduce rockfall and to protect project structures during project operation. If B&C carries out an erosion, sediment, and slope-stability control plan that incorporates their mitigative proposals and the staff's recommendations, the impacts to soil and geologic resources would be minor. If talus deposits on the south canyon wall are destabilized due to blasting for construction of the canal or from water level fluctuations in the canal during operation, impacts would be moderate.

4.1.1.2.3 Unavoidable Adverse Impacts

Minor, localized erosion and sedimentation and minor, temporary increases in turbidity and suspended sediments would be avoidable during project construction until disturbed land surfaces are stabilized. Minor rockfall and localized mass movement of talus materials would be unavoidable during blasting for the powerhouse and tailrace excavation. Minor, localized mass movement of talus materials would also be unavoidable during construction of the access road leading to the powerhouse.

Placement and removal of the temporary cofferdams and dewatering construction areas would produce minor, temporary increases in suspended sediments and turbidity within the Snake River. Increased bank erosion, localized mass movement of unconsolidated talus deposits, and rockfall along the proposed reservoir shoreline would be unavoidable during project operation, and would be a minor, chronic source of sediment and rock debris for the proposed reservoir.

4.1.1.3 Twin Falls Project

4.1.1.3.1 Environmental Consequences of Project as Proposed

Project construction would cause minor levels of erosion and sedimentation and temporary increases in suspended sediments within the Snake River. Construction of the new intake and powerhouse would require the placement of upstream and downstream rockfill cofferdams. Construction areas protected by the cofferdams would be dewatered by pumping. If necessary, IPC would pass excess water through settlement ponds to reduce sediment concentrations before the water is returned to the Snake River. The cofferdams would keep the sediment eroded from the construction areas from reaching the Snake River; placing and removing the cofferdams would cause minor, temporary increases in turbidity and suspended sediments in the river.

Blasting for the water conduit shaft and tunnel and excavation for the tailrace would generate spoil materials, primarily rock fragments. Blasting might trigger localized rockfall or minor mass movement of loose rock; rock debris would be contained within the construction area dewatered by the downstream cofferdam. IPC would stabilize the rock slope above the powerhouse with rockbolts to protect the powerhouse against rockfall.

4.1.1.3.2 Environmental Consequences with Staff-recommended Mitigation

IPC should identify spoil disposal sites for rock fragments resulting from blasting for the water conduit shaft and tunnel. For stability, the slopes of the spoil material should not exceed the natural angle of repose. Clean gravel should be used in the cofferdams to minimize turbidity and sedimentation in the Snake River. Implementing IPC's proposed mitigative measures and the staff's recommendations would make impacts on soil and geologic resources minor.

4.1.1.3.3 Unavoidable Adverse Impacts

During project construction, minor, localized erosion and sedimentation and minor, temporary increases in turbidity would be unavoidable. Constructing the water conduit tunnel and shaft would generate spoil materials.

4.1.1.4 Auger Falls Project

4.1.1.4.1 Environmental Consequences of Project as Proposed

Construction activities would cause moderate localized erosion and sedimentation until land surfaces are stabilized. Building the dam would cause moderate temporary increases in turbidity and sedimentation within the Snake River and would produce spoil materials, including rock and alluvial deposits from excavating the foundation.

Excavation for the power canal would generate spoil materials of rock, gravel, and soil. Constructing the canal embankments would produce moderate levels of erosion and sedimentation; sediment would be deposited primarily within the power canal rather than being eroded into the Snake River, and removed mechanically, if necessary, when the canal is lined to prevent seepage losses.

Excavation in loose, sandy deposits might cause failure of the canal banks because of the relatively steep slope COG proposes for the sides of the canal. The stability of the canal sides would be a concern during project operation, particularly during short-term drawdowns, since slopes that are excavated into fine grained soils are generally subject to downslope creep or some type of slope failure.

Constructing the north embankment and the overflow wall in the first portion of the canal, closest to the river, would have the greatest potential for diminishing water quality from sedimentation. The relatively flat gradient of the power canal would reduce the erosion hazard along the canal alignment. Lining the canal to reduce seepage would also prevent erosion within the canal. A failure of the canal banks during project operation, however, would cause erosion and would generate sediment that would be transported to the Snake River.

Excavating the trenches for the penstock, powerhouse, and tailrace would require extensive blasting; about 160 feet of the rim of the cliffs immediately above the powerhouse would be removed. The base of the powerhouse would be 120 feet below the existing surface of the cliffs. Blasting is needed because the basalt is hard and relatively massive. Because joints extend 5 to 10 feet back from the rim of the cliffs, however, both nearby fractured areas and areas where blasting would occur could be subject to rockfall. Rock stability problems might occur at vertical cuts at the powerhouse excavation. COG's proposal to use a cofferdam to dewater the excavation would not prevent rockfall from entering the Snake River in the pool at the proposed powerhouse site. Rock fragments would also enter the large pool from the excavation of the tailrace.

COG would minimize erosion and sedimentation by timing construction to coincide with low river flow and with the dry weather season. COG would use an existing road to the proposed Auger Falls site to minimize damage to soils. Erosion and dust control measures would be used during construction of the power canal and waterfowl ponds. Canal and pond embankments would be seeded with natural grasses and shrubs following completion of construction. Lined surface drainage swales on each side and parallel to the canal would capture surface runoff and would channel when away from the canal embankment.

Fill that is placed next to the Snake River between the diversion structure and approximately 1,000 feet to the west, would be riprapped to prevent the river from eroding the canal embankment. Riprap would also be placed at the top of the canal banks to prevent erosion. The power canal would be stabilized and lined before diverting water through it.

COG would use cofferdams during construction to dewater the diversion site and the powerhouse site to reduce erosion and to contain sediments in the construction areas, and to reduce turbidity and suspended sediment within the Snake River.

COG proposes to design the power canal to obtain a balance between cuts and fills so that only a minor amount of excess spoil would result. Excavation of the trenches for the penstocks, the powerhouse, the staging area, and the tailrace would produce spoil materials, primarily rock fragments. Excess spoil materials would be used to build dams and embankments for two waterfowl ponds that would be constructed just south of the power canal.

4.1.1.4.2 Environmental Consequences with Staff-recommended Mitigation

For both construction and operation, COG should provide a detailed, site-specific plan that identifies measures to control erosion, sedimentation, and slope stability. The plan should include provisions for diverting runoff around disturbed areas, collecting and filtering runoff, and providing perimeter control along the power canal by using such devices as silt fences and straw bales. The plan should contain provisions for revegetation that specify species to be planted, seeding or planting rate, and kinds of fertilizer and mulch to be used. To minimize turbidity, COG should use clean gravels or sand for the cofferdams.

COG could significantly reduce the potential for instability of the canal bank slopes by using canal bank slopes of 2:1 (horizontal to vertical) instead of the steeper 1.5:1 slopes that are proposed. In the erosion control plan, COG should specify measures to stabilize soils and to control seepage within the canal.

COG should make a geotechnical investigation of the proposed diversion and powerhouse sites to assess the quality of the basalt rock, to define geologic discontinuities such as joints, faults, and fractures, and to determine how those features could cause seepage or could affect the stability of the foundations for the diversion and powerhouse. COG should carefully control blasting to minimize rockfall from adjacent areas and to minimize the quantity of rock fragments entering the Snake River. Rock debris from blasting should be end-hauled out of the excavation.

Rockbolts or steel mesh might be needed to minimize the potential for damage to the powerhouse from rock debris falling from the cliff walls and to prevent rock debris from entering the Snake River during project operation. Seepage control measures such as grout curtains might be required at the diversion site, where the river appears to have cut through the basalt in an area where jointing and fracturing may be common. If blasting for the powerhouse excavation is carefully controlled, the amount of rockfall would be relatively small, but there is a potential for more extensive rockfall from adjacent areas of the cliff face and rim due to joints and fractures that occur in the rock, which would cause moderate impacts on the geologic resources. If COG follows its proposed mitigative measures and the staff's recommendations, the effects on soil and geologic resources would be minor.

4.1.1.4.3. Unavoidable Adverse Impacts

Minor, temporary, localized erosion, and sedimentation would be unavoidable during construction until disturbed areas are stabilized. Minor, temporary increases in turbidity and suspended sediment would be unavoidable when cofferdams are placed and removed. Rock debris would enter the Snake River where blasting would occur right next to the river channel.

4.2 AQUATIC ENVIRONMENT

4.2.1 Water Quality and Quantity

4.2.1.1 Milner Project

4.2.1.1.1 Environmental Consequences of Project as Proposed

4.2.1.1.1.1 Construction-related Impacts

The most significant physical impact related to construction would be increased turbidity, increased siltation, and changes in stream flow. Proposed construction activities that might affect water quality include modifications of the dam and headworks, replacement of the spillway, modifications of the Twin Falls Main Canal and canal bridge, and construction of a wasteway, intake structure, forebay, penstock, and powerhouse. The canal would be excavated to increase its capacity, and over 600 feet of river bed would be excavated in the tailrace area to improve hydraulic flow conditions and create higher head for the turbine. These activities would cause an increase in turbidity and in total and suspended solids concentrations in the Twin Falls Main canal and the Snake River. Sediments would be contributed to the Snake River through dredging and the disposal of dredge spills, by demolition waste, and as a result of excavation. Changes in stream flow would occur when water is diverted around the construction area. Cofferdams would alter the natural river course in areas where project structures would be constructed, changing water velocity and depth.

Chemical changes in water quality might result from construction. Substances absorbed by sediments might be washed into the river. Phosphorus, heavy metals, pesticides, and other toxic materials might enter the water column from the sediment of Milner reservoir. These substances could adversely affect all levels of the aquatic food chain (plants, invertebrates, fish). Oils, grease, motor fuel, paint, cement, and fine particulate matter might enter the river from equipment maintenance areas and concrete mixing plants, especially in runoff from storms. Accidental spills of large amounts of materials or wastes are possible and could have a major adverse impact on the environment.

Much of the construction would be scheduled during the low flow season, but the quantity of sediments introduced into the river would depend on the actual river stage during construction. Most of the impacts would be limited to the construction period; the magnitude of these impacts would depend on the type of construction and of river discharge.

Although many adverse effects of construction would occur only during the construction period, some adverse construction effects would last longer. For example, the sediment generated during construction would reach the river with each rainfall;

this sediment also could be brought to the river by wind, landslides, or slope collapse. The introduction of these suspended sediments would produce turbid water and would increase siltation and sedimentation.

4.2.1.1.1.2 Long-term Impacts

4.2.1.1.1.2.1 Water Quantity

Project operation would markedly decrease flows in 1.6 miles of the Snake River, upstream of the proposed powerhouse. The proposed project would divert an additional 3,800 cfs to the power generating system. During the nonirrigation season (October 16 to April 14), the proposed discharge of 58 cfs in this 1.6 mile stretch of river would provide flows that are considerably lower than present flows; during the 1984 Water Year, for example, the lowest minimum daily flow at the Milner gage was 1,420 cfs from October through April, and the monthly mean discharge ranged from 4,857 cfs to 13,960 for these 7 months (Geological Survey, 1985). For a 51-year period, historical monthly average discharge from November to March ranged from 2,722 cfs in November to 4,921 cfs in February; the lowest minimum mean discharge for the period of record during the nonirrigation season was 300 cfs, and the maximum mean discharge was 19,037 cfs.

CC proposes to repair the leakage at Milner dam that presently provides a minimum flow in the Snake River downstream of the dam. Since CC proposes no minimum flows during the irrigation season, the river channel could be completely dry in the 1.6-mile-bypassed reach, at any time from April 15 to October 15. Water is currently discharged from Milner dam during the summer-fall period because IPC annually buys stored water from the Upper Snake River Water Bank for delivery to power plants below Milner reservoir (Robertson et al., 1986), but the releases are based on downstream power needs and are not continuous. Operation of the project would reduce the quantity of these discontinuous releases that are discharged to the bypassed reach.

If DO concentrations are low near the substrate of Milner reservoir, changes in the redox (oxidation-reduction) potential could cause the release of toxic substances from the substrate to the water column and could lower water quality downstream in the Snake River when releases were made from Milner dam.

4.2.1.1.1.2.2 Impacts in the Bypassed Reach

CC proposes a minimum flow of 58 cfs for the 1.6-mile-long bypassed reach during the nonirrigation season, with no minimum flow during the irrigation season. The reduction in discharge to the bypassed reach would adversely affect the water quality of the bypassed reach and the quality of the river downstream of the project.

The reduction in the quantity of water spilled over the dam and discharged through the bypassed reach would cause a corresponding reduction in the the aeration effect of the dam in the high gradient reaches of the bypassed reach, and would lower the DO levels of the bypassed reach and of the river downstream of the project. During the summer low-flow period, the DO levels in the bypassed reach and downstream of the powerhouse could fall below state standards. During the fall and winter periods, under low-flow conditions, DO levels could be reduced to state standards levels.

Accumulation of organic sludge on the river bottom increases as the river velocity decreases. Velz (1958) showed that bottom deposite caused acute BOD when the velocity is reduced below 0.6 feet per second. Changes in microbiological action and leaching of organic and mineral substances would also be expected with lower flow velocities. Much slower velocities in the bypassed reach also might increase the biomass of aquatic plants: increased plant respiration and decomposition would cause further DO reductions.

Lower flows or zero discharge in the proposed bypassed reach would reduced the dilution of pollutants entering the reach through surface runoff or irrigation returns and would increase the concentrations of pollutants (herbicides, pesticides, heavy metals) and suspended solids in the area of the Snake River between Milner dam and the powerplant return flow. Greater uptake of toxic materials by primary producers in this area would cause bioconcentration of some substances. Biomagnification of toxic materials in the food chain could raise the levels of pesticides and heavy metals in the Snake River fish consumed by fishermen.

Because high discharges would no longer flow through the channel of the Snake River in the bypassed reach, flushing flows would not be available to remove sediments and toxic materials that would accumulate in the bypassed reach as a result of much lower discharges. Except for the minimum proposed flow of 58 cfs during the nonirrigation season of the year, all flows less than 4,000 cfs would be diverted to the power canal. This diversion could cause the accumulation of toxic materials that would settle on the substrate in the bypassed reach as a result of much lower velocities.

Reduced flows in the bypassed reach would produce warmer water temperatures in the summer and colder water temperatures in the winter. Under extremely cold conditions, the potential exists for the formation in the bypassed reach of anchor ice, frazil ice, and surface ice.

4.2.1.1.1.2.3 Impacts in the Twin Falls Main Canal

Silting and erosion have occurred in the past in the Twin Falls Main Canal. The proposed project would divert up to an additional 4,000 cfs through the canal. Erosion and bank instability along the power canal would increase turbidity and total and suspended solids in the river.

If herbicides are required to ensure that plants sloughed from the bottom of the canal do not interfere with the effective operation of the powerplant, there is the posssibility of adverse impacts on the water quality of the Snake River. Herbicides are presently applied in the Twin Falls Main Canal only at points below the diversion into the power plant, however, and CC does not expect to use herbicides above the diversion to the power plant.

4.2.1.1.2 Environmental Consequences with Staff-recommended Mitigation

The proposed minimum flow of 0 cfs during the irrigation season would not protect water quality in the Snake River; further, the present leakage flows of 58 cfs might not be adequate to protect water quality. No water quality modeling has been conducted to determine the discharges necessary to maintain state DO concentrations or to assimilate materials introduced in irrigation returns or in industrial and municipal discharges.

To maintain water quality in the bypassed reach and in the river downstream of the project at levels that would protect aquatic resources, CC should release a continuous minimum flow from the project dam. The minimum flow release must be of sufficient magnitude to minimize the reduction of the DO concentration of the river below state levels and the buildup of sediment in the bypassed reach and to ensure adequate dilution of irrigation return flows.

During the summer low-flow period, flows in excess of the current leakage flow of 58 cfs would be required to maintain the water quality of the bypassed reach at levels that would protect water resources in the reach. Releasing water in excess of 58 cfs would require reappropriation of water from existing users; based upon available data however, the improvements in water quality associated with increased discharges from the dam would not warrant the detrimental impacts to the existing water users that would result.

When flows of the river are in excess of the needs of the existing water users, enough water must be released from the project dam to protect the quality of water in the bypassed reach and in the river downstream of the project. Since the

58-cfs leakage flow is currently unavailable to existing users the release of this quantity of water would provide some protection for the water quality of the river without conflicting with the needs of existing users. Additional flows that would be available for power generation should be diverted to the bypassed reach in sufficient quantity to protect water quality. The quantity of these flows should be based upon the results of a water quality monitoring plan.

During the remainder of the year or (essentially the non-irrigation season), CC should release minimum flows of approximately 1,260 cfs to protect fish resources. Flows of this magnitude would ensure that the reduced DO levels and the modifications to the temperature regime of the bypassed reach caused by project-induced flow reductions would be minimal.

The release of flows that would be available for power generation to the bypassed reach would minimize the project's impacts on water quality in the bypassed reach and in the river downstream of the project powerhouse. Under an effective water quality monitoring plan, CC could quickly implement changes in the operation of the project to minimize the occurrences of poor water quality conditions in the affected reach of the river.

4.2.1.1.3 Unavoidable Adverse Impacts

During the construction period, these effects could not be avoided: turbidity, suspended solids, and dissolved solids would increase in the reach of the Snake River downstream from the project; water velocities would be significantly decreased in the bypassed reach during project operation: the reaeration potential of the large rapids in the bypassed reach would be reduced; and the capacity of the Snake River to assimilate waste would be reduced.

4.2.1.2 Star Falls Project

4.2.1.2.1 Environmental Consequences of Project as Proposed

4.2.1.2.1.1 Construction-related Impacts

Constriction activities would temporarily alter flow and increase erosion and siltation in the Snake River. During construction, cofferdams would alter the natural river course in areas where project structures would be constructed, changing water velocity and depth. Fine sediments that would be introduced into the river during the excavation of the construction would be scheduled during the low-flow season, but the quantity of sediments introduced into the stream would depend on the actual river stage during construction.

Construction activities would raise turbidity levels, total and suspended solids concentrations, and nutrient levels in the immediate and downstream river areas, especially during low-flow periods. The sediment produced during construction would be brought to the river by each rainfall or by wind, landslides, or slope collapse.

Suspended sediment would produce turbid water. Spoil and borrow areas also might increase turbidity in the Snake River, especially if construction activities intercept groundwater or springs in spoil and borrow areas and require dewatering.

Oils, grease, motor fuel, paint, cement, and fine particulate matter might enter the river from equipment maintenance areas and concrete mixing plants, especially in runoff from storms. Accidental spills of large amounts of materials or wastes are possible and could have a major adverse effect on the environment.

Construction might cause chemical changes in water quality. Substances absorbed by sediments could be washed into the river. Heavy metals, pesticides, and other toxic materials might enter the water column from the sediment of the Snake River. These substances could adversely affect all levels of the aquatic food chain (plants, invertebrates, fish).

Construction of the dam would dewater a small area and would temporarily decrease groundwater levels near the site. Construction activities would be primarily confined to the canyon and would not impede groundwater discharge into the project area.

Generally, all the impacts would be limited to the construction period, and the magnitude of impacts would depend upon the type of construction and the river flow.

4.2.1.2.1.2 Long-term Impacts

4.2.1.2.1.2.1 Impacts in the Reservoir Reach

The relatively small increase in river elevation in the impoundment would have an insignificant effect upon the regional aquifer and the groundwater discharge rate in the area.

A major impact would be the change of about 3.5 miles of free-flowing river to a 161-acre reservoir with an average depth of 20 feet. Creation of the reservoir would reduce water velocity and would increase the time required for water to travel through the 3.5-mile reach (water retention time). The average flow through the reservoir would be 3,290 cfs, and the average water retention time would be 10.2 hours. The water retention time for B&C's proposed minimum flow of 160 cfs would be about 210 hours (B&C Energy, 1984). Flows of less than 160 cfs would increase the retention time. Flows equal to or less than 160 cfs occur 30, 17,

and 11 percent of the time in July, August, and September. respectively. During average water years, the flow rate and the pool retention times in July, August, and September would be 833 cfs, 450 cfs, and 576 cfs, and 40, 74, and 58 hours, respectively. These water retention values would change as the reservoir fills with sediment.

Temperatures and DO concentration in the reservoir would be altered. To predict temperature and DO conditions in the proposed reservoir, B&C used a model of Water Quality for River-Reservoir Systems designed by the Corps of Engineers. The model predicted that DO concentration in water discharged from the project would remain above the 5.0 mg/l state standard during low-flow conditions and that the level of thermal impacts would range only between 0.7°C and 0.9°C; some of the assumptions used in the model might not be met, however. The assumption was made that DO concentrations in inflowing water were 95 percent saturated. During low-flow years, when there is no discharge to the Snake River from Milner dam and when large amounts of of decaying algae are present, the 95-percent saturation assumption might not be met. Also, if water in the Snake River below Milner dam is diverted through the proposed Milner powerplant on the Twin Falls Main Canal, the reaeration capacity of the rapids in the river above the Star Falls Project (in the Milner bypassed reach) would be significantly reduced, and the assumption of 95 percent saturation might not be met at all times. Further, the assumption that inflow would be 160 cfs would not be met, if the leakage at Milner dam is repaired and if discharge at Milner dam is less than the estimated current leakage of 58 cfs. B&C proposes no minimum flow for the 6-month irrigation season. B&C did not identify the sources of the 100 cfs accruing in the river between Milner dam and Star Falls. The staff believes that 100 cfs does not accrue in the river in this reach, and that the water quality could be subject to further reductions in DO levels. Therefore, because the model assumptions might not always be met, the model predictions are open to questions. Given the much lower discharge, it is probable that DO concentrations in water discharged from the facility would sometimes be less that 5 mg/l.

Nutrient concentrations and BOD would be higher in the reservoir, especially during the initial years of project operation. The reservoir would flood a riparian zone in the area just upstream of the dam that contains large amounts of organic material. Farther upstream, the shoreline has less riparian vegetation, and the basalt rocks along the shoreline would not be easily eroded, so less organic material would be added to the reservoir in the upstream reach. In other areas along the proposed reservoir shoreline, bank erosion would increase sediment in the reservoir. After filling, the reservoir would contain high concentrations of dissolved and suspended solids, organic material, nutrients, and metals from land and vegetation that have been inundated. The impounded water would dissolve many of the nutrients present in

soil. An additional nutrient source might be leachate from soils along the reservoir shoreline. The overall effect would be heavy nutrient enrichment in the new reservoir, an effect that often stimulates primary production in the first few years. These conditions would persist until the inundated vegetation and other materials have been significantly decomposed. Organic debris on the reservoir bottom would ultimately break down and would go into solution. It usually takes at least several years before a new impoundment becomes chemically stable.

4.2.1.2.1.2.2 Impacts in the Bypassed Reach

B&C is proposing a minimum flow of 160 cfs for the 3,400-foot-long bypassed reach. Greatly reduced velocities in the reach during the operation of the powerplant would significantly reduce the reaeration capacity of the Snake River in this area. At present, high flows over Star Falls, Basalt Falls, and Amnesia Falls, combined with large rapids, provide significant reaeration during the summer low-flow period; the power canal would bypass this area, and much of the reaeration capacity would be lost.

Accumulation of organic sludge on the river bottom would increase with lower river velocities. (Velz, 1958) showed that acute BOD effects from bottom deposits can be expected when velocity is reduced below 0.6 feet per second. Changes in microbiological action and leaching of organic and mineral substances would be expected with lower flow velocities. Much slower velocities in the bypassed reach would also increase the biomass of aquatic plants. Increased plant respiration and decomposition would reduce DO.

Lower flows in the bypassed reach also would reduce the dilution of pollutants entering the Snake River through surface runoff or irrigation returns. The river flows might produce higher concentrations of pollutants (herbicides, pesticides, heavy metals) and might increase suspended solids in the area of the Snake River between the Star Falls dam and the powerplant return flow.

Because the present high discharges would no longer flow through the bypassed reach, flushing flows might not always be available (except during high-flow years) to remove accumulated sediments and toxic materials in the bypassed reach. This could result in the accumulation of toxic materials in the sediments of the bypassed reach.

If herbicides are required to ensure that plants do not interfere with the effective operation of the powerplant, there would be a potential for adverse effects on the water quality of the Snake River.

4.2.1.2.2 Environmental Consequences with staff-recommended Mitigation

The staff believes that the proposed minimum flow of 160 cfs might not maintain water quality in the Snake River. At some times of the year, inflowing water is high in BOD from point and nonpoint sources and contains large quantities of decaying algae and organic matter. B&C has conducted no mathematical water quality modeling to estimate the discharges necessary to maintain state DO concentrations or to assimilate materials introduced in irrigation returns or in industrial and municipal discharges.

B&C should release sufficient flows to the bypassed reach to maintain the water quality of the reach and of the affected portion of the river downstream of the project. During the summer low-flow period, which generally coincides with the irrigation season, most of the flow of the river might have to be discharged from the dam to minimize the accumulation of sediments and toxic substances in the bypassed reach and to minimize modifications to the temperature regime of the river. Further, it might be necessary to discharge this quantity of water to the bypassed reach to provide sufficient reduction of DO loadings to the river and to mitigate for the reduction in the DO levels of the river that would result from the physical presence of the project reservoir and from the reduced reaeration potential of the bypassed reach.

During extreme low-flow conditions, flows in excess of the current flow levels might have to be discharged to the river to minimize the occurrence of low DO levels in the project reservoir and to maintain DO downstream of the project at levels that would protect existing water users and aquatic biota. Additional flow releases to the river would require reappropriation of water from water users located upstream of the project; however, the occurrence of these low-flow conditions is expected to be rare enough that it would not warrant the resulting adverse impacts to existing water users and to the socioeconomic environment of this region.

During the remainder of the year, in the nonirrigation season, flows of approximately 1,260 cfs, which would be required to protect fish resources, also would adequately protect the water quality in the bypassed reach and in the river downstream of the project. Flows of this magnitude would minimize the low DO and the modifications to the temperature regimes of the river.

Ultimately, to determine the quantity of water to be discharged to the bypassed reach, B&C should implement a water quality monitoring plan. At a minimum, the plan should provide for continuous monitoring of the DO and the temperature of the river and should include provisions for discharging sufficient water to the bypassed reach to protect the water quality of the river. Using

such a plan, B&C could minimize the effects of the project on the water quality of the Snake River by releasing higher minimum flows, if water quality standards are violated by inadequate discharge for the dilution of pollutants, and by discharging water from the reservoir instead of through the powerhouse, or if water quality is poor.

4.2.1.2.3 Unavoidable Adverse Impacts

During the constructon period, turbidity, suspended solids and dissolved solids would increase in the Snake River.

The proposed reservoir would flood 3 1/2 miles of free-flowing river. Water velocity in the reach would be decreased, and water retention time would be increased. Flows would be significantly reduced in the 3,400-foot-long bypassed reach during project operation. The reaeration potential of Star Falls, Basalt Falls, Amnesia Falls, and other rapids in the area of the reservoir and of the bypassed reach would be lost or reduced. The capacity of the Snake River to assimilate waste would be reduced, and DO concentrations would be lowered.

4.2.1.3 Twin Falls Project

4.2.1.3.1 Environmental Consequences of Project as Proposed

4.2.1.3.1.1 Construction-related Impacts

Construction activities would temporarily alter flows and would increase erosion and siltation in the Snake River. During construction, cofferdams would alter the natural river course in area where project structures would be constructed and would change water velocity and depth. The instream construction of the cofferdam would introduce silts and large-size sediments into the river; erosion from disturbed areas would introduce additional fine sediments to the river. Much of the construction would be scheduled during the low-flow season, but the quantity of sediments introduced into the stream would depend on the actual river stage during construction.

Construction activities would increase turbidity levels, total and suspended solids concentrations, and nutrient levels in both the immediate and downstream river areas, especially during low-flow periods. The sediment mobilized during construction would be carried to the river by each rainfall or by wind, landslides, or slope collapse. Suspended sediment results in turbid water. Spoil and borrow areas also might contribute to higher turbidity levels in the Snake River, especially if construction activities intercept groundwater or springs in spoil and borrow areas and require dewatering.

Oils, grease, motor fuel, paint, cement, and fine particulate matter may enter the river from equipment maintenance areas and concrete mixing plants, especially in runoff from storms. Accidental spills of large amounts of materials or wastes are possible and could have a major adverse impact on the environment.

Chemical changes in water quality might result from construction. Heavy metals, pesticides, and other toxic materials might enter the water column from sediments disturbed during project construction. These substances could adversely affect all levels of the aquatic food chain (plants, invertebrates, fish).

Most of the impacts would be limited to the construction period; the magnitude of the impacts would depend on the type of construction and the river flow.

4.2.1.3.1.2 Long-term Impacts

4.2.1.3.1.2.1 Impacts in the Reservoir Reach

The proposed project would not change water retention time in the reservoir, because reservoir volume would not change and because the proposed project would continue to be operated as a run-of-river facility. The present water retention time of the project reservoir is 39 hours, 4.7 hours, and 0.6 hours at the minimum (310 cfs), mean (2,580 cfs) and maximum (19,340 cfs) monthly flows, respectively. Any potential project impacts on DO, nutrient concentrations, and temperature associated with the physical presence of the impoundment would be minimal, because of the short retention time in the impoundment. The 14-mile reach of the Snake River above the Twin Falls Project reservoir is characterized by a number of rapids (figure 3-15), and these rapids provide aeration that contributes to high DO levels in the proposed project vicinity. The project reservoir has a rapid flow-through time, and the water column does not appear to stratify. Since no changes in the reservoir level, retention time, or project flows are proposed, DO levels in the reservoir would not change, unless the proposed Milner and Star Falls Projects are constructed upstream; these projects have the potential to lower the DO concentration of incoming water. Because the reservoir and the river upstream of the reservoir receives loadings of organic matter from point and nonpoint sources of pollution, it is possible that DO concentrations in the reservoir might be below state standards during extreme low-flow conditions.

IPC proposes no increase in river water surface elvation in the impoundment, so there would be no effect upon the regional aquifer or upon the groundwater discharge rate in the area.

4.2.1.3.1.2.2 Impacts in the Reach Downstream from Twin Falls Dam

A major impact of the expanded project would be the reduction of reaeration caused by bypassing additional flows for power production around Twin Falls; the diverted flows would not receive the benefit of reaeration by Twin Falls or by the existing project spillway. When BOD concentrations are high, the loss of natural reaeration could reduce the DO levels of the Snake River both in the immediate project area and downstream; reduced DO levels would reduce the assimilative capacity of the Snake River in these areas. Two rapids, located 1 mile below the Twin Falls dam, would provide some reaeration, but would not fully compensate for the loss of reaeration at Twin Falls.

4.2.1.3.2 Environmental Consequences with Staff-recommended Mitigation

At present, IPC takes no specific measures to maintain water quality standards at or below Twin Falls dam, and no specific measures for maintaining water quality are proposed by IPC. The staff recommends that IPC continuously measure temperature and DO downstream from the project tailrace. Other proposed hydropower projects upstream from Twin Falls could significantly lower DO concentrations in water entering the reservoir. If DO concentrations drop below state standards, IPC should reduce project operation and should discharge enough water over the spillway to maintain state standards. These actions would enhance the quality of the river by minimizing the occurrences of low DO levels caused by operating the existing project and would minimize the effects of operating the additional facilities.

4.2.1.3.3 Unavoidable Adverse Impacts

Sediments would be introduced into the Snake River during construction, causing increased turbidity, suspended solids, and siltation of the substrate. Discharge over Twin Falls would be significantly reduced. The reaeration affect of water discharged over Twin Falls and over the existing project spillway would be significantly reduced, lowering DO levels in the bypassed reach and in portions the river downstream of the project.

4.2.1.4 Auger Falls Project

4.2.1.4.1 Environmental Consequences of Project as Proposed

4.2.1.4.1.1 Construction-related Impacts

Project construction activities would temporarily alter flow and increase erosion and siltation in the Snake River. During construction, cofferdams would alter the natural river course in areas where project structures would be constructed and would change water velocity and depth. The instream

construction of the cofferdams and the diversion structure would introduce silts and larger-sized sediments into the river; erosion from disturbed areas would introduce additional fine sediments to the river. Although much of the construction would be scheduled during the low-flow season, the quantity of sediment introduced into the stream would depend on the actual river stage during construction.

Construction activities would increase turbidity levels, total and suspended solids concentrations, and nutrient levels in the immediate and downstream river areas, especially during low-flow periods. The sediment produced during construction would be drawn to the river by each rainfall or by wind, landslides, or slope collapse. Suspended sediment causes turbid water. Spoil and borrow areas also could contribute to higher turbidity levels in the Snake River, especially if construction activities intercept groundwater in spoil and borrow areas and require dewatering.

Oils, grease, motor fuel, paint, cement, and fine particulate matter might enter the river from equiment maintenance areas and concrete mixing plants, especially in runoff from storms. Accidental spills of large amounts of materials or wastes are possible and could have major adverse effects on the environment.

Chemical changes in water quality could result from construction. Substances absorbed by sediments might be washed into the river. Heavy metals, pesticides, and other toxic materials could enter the water column from the sediments of the Snake River and could adversely affect all levels of the aquatic food chain (plants, invertebrates, fish).

Most of the impacts would be limited to the construction period, and the magnitude of these impacts would depend on the type of construction and the river flow.

4.2.1.4.1.2 Impacts in the Reservoir Reach

The proposed diversion dam is designed to have little effect on the water surface elevation of the river. There would be very little impoundment of water behind the diversion structure when river flows are equal to, or greater than, 5,000 cfs. At discharges between 2,000 and 5,000 cfs, the impoundment would vary from 2 acre-feet at 2,000 cfs to 0 acre-feet at 5,000 cfs flow. At discharges between 670 cfs (low flow) and 2,000 cfs, the impoundment would vary between 5 acre-feet at 670 cfs and 2 acre-feet at 2,000 cfs. The maximum size of the impoundment at low flows would affect an area of 90,000 square feet with an average depth of 2.5 feet; the impoundment would be about the same size and have an average depth of about 2 feet at flows of 2,000 cfs. Water retention time above the diversion dam would be approximately

6 minutes at a river discharge of 670 cfs and 45 seconds at a river discharge 2,000 cfs. The proposed project would be operated as a run-of-river plant.

Since there would be little to no increase in the surface elevation in the impoundment formed by the diversion dam, the project would have an insignificant effect upon the regional aquifer and upon the groundwater discharge rate in the area.

Creation of the reservoir would reduce water velocity and would slightly increase water retention time. Because of the short retention time in the impoundment, the potential impacts on DO, nutrient concentrations, and temperature would be less than in a larger reservoir. There are water quality problems in the area during low-flow periods now, however, and the creation of a reservoir would exacebrate present problems of discharges from industrial and municipal point sources upstream and from nonpoint agricultural sources. The aeration effect of water pasing over the diversion structure would partially compensate for reductions in DO concentration within the impoundment.

Nutrient concentrations and BOD would be higher in the reservoir than in the Snake River at its present elevation, especially during the initial years of project operation. The reservoir would inundate a 1-acre riparian zone in the area, just upstream of the dam, that contains large amounts of organic material. After filling, the reservoir would initially contain high concentrations of dissolved and suspended solids, organic material, nutrients, and metals from land and vegetation that would be flooded. The impounded water would dissolve many of the nutrients present in previously terrestrial soil. Leachate from soils along the reservoir shoreline might be an additional nutrient source. The overall effect would be heavy nutrient enrichment in the new reservoir, an effect that often stimulates primary production in the first few years. These conditions would persist until the inundated vegetation and other materials have been significantly decomposed. Organic debris on the reservoir bottom would ultimately break down and would go into solution.

4.2.1.4.1.3 Impacts in the Bypassed Reach

COG's proposed flow regime for the bypassed reach is presented in section 2.1.3.2. The regime calls for no water withdrawal from the Snake River from July 1 to September 30, when river flow just above the diversion point drops to 670 cfs. The proposed minimum flow of 670 cfs is the median flow that was measured from July 1 September 30 for the period from 1962 to 1981. Because the minimum hydraulic capacity of the project is 200 cfs, the project would operate only when flows of the river exceed 870 cfs. The amount of time that the flows vary between 670 cfs and 1,000 cfs (when river temperatures and nutrient concentration are highest), is approximately 20 percent of the year,

A major impact of the project would be the reduction of reaeration caused by passing flows for power production around Auger Falls and other rapids in the bypassed reach; the diverted flows would not be reaerated by thse falls and rapids. During low-flow periods, the loss of natural reaeration could significantly affect the DO regime in the Snake River, both in the immediate project area and downstream. Because COG proposes no project operation during the times when DO concentrations are expected to be the lowest, the project would not have a major impact on DO concentrations of the river during the most critical periods of the year. Nevertheless, greatly reduced velocities in the bypassed reach when the powerplant is operating would decrease the reaeration capacity of the Snake River in the reach during periods of high BOD loadings to the river, and could cause violations of the state DO Standard. Violations of the state DO Standard during the remainder of the year are expected to be infrequent.

Present DO levels, while generally high in the project area because of the large number of rapids, are subject to diel (24-hour) variations. During the irrigation season, DO concentrations are high during the day because of high algal production; at night, DO levels drop below saturation as aquatic plants respire. Reduced velocities in the bypassed reach could significantly increase plant biomass during years when discharges are high enough to permit frequent generation in summer and fall months. Diel variations in DO would increase and could be significant; DO concentration would be low during periods of darkness.

Lower flows in the proposed bypassed reach also would reduce the dilution of pollutants entering the Snake River through surface runoff or irrigation returns. This could produce higher concentrations of pollutants (herbicides, pesticides, heavy metals) in plants within the bypassed reach in the area of the Snake River between the proposed Auger Falls dam and the powerplant return flow.

Because discharges would be reduced in the bypassed reach, flushing flows may not always be available to remove accumulated sediments and toxic materials in the bypass reach during lower flow years. Flow in excess of the hydraulic capacity of the plant would flow over the diversion dam, and during years when discharge would be high, flushing of the sediments would probably be adequate.

If herbicides are required to ensure that plants sloughed from the bottom of the power canal do not interfere with the effective operation of the powerplant, the potential exists for adverse affects on the water quality of the Snake River; however, COG does not anticipate the need for herbicide applications (Cogeneration, Inc., 1987).

4.2.1.4.2 Environmental Consequences with Staff-recommended Mitigation

To maintain water quality standards in the bypassed reach and in the affected portion of the river downstream of the project, COG must provide sufficient flows to assimilate organic wastes discharged into the river, to provide adequate dilution of industrial discharges and of irrigation return flows, and to maintain water quality standards during extreme low-flow conditions. Under severe low-flow conditions, water currently used for irrigation would have to be reappropriated from upstream water users and returned to the river to maintain state standards; extreme low-flow conditions would probably occur so infrequently, however, that reappropriation would be unnecessary.

To minimize the project's effects on the water quality of the bypassed reach, COG should discharge to the bypassed reach water that would be available for power generation in sufficient quantity to maintain the DO and temperature of the bypassed reach and of the impacted reach of the Snake River downstream of the powerhouse. Given COG's proposed minimum flow regime and proposed minimum hydraulic capacity, the project would not be operating during the time of year when DO levels would approach state standard levels. Because of relatively high discharges that periodically occur in the summer and that result from the use of water stored in the upper basin, the reduction in the flow regime of the bypassed reach to 670 cfs could violate state water quality standards. Further, there may be other periods of the year when BOD loadings are sufficient to cause low DO levels. To take full account of the project's effects on DO levels in the river, COG should establish a water quality monitoring plan that would determine the timing and magnitude of the discharges to the bypassed reach needed to protect the DO levels of the river.

Establish of an effective water quality monitoring plan would ensure the release of sufficient water to the bypassed reach to minimize the project's effects on the DO levels and on the temperature regime of the river.

4.2.1.4.3 Unavoidable Adverse Impacts

During the construction period, turbidity, suspended solids, and dissolved solids would increase in the reach of the Snake River downstream from the project. The proposed reservoir would flood 0.2 miles of the Snake River during low-flow periods. Water velocity in the reach would be decreased, and water retention time would be slightly increased. Flows would be significantly reduced in the 2-mile-long bypassed reach during project operation. The reaeration potential of Auger Falls and other rapids would be reduced.

4.2.2 Fishery Resources

4.2.2.1 Milner Project

4.2.2.1.1 Environmental Consequences of Project as Proposed

4.2.2.1.1.2 Construction-related Impacts

During construction of the proposed project, increased levels of suspended and dissolved solids would temporarily degrade the aquatic habitat. Suspended sediment produces turbid water, which can reduce visibility, clog fish gills, disrupt fish spawning, and cause invertebrates to leave the substrate and drift downstream. Increased turbidity would decrease light penetration and therefore would decrease productivity of planktonic algae present in pools in the Snake River.

Fish might be disturbed by construction noise from the use of equipment or from blasting, or by any spills of oil or toxic wastes. Pollutants such as lubricants and fuels might be introduced, and toxic materials might be resuspended from the sediments; these substances could have sublethal or lethal effects on aquatic organisms. Dewatered zones, which would be created during construction, could strand fish and invertebrates.

Depositing suspended solids downstream from the construction site would adversely affect macroinvertebrate and periphyton production and could adversely affect fish spawning. Siltation during construction probably would reduce the densities of aquatic macroinvertebrates and the biomass and productivity of periphytic communities downstream from the project. Construction activities would occur in the late summer and fall; thus, rainbow trout spawning would be unaffected. Whitefish spawning, however, occurs in October and November, and sedimentation from construction activities would adversely affect spawning in this species.

4.2.2.1.1.3 Impacts of Project Operation

4.2.2.1.1.3.1 Fish

The amount of habitat available to fish would be significantly altered. Total wetted perimeter during project operation would be significantly reduced. The proposed minimum flow of 58 cfs during the nonirrigation season (defined by CC as the period from October 16 through April 14) would wet only a small percentage of the streambed. Discharges required to wet the perimeter of the Snake River in the bypassed area are probably over 2,000 cfs (Cochnauer, 1976). Flows necessary to wet the perimeter are generally much less than the discharge that would provide optimal habitat for trout (as determined by FWS's Instream Flow Incremental Methodology or by other instream flow methods).

CC has proposed no minimum flow from April 15 through October 15, so there might be no available habitat for fish during the irrigation season after leakage at Milner dam is stopped. Minimum flows in the bypassed reach during the irrigation season would be limited to the amount of water that seeps under or through the dam after repairs are made and to water from irrigation returns and springs. At a discharge of 58 cfs, winter habitant for fish would be substantially reduced; game fish would not move upstream into the project area if water depths and velocities are unsuitable. Dewatering the streambed would also affect fish through sediment accumulation, low DO concentrations, and when discontinuous shallow reaches are bypassed, through thermal effects.

Low flows in the bypassed reach would limit trout distribution and trout abundance. Low flows can increase overwintering mortality, decrease cover, allow sediment accumulation, and cause stranding (Petts, 1984). The requirements of trout and trout food organisms would not be met if channel changes involve the formation of a silted, uniform bed. Decreased flows and decreased water velocity favor rough fish over large trout. Changes in the velocity of flows influence the habitat that is available for fish. High velocities create turbulence and white-water areas, which increase DO concentrations by reaeration and make trout less visible to predators; reduced flows concentrate fish in the remaining habitat and intensify predation. Low flows also cause trout to move to less suitable habitat, increasing competition with other fish.

CC's proposed minimum flow of 58 cfs is not adequate to allow large trout to move through all areas of the bypassed reach. Trout require adequate stream depths for normal intrastream movement. Riffles are used for feeding and for movement between pools; flows that reduce water depth over riffles to 2.9 inches or less make these areas unusable to large trout (Corning, 1970). Minimum depth requirements vary with the size of trout, but minimum water depth over riffles should not be less than .59 feet (Giger, 1973).

Because of insufficient flows and water quality constraints, the project would not be operated continuously. Irregular operation would produce flow fluctuations in the bypassed reach that would be very detrimental to fish food organisms and to fish habitat. The project would operate in a run-of-river mode, but because operation would not be on a year-round basis, some of the adverse effects on fish resources would be similar to effects found below hydropower facilities that use peaking operations, where flow fluctuations cause invertebrate drift, stranding of periphyton (algae growing on the river bottom), macroinvertebrates, and fish, and alterations in habitat. Rapid flow variations (from 0.98 to 9 cfs) caused by irrigating the Snake River in Wyoming, exposed algae and higher plants, and led to the destruction of the primary producers (Kroger, 1973).

Channel sedimentation could induce a marked change in the composition of insect populations and could cause a loss of larger, more accessible food items for fish in the bypassed reach. If enough material settles, it would decrease the densities of invertebrates and would make the substrate unsuitable for spawning of many fish species. Many fish spend the winter near the river bottom, and sedimentation would deprive these fish of necessary hiding places.

CC's proposed minimum flow of 58 cfs during the period from November 16 through April 14 was suggested by IDFG as the flow that would provide survival for game fish during the winter (Cochnauer, 1979). IDFG conducted an investigation for CC in February 1979, with the objective of determining a minimum winter survival flow for game fish populations in the bypassed reach of the Snake River below Milner dam (Cochnauer, 1979). A flow of 173 cfs was the lowest flow provided during the study period, because the dam gates could not be completely closed. Thus, trout habitat at low flows could not be evaluated. Also, temperatures above freezing during the 2-day period prevented an asssessment of the extent of freezing at reduced flows in the study reach. Using the assumption that freezing would probably not occur at water velocities higher than 1.0 foot per second, IDFG determined that a flow 58 cfs would provide an average column velocity of 1 foot per second at one transect. Further, to maintain adequate flow in pools at opposite ends of the dam, it was estimated by visual observations that 40 cfs should be released at the west end and 18 cfs should be released from the east end of Milner dam. IDFG's recommendation for a minimum winter survival flow from Milner dam thus was 58 cfs.

The scouring effects of ice discharged from Milner reservoir, in combination with increased ice formation in the river channel as a result of lower flows, could be extremely deterimental to the aquatic organisms. The present winter operations of Milner dam facilitate the discharge of ice from the reservoir into the river channel below the dam (Twin Falls Canal Company and North Side Canal Company, Ltd., 1987). CC would replace the existing spillway to improve its ability to pass ice during the winter. Thus, ice would continue to be discharged into the river channel below the dam, but with substantially reduced flows in the river channel, the detrimental effects of ice from the reservoir on the aquatic organisms downstream from the dam would be magnified.

Surface release reservoirs, such as Milner reservoir, act as heat exporters during the summer. In general, epilimnial-release dams produce a warm tailwater, more suitable for coarse-fish species. Because the proposed project would significantly reduce discharges, temperatures in the bypassed reach would be somewhat warmer than at present. Rainbow trout tolerate somewhat higher temperatures than other trout, but water temperatures above 21.1° C are detrimental to rainbow trout (Walburg et al., 1981).

Present temperatures downstream from Milner dam approach the upper limit for suitable temperatures for trout, and even minor increases in temperature resulting from project operation would have an adverse impact.

Discharges at the entrance to the Twin Falls Main Canal would be much higher during project operation, and would cause more fish to enter the main canal. Fish entering the main canal would constitute a loss to the population in Milner reservoir, and possibly a total loss to the river-reservoir system, if conditions in the canal should be unsuitable for survival or if the fish should be killed while passing through the project facilities. Fish that have been disoriented and injured in the turbines would provide a food source for predators in the local area downstream from the project tailrace. The supply of phytoplankton and zooplankton from Milner reservoir would still be available in the tailrace discharge, although food items may be dead or damaged. More fish would probably concentrate near the tailrace discharge than at the base of the dam.

The number of fish that would be lost to turbine mortality at the proposed project is unknown; some mortality from passage through the turbines would be expected. Fish that are swept through the turbine and outlet works would encounter extreme turbulence and pressure changes and probable injury or mortality. Fish passing through turbines with small clearance in relation to the fish's size could experience mechanical injury. Experimentation by Cramer and Oligher (1964) revealed that turbine mortality could fluctuate between 9 and 54 percent, depending upon tailwater levels, turbine type, and operational conditions.

4.2.2.1.1.3.2 Aquatic Macroinvertebrates

The reduction in wetted perimenter in the bypassed reach during the nonirrigation season would provide less surface area for the production of macroinvertebrates. The possible absence of any flow during the 6-month irrigation season would have a very damaging effect on invertebrate populations. Most species of aquatic insects emerge and lay their eggs during the time of year when there could be no flows in the bypassed reach. Species composition might be limited to the few species, such as midges, that can colonize rapidly from downstream locations and that have multiple generations per year.

Flow patterns and ramifications of flow, such as substrate particle size, are dominant factors that control macroinvertebrate distributions in regulated rivers (Ward and Stanford, 1979; Petts, 1984). Excessive velocity is currently a limiting factor for many species of invertebrates in some areas of the proposed project bypassed reach. The fauna in the rapids within the project area is probably dominated by small-bodied species, such as some Chironomidae, that can inhabit substrate spaces below high-

velocity flows. Reduced flows in the bypassed reach would allow species adapted to slower velocities to colonize the area.

The elimination of high flows that flush the substrate of fine sediment would produce channel sedimentation in the bypassed reach. Sedimentation would fill the interstices of the substrate and could severely reduce the periphyton, so that habitat heterogeneity would be greatly reduced. The heterogeneity of the particle size of substrate is of critical importance in providing varied microhabitats that can support an abundant and diverse fauna (Hynes, 1970). Reduced velocities and the lack of flushing flows eventually would produce a silted subsrate; burrower organisms, such as nematodes and oligochaetes (worms), which favor fine substrates, would dominate sites where sedimentation causes the build-up of organic sediments.

Reductions in flow fluctuations in the bypassed reach caused by project generation would have a beneficial effect on macroinvertebrates during the nonirrigation season. Multiple draw-downs in regulated rivers can have devastating effects on macroinvertebrate populations.

Kroger (1973) reported that fluctuating water levels below Jackson Lake dam on the Snake River destroyed the periphyton and stranded large numbers of benthic organisms. More constant flows would have a positive effect during project operation, as long as velocities were within a favorable range.

Surface-release dams such as Milner dam supply a reliable planktonic food supply from the reservoir to macroinvertebrates in the receiving river; an increased biomass of filter-feeding invertebrates is often observed downstream from reservoir outflows (Spence and Hynes, 1971; Henricson and Muller, 1979). Reduced flows or no flows from Milner reservoir would reduce the volume of the planktonic food supply and could reduce the densities of filter-feeding invertebrates in the bypassed reach. Passage of phytoplankton and zooplankton through the power canal and turbines would increase the number of morbid phytoplankters and would adversely affect planktonic food supply for invertebrates downstream of the powerplant.

4.2.2.1.1.3.3 Aquatic Plants

Increased deposition of suspended solids generated by constructon activities and by lower flows in the bypassed reach would adversely affect production of periphyton. Slower velocities in the bypassed reach would increase plant biomass, if increased siltation does not reduce the suitability of the substrate for the growth of periphyton. Species replacement and changes in community composition would be expected as a result of the marked change in current velocities. McIntire (1966) reported the development of diatoms at high velocities and of long filaments of

green algae under low-velocity conditions. No algal studies have been conducted in the bypass reach, but diatoms probably dominate under the high flows currently present in the bypassed reach. Green and blue-green algae would probably become more dominant under the reduced flows that would exist with the project. A reduction in flow and in water depth would provide conditions more suitable for the growth of aquatic plants in the bypassed reach, and in turn, would lead to possible problems in DO, organic load, and weed control.

Phytoplankton from Milner reservoir are presently released into the Snake River, especially during summer flood flows. A number of factors, including flow velocities, determine how long phytoplankton persist downstream. high current velocities in the Snake River presently abraid and destroy large numbers of algal cells. Slower velocities in the bypassed reach would allow greater development of phytoplankton populations in the river downstream from the reservoir. Species that are abundant in the reservoir plankton would be dominant below the dam, because of constant replenishment, provided that minimum flows are released from Milner reservoir.

4.2.2.1.2 Environmental Consequences with Staff-recommended Mitigation

CC's minimum flow proposal of 0 cfs during the irrigation season and 58 cfs during the rest of the year is not adequate to protect fish resources in the bypassed reach. The staff believes that a continuous year-round minimum flow release at the dam is necessary to maintain the periphytic and macroinvertebrate food base and to maintain adequate water quality and habitat for fish.

A continuous minimum flow should be discharged from the dam to provide sufficient aquatic habitat to maintain the aquatic biota native to the bypassed reach. To ensure protection of the fish resources of the affected reach of the river, 60 percent of the flow required to wet the river channel should be discharged from the dam. Based upon data collected by Cochnauer (1976), at a site 0.6 miles upstream of the Twin Falls dam, this flow is equal to 1,260 cfs.

During the summer low-flow period, which generally coincides with the irrigation season, flows in the reach of the river located downstream of the dam are reduced to the leakage from the dam, which is approximately 58 cfs. The reduction in river flow results from the withdrawal of water from the project reservoir and from the river upstream of the project for such consumptive water uses as irrigation. Requiring the release of 1,260 cfs from the dam during the summer low-flow period would enhance the fish resources of the bypassed reach, as well as the resources of the entire study reach of the river; this enhancement, however, would require

reappropriation of 1,142 cfs away from the existing water users. The enhancement resulting from the increased minimum flows would provide additional habitat for the rough fish that may exist in the bypass reach; because of high water temperatures, however, it is unlikely that the additional flows would maintain a year-round trout fishery. The staff believes that the enhancement to fish resources would not warrant the detremental impacts to the existing water users and the corresponding adverse impacts to the socioeconomic environment of the region.

CC should discharge from Milner dam a minimum flow of 58 cfs during the irrigation season to provide some protection for existing fishery resources in the bypassed reach. A minimum flow of this size would not conflict with the existing water uses of the river, but would provide sufficient habitat to maintain the biotic resources of the bypassed reach that are characteristic of this portion of the river during the irrigation season. During the remainder of the year, CC should release a minimum flow of 1,260 cfs to provide sufficient habitat to protect the fish species that would migrate into the bypassed reach during the irrigation season. In addition to providing adequate water depths for fish habitat, this flow would also maintain the periphytic and macroinvertebrate food base and water quality at levels that would protect the fish resources of the bypassed reach.

To ensure that this minimum flow regime would adequately protect the fish resources of the bypassed reach, CC, in consultation with the resource agencies, should develop a plan to monitor changes to the biotic community of the bypassed reach. The plan should include provisions for modifying the minimum flow regime or developing other mitigative measures, such as habitat enhancement, if project operation results in unforeseen significant impacts to the biotic resources of the bypassed reach.

The staff recommends that CC develop a plan to limit the maximum rate of change in river flow in the bypassed reach during project start-up and shutdown. An appropriate ramping rate should be developed, after consultation with IDFG and the FWS, to minimize the stranding of invertebrates and fish and to minimize the loss of invertebrates through catastrophic drifting to downstream areas.

CC proposes an experimental habitat enhancement study in which 300 to 350 three-tier units would be placed on the bottom of Milner reservoir; CC also proposes to evaluate the success of these structures in providing a surface for the colonization of macroinvertebrates and for spawning habitat and cover for fish. There is no evidence that placement of these structures would enhance macroinvertebrate and fish populations; the structures might sink within a loose silted substrate and might be covered soon after placement, or high rates of sedimentation might cover them within a relatively short period of time.

CC should develop a plan to evaluate the success of such structures in enhancing the fish habitat of the reservoir. In the event the structures prove ineffective, CC should investigate the feasibility of alternative habitat improvement structures that would improve the quantity and quality of fish habitat in the reservoir.

In discharging from the project dam a minimum flow of 58 cfs during the irrigation season and 1,260 cfs during the nonirrigation season, CC would minimize the effects of the project on the fish resources of the bypassed reach. Establishment of an appropriate ramping rate also would minimize the impacts on aquatic resources of project start-up and shutdown.

4.2.2.1.3 Unavoidable Adverse Impacts

Increased levels of suspended solids and excavation of the substrate during construction would reduce periphytic cover and benthic invertebrate populations and would displace or cause the loss of fish downstream of the proposed project. These effects would be limited to the duration of the construction period, plus the time required for recolonization after construction is completed.

Long-term unavoidable adverse impacts would include these: (1) fish mortality associated with passage through the project tubines; (2) the reduction of fast-flowing river habitat in the bypassed reach and a resulting change in community composition to one suited to slower-flowing river conditions; and (3) reduction of wetted perimeter and fish habitat in the bypassed reach.

4.2.2.2 Star Falls Project

4.2.2.2.1 Environmental Consequences of Project as Proposed

4.2.2.2.1.1 Construction-related Impacts

During construction of the proposed project, the increased levels of suspended and dissolved solids would temporarily degrade the aquatic habitat. Suspended sediments cause turbid water, which can reduce visibility, clog gills of fish, disrupt fish spawning, and cause invertebrates to leave the substrate and drift downstream.

Construction activities could disturb fish by noise from equipment and from blasting or by any spills of oil or toxic wastes. If pollutants such as lubricants and fuels are introduced, toxic materials could be resuspended from the sediments; these substances might have sublethal or lethal effect on aquatic organisms. Dewatered zones, created during construction, could strand fish and invertebrates.

Deposition of suspended solids downstream from the construction site would adversely affect macroinvertebrate and periphyton production, and could adversely affect fish spawning. Siltation during construction probably would decrease the densities of aquatic macroinvertebrates and of biomass and the productivity of periphytic communities downstream from the project. Because construction would take place in the late summer and fall, rainbow trout spawning would be unaffected; whitefish spawning, however, occurs in October and November, and sedimentation from construction activities would adversely affect spawning of this species.

4.2.2.2.1.2 Impacts of Project Operation

4.2.2.2.1.2.1 Impacts in the Reservoir Reach

4.2.2.2.1.2.1.1 Fish

The proposed project would inundate rapids, causing loss of aeration potential, reducing fish food production, and removing whitefish spawning habitat. The project would eliminate 3.5 miles of free-flowing river and in its place would create a run-of-river impoundment. As a result, there would be a shift in the composition and diversity of the aquatic community composed of a limited number of species capable of existing in a reservoir with a short retention time. A project such as the proposed Star Falls Project creates a pool habitat that represents a transition habitat between a reservoir and a free-flowing system. Few studies have been conducted on this type of fisheries habitat, because the fishery is generally poor. The numbers of cold-water game fish such as rainbow trout and mountain whitefish would be reduced, and there would be a general reduction in species diversity. The presence of submerged vegetation and debris from clearing operations could provide habitat for warmwater fish.

With the loss of fast-flowing riverine habitat and reduced numbers of coldwater game fish, a reduction in the recreational use of the Star Falls reach by anglers would be expected. The IDFG management goal for this reach of the Snake River is to maintain or to create a high-yield trout fishery (Idaho Deparment of Fish and Game, 1986). The project reservoir would not provide a high quality habitat for naturally reproducing trout that would meet IDFG's goal of a catch rate of 0.5 trout per hour. Warmwater game fish species such as yellow perch and smallmouth bass may be better suited than trout to conditions in Star Falls reservoir, but their potential success is unknown, and rough fish would dominate.

If no minimum flow is released from Milner dam during the irrigation season from April 15 through October 15, the inflow to the proposed Star Falls reservoir would consist only of the approximately 100 cfs accretion flow below Milner dam and any

leakage from Milner dam that cannot be prevented. As mentioned previously, this 100 cfs accrual between Milner dam and Star Falls is suspect. The presence of a reservoir would change water quality and would affect the fishery, especially during July, August, and September of low-flow years. At these times, the project would not be generating and the flow through the reservoir would result in a retention time in the impoundment and in the power canal of about 210 hours, or longer with reduced flows. Increased plankton populations in the slowermoving water in the impoundment would reduce DO concentrations by increasing respiration and BOD. Reduced DO concentrations and increased temperatures would adversely affect fish in the reservoir.

The principal trout migration pattern in the project area is the downstream movement of juvenile wild trout and hatchery plants from upstream areas. B&C has not proposed upstream fish passageways because Star Falls has historically prevented upstream migration. B&C would release a minimum flow of 160 cfs over the dam when the plant is operating, and these flows would allow some downstream passage of fish through the Snake River channel. Fish passed through Star Falls dam in minimum flow releases, however, would be subject to injury, because water depths at the base of the dam would be shallow with 160 cfs minimum flows; fish passing over the spillway would be injured by impacts with rocks in the pluge zone, by abrasion with the rough sides of the spillway, and by the shearing effects of turbulent water (Rochester et al. 1984).

Fish that enter the power canal would constitute a loss to the population upstream of the dam, and possibly a total loss to the river-reservoir system, if conditions in the canal are not suitable for survival or if the fish are killed while passing through the project facilities.

4.2.2.2.1.2.1.2 Aquatic Macroinvertebrates

The density and diversity of benthic invertebrates would be reduced in the proposed impoundment. At present, there is a slow-flowing pool in the reach immediately upstream from Star Falls; the substrate in this pool is silted and densities of benthic invertebrates are low (B&C Energy, 1984). Faster-flowing reaches that would be inundated by the reservoir, however, probably contain invertebrates that are characteristic of the Snake River just below the project (mollusks, mayflies, hydropsychid caddisflies, and dipterans such as blackflies and netwinged midges). The substrate of the reservoir would reflect that of the large pool and, as a result, the benthic community would be dominated by chironomids (midges) and annelid worms.

Loss of riparian vegetation by flooding would reduce the terrestrial food base that is used by some invertebrates (leaves) and by fish (terrestrial insects). The proposed reservoir would lie partially within a canyon, where riparian vegetation is limited, and the loss of part of the available terrestrial food sources could be detrimental.

4.2.2.2.1.2.1.3 Aquatic Plants

Slower velocities in the proposed reservoir would allow greater development of phytoplankton populations. Phytoplankton from Milner reservoir are presently released to the Snake River, especialy during summer flood flows. A number of factors, including flow velocities, determine how long phytoplankton persist downstream. High current velocities in the Snake River at present abraid and destroy large numbers of algal cells. Phytoplankton entering the proposed Star Falls reservoir from Milner reservoir would survive in higher numbers because of reduced flow velocities and reduced abrasion. Species that are abundant in the plankton in Milner reservoir would be dominant in Star Falls reservoir, because of constant replenishment, provided that minimum flows were released from Milner reservoir. There would be a shift in the upper reach of the proposed reservoir from a benthic plant community to a community composed primarily of phytoplankton. Increased water retention times would increase the potential for algal blooms during the summer and fall months. Algal blooms would cause daily variations and probably a general reduction in DO concentrations in the reservoir.

Aquatic vascular plants could develop in the reservoir from decreased velocities and from the eventual buildup of sediments. Reducing the effects of scour might allow the root systems of vascular plants to take hold in locations where current velocities are presently too fast or where flow flunctuations are too marked.

4.2.2.2.1.2.2 Impacts in the Bypassed Reach

4.2.2.2.1.2.2.1 Fish

B&C's proposed minimum flow of 160 cfs would considerably alter fish habitat in the bypassed reach. The river in the bypassed reach is presently characterized by a very rapid current and by turbulence, especially within the first 1,500 feet below the falls. Wetted area and the available habitat for invertebrates and fish would be reduced. Total wetted perimeter during project operation would be reduced by a significant, but unquantified amount. Because of the high gradient of Star Falls, the upstream end of the bypassed reach is currently not good habitat for fish. Downstream of the falls, habitat for fish would be reduce by markedly reduced discharge.

Low flows in the bypassed reach could limit trout distribution and abundance. Low flows can increase overwintering mortality, decrease cover, and increase sediment accumulation (Petts, 1984). Decreased flows and decreased water velocity would favor rough fish over large trout in this reach of the river. Changes in the velocity of flows influence the habitat that is available for fish; high velocities create turbulence and white-water areas, which in turn increase DO concentrations by reaeration and make trout less visible to predators. Reduced flows concentrate fish in the remaining habitat and intensify predation. Low flows also cause trout to move to less suitable habitat, increasing competition with other fish.

The proposed minimum flow of 160 cfs would not allow large trout to move through all areas of the bypassed reach. Trout need adequate stream depths for normal intrastream movement, and the steep gradient in the area of the bypassed reach would require higher flows to allow trout to move through the area. Flows that reduce water depth over riffles to 7.6 centimeters or less make these areas unusable to large trout (Corning, 1970). Minimum depth requirements vary with the size of trout, but minimum water depth over riffles should not be less than 0.18 meters (m)(Giger, 1973). Trout probably do not reproduce in the project area to any great extent, so to maintain a fishable population, adult trout must be able to move into the project area from upstream and downstream and to move freely within the bypassed area.

Because of insufficient flows and water quality constraints, the project would not be operated continuously. This irregular operation would cause flow fluctuations in the bypassed reach that would be very detrimental to fish food organisms and to fish habitat. The project would operate as run-of-river, and flow fluctuations would not occur as frequently as below hydropower facilities that operate in peaking modes. Because operation would not be continuous on a year-round basis, however, some of the adverse effects on fish resources would be similar to those below peaking operations, where flow fluctuations cause invertebrate drift, stranding of periphyton, macroinvertebrates, and fish, and alterations in habitat.

Channel sedimentation could cause a marked change in the composition of insect populations and a loss of larger, more accessible food items for fish. If enough sediment settle, it would decrease the densities of invertebrates and would make the substrate unsuitable for spawning by many fish species. Many fish winter near the river bottom, and heavy sedimentation may reduce the amount of substrate available for winter habitat. The filling of pools would deprive fish of necessary hiding places.

Summer temperatures in the bypassed reach would be somewhat warmer than at present, because of warming in the proposed reservoir and because of significantly reduced discharges in the bypassed reach during project operation. In general, surface-release dams

produce temperatures in the tailwater more suitable for coarse-fish species. If releases are made from the surface of the reservoir, temperatures in the tailwater would be 1 to 2 degrees warmer than if releases were from a multi-level outlet.

Reduced discharges in the bypassed reach would reduce the dilution of toxic materials (pesticides, herbicides, algicides, heavy metals) introduced through irrigation return flows and from surface runoff; toxic materials could have acute or sublethal effects on aquatic organisms and could become magnified in the food chain.

4.2.2.2.1.2.2.2 Aquatic Macroinvertebrates

The reduction in wetted perimeter in the 3,400-foot-long-bypassed reach would provide less wetted area for macroinvertebrate production; however, excessive velocity is currently a limiting factor for many species of invertebrates in some areas of the proposed project bypassed reach. Reduced flows in the bypassed reach would allow species adapted to slower velocities to colonize the area.

The elimination of high flows that flush the substrate of fine sediment would cause channel sedimentation. Sedimentation would fill the interstices of the substrate and could severly reduce the biomass of periphyton, so that habitat heterogeneity would be greatly reduced, and food sources for grazing invertebrates would be limited. The heterogeneity of substrate particle size is of critical importance in providing varied microhabitats that can support an abundant and diverse fauna (Hynes, 1970). Reduced velocities and the lack of flushing flows would eventually result in a silted substrate; burrowers or organisms that favor fine substrates such as nematodes and oligochaetes (worms) would dominate sites where sedimentation would cause a buildup of organic sediments. Building the proposed power canal would destroy macroinvertebrate communities in springs and spring seeps of the canal area.

The power canal might disrupt spring flow into the Snake River and might disturb aquatic habitat at the mouth of the springs. The excavation of approximately 40,000 cubic yards in the proposed tailrace area would remove fish food production sites.

4.2.2.2.1.2.2.3 Aquatic Plants

Increased deposition of suspended solids generated by construction activities and by lower flows in the bypassed reach would adversely affect the production of periphyton.

High-flow velocities, short-term flow manipulations, and high turbidities currently limit the growth of aquatic plants in the

area of the proposed bypass reach. Very high current velocities cause scouring of attached algae. Slower velocities in the bypassed reach would increase plant biomass, if increased siltation does not reduce the suitability of the substrate for the growth of periphyton. Because of the marked change in current velocities, species replacement and changes in community composition would be expected. McIntire (1966) reported the development of diatoms at high velocities and long filaments of green algae under low-velocity conditions. A reduction in flow and in water depth would provide conditions more suitable for the growth of aquatic plants, and in turn, would lead to possible DO problems, organic load problems, and weed control problems.

4.2.2.2.1.2.3 Impacts Downstream from Powerhouse

Some fish that would be swept through the turbine and outlet works would be injured or killed. Fish passing through turbines with small clearances in relation to the fish's size may experience mechanical injury. Experimentation by Cramer and Oligher (1964) revealed that turbine mortality could fluctuate between 9 and 54 percent, depending upon tailwater levels, turbine type, and operational conditions. The losses that could be expected from turbine injuries and mortalities at the proposed project are unknown.

Fish that have been disoriented, injured or killed in the turbines would provide food for predator fish in the local area downstream from the project tailrace. As a result, fish would probably concentrate near the tailrace discharge.

4.2.2.2.2 Environmental Consequences with Staff-recommended Mitigation

B&C's minimum flow proposal is not adequate to protect fish resources in the bypassed reach; a higher minimum flow release at the dam is necessary to maintain the periphytic and macroinvertebrate food base and to maintain adequate space for fish habitat.

The staff recommends a minimum flow release to the bypassed reach during the irrigation season of 160 cfs or the inflow to the project, whichever is less, with higher flows if water quality standards are violated. B&C should release much higher minimum flows than those proposed during the nonirrigation season. The staff recommends that B&C release a discharge to the bypassed reach that would provide at least 60 percent of the discharge needed to wet the river channel, or the project inflow, whichever is less, during the period when water is not being withdrawn for irrigation. Based upon wetted perimeter detailed upstream of the Twin Falls dam (Cochnauer, 1976), the staff believes that a minimum flow of 1,260 cfs would be necessary to protect fish resources in the bypassed reaches.

To protect and enhance the fish resources of the bypassed reach a continuous minimum flow of 1,260 cfs would have to be released to the reach. Since the flows in the reach are approximately 160 cfs during the summer low-flow period, or the irrigation season, additional flows would have to be be reappropriated from existing consumptive uses to maintain a flow of 1,260 cfs. The enhancement of the fish resources in this reach of the river thus would deplete the amount of water available to the existing water users by 1,040 cfs. This enhancement does not warrant the adverse impacts to the existing water users and the corresponding impacts to the socio-economic resources of the region that would be caused by reappropriating the added flows.

At a minimum, B&C should maintain a minimum flow of 160 cfs to protect the existing fish resources of the bypassed reach during the summer low-flow period, which generally extends from July through September. Assuming a minimum hydraulic capacity of approximately 500 cfs (table 2-1), project operation could reduce flows to the bypassed reach to 160 cfs when flows of the river exceed 660 cfs, or less than 25 percent of the time. This minimum flow requirement should make sufficient habitat available to protect the fish resources of the bypassed reach.

During the remainder of the year, B&C should should release a minimum flow of 1,260 cfs to the bypassed reach. This release, which represents 60 percent of the discharge required to wet the river channel, would maintain the periphytic and macroinvertebrate food base, and would provide sufficient habitat to protect the fish resources in the bypassed reach. Releasing this flow during the irrigation season would cause no conflicts with with existing consumption uses of the river.

To ensure this minimum flow regime adequately protects the fish resources of the bypassed reach, B&C should conduct a fish-population monitoring program that would evaluate changes to the biotic resources of the bypassed reach. If the monitoring program shows that project operation has unforseen adverse effects on the biotic resources, B&C should modify project operation and should institute a fish habitat enhancement program or other appropriate mitigative measures.

B&C should develop a plan to limit the maximum rate of change in river flow in the bypassed reach during project startup and shutdown, and after consultation with IDFG and FWS, should develop an appropriate ramping rate to minimize the stranding of invertebrates and fish and the loss of invertebrates through catastrophic drifting.

Carrying out this minimum flow regime and fish population monitoring program would ensure that project operation would have only minimal effects on the fish resources of the bypassed reach.

4.2.2.2.3 Unavoidable Adverse Impacts

During project construction, increased levels of suspended solids and increased excavation of the substrate would reduce periphytic cover and benthic invertebrate populations and would cause the displacement or loss of fish downstream of the proposed project. These effects would be limited to the duration of the construction period, plus the time required for recolonization after construction is completed.

Long-term unavoidable adverse impacts would include these: (1) loss of habitat for riverine fish in the reach of the river inundated by the proposed reservoir; (2) fish mortality caused by passage through the project turbines; (3) loss of fast-flowing river habitat in the bypassed reach and a resulting change in community composition to one suited to slower flowing river conditions; (4) loss of habitat for macroinvertebrates and fish in the 3,400-foot-long bypassed reach; and (5) reductions in DO concentrations for aquatic communities.

4.2.2.3 Twin Falls

4.2.2.3.1 Environmental Consequences of Project as Proposed

4.2.2.3.1.1 Construction-related Impacts

Project construction would temporarily increase levels of suspended and dissolved solids and would degrade the aquatic habitat. Suspended sediment produces turbid water, which might reduce visibility and disrupt fish feeding patterns, clog gills of fish, disrupt fish spawning, and cause invertebrates to leave the substrate and drift downstream.

Fish could be disturbed by noise from equipment and blasting and by any spills of oil or toxic wastes. Pollutants such as lubricants and fuels might be introduced, and toxic materials could be resuspended from the sediments; these substances might have sublethal or lethal effects on aquatic organisms. Dewatered zones created during construction and dewatering could strand fish and invertebrates.

Materials disturbed by construction would settle to some extent in pools within the project boundary. Deposition of suspended solids downstream from the construction site would adversely affect macroinvertebrate and periphyton production and might adversely affect fish spawning. Siltation would decrease the densities of aquatic macroinvertebrates and of biomass, and would lessen the productivity of periphytic communities downstream from the project.

Construction of the access road also would adversely affect the fish and the invertebrate habitat in the unnamed spring downstream from the new powerhouse.

4.2.2.3.1.2 Long-term Impact

4.2.2.3.1.3 Impacts in the Reservoir Reach

Construction of the original project inundated salmonid spawning habitat in the lower reach of Vinyard Creek and in the Snake River, but no additional loss of spawning habitat is expected. Since the level of Twin Falls reservoir would not be increased, no additional adverse impacts are expected at Vinyard Creek, an important spawning tributary that enters within the reservoir area.

4.2.2.3.1.4 Downstream Effects on Fish

Fish moving downstream through the project area would be subject to entrainment, and turbine-related mortality would be expected to increase with the proposed increase in project capacity. The magnitude of the additional losses that could be expected from turbine injuries and mortalities at the Twin Falls

Project is unknown; estimates of present turbine mortality are not available. Turbine-related injury and mortality could have a significant negative effect on the trout fishery.

Fish that have been disoriented, injured, or killed in the turbines would provide a food source for predator fish in the local area downstream from the project tailrace. Fish would probably concentrate near the tailrace discharge.

4.2.2.3.2 Environmental Consequences with Staff-Recommended Mitigation

The staff believes that IPC's proposed payment of $50,000 to IDFG would not adequately mitigate the potential losses of game fish through turbine mortality. Cutthroat and cutthroat-rainbow hybrid trout, species preferred by fishermen, would suffer turbine mortality, and the effects on the fishery might be large in comparison to this relatively small payment. The staff recommends instead that IPC should evaluate the magnitude of turbine mortality, and should establish mitigation, based on the results of the evaluation

4.2.2.3.3 Unavoidable Adverse Impacts

During project construction, increased levels of suspended solids and excavation of the substrate would reduce periphytic cover and benthic invertebrate populations and would cause the displacement or loss of fish downstream of the proposed project. These effects would be limited to the duration of the construction period, plus the time required for recolonization after construction is completed.

Long-term unavoidable adverse impacts would include fish mortality, caused by passage through the project turbines, and reductions in the fish and the invertebrate habitat in the reach immediately downstream from Twin Falls.

4.2.2.4 Auger Falls Project

4.2.2.4.1 Environmental Consequences of Project as Proposed

4.2.2.4.1.1 Construction-related Impacts

During project construction, increased levels of suspended solids would adversely affect benthic populations and fish populations; increases in turbidity accompanying construction of the project diversion and tailrace structures would be expected to last only a few weeks. Suspended sediment causes turbid water, which may reduce visibility, disrupt fish feeding patterns, clog gills of fish, disrupt fish spawning, and cause invertebrates to leave the substrate and drift downstream.

Noise from equipment and blasting and any spills of oil or toxic wastes could disturb fish. Pollutants such as lubricants and fuels might be introduced, and toxic materials could be resuspended from the sediments; these substances might have sublethal or lethal effects on aquatic organisms. Dewatered zones that would be created during construction strand fish and invertebrates.

Materials disturbed by construction would settle primarily in the deep pool downstream from the powerhouse. Deposition of suspended solids downstream from construction sites would adversely affect benthic production and could adversely affect spawning of such fish as the white sturgeon. Siltation would decrease the densities of aquatic macroinvertebrates and of biomass and would lower the productivity of periphytic communities downstream from the diversion structure.

Because construction would occur in the summer and fall, the spawning of rainbow trout would be unaffected; whitefish spawn in October and November, however, and sedimentation would adversely affect the spawning of this species.

4.2.2.4.1.2 Long-term Impacts

4.2.2.4.1.3 Impacts in the Reservoir Reach

4.2.2.4.1.3.1 Fish

For flows less than 5,000 cfs, the diversion dam would create a small impoundment with a very short retention time. During this retention time, there may be changes to the compostion and diversity of the fish species in this portion of the river. For flows in excess of 5,000 cfs, the fish resources in this reach of the river would be expected to resemble the preproject fish community, since the backwater effect of the diversion stretches would be negligible.

The overall slope from the proposed diversion structure to a point approximately 300 feet upstream would be approximately 1.7 percent. The proposed pool would inundate rapids, causing the loss of aeration potential and reducing fish food production. Project construction would eliminate 2 miles of free-flowing river and in its place would create a rapid-flow-through impoundent; some shifts in the composition and diversity of the aquatic community would result.

Inundation of riparian vegetation would reduce the terrestrial food base used by some invertebrates (leaves) and by fish (terrestrial insects). Riparian vegetation is scarce, and the loss of part of the available terrestrial food sources could be detrimental.

4.2.2.4.1.3.2 Aquatic Macroinvertebrates

Changes in the velocity, depth, and substrate of the reservoir would change the composition of the species in the invertebrate community. These changes would occur at river flows of less than 5,000 cfs. For flows in excess of this amount, the benthic community would be expected to return to the species composition of the preproject riverine community.

The diversion structure would affect a riparian border comprised of 20 willows that are about 50 feet tall. One acre of willow riparian vegetation would be permanently flooded in the pool area above the diversion. The inundated vegetation might provide additional habitat for aquatic invertebrates, although most species of insects in the Snake River are not adapted to this type of habitat.

4.2.2.4.1.3.3 Aquatic Plants

Slightly increased water retention times in the reservoir would increase the potential for algal blooms during the summer and falls months. Higher algal biomass would increase diel variations in the DO concentrations in the reservoir. Flows in the impoundment would still fluctuate on a seasonal basis, preventing the establishment of stable aquatic vegetation along the shoreline.

4.2.2.4.1.3.4 Impacts in the Bypassed Reach

4.2.2.4.1.3.4.1 Fish

In the upper end of the bypassed reach, the river is characterized by a very rapid current and turbulence. The proposed diversion structure would be located just upstream of a narrow rapids area that has a hydraulic gradient of approximately 6 percent; because of the high gradient of Auger Falls, the upstream end of the bypassed reach is currently not good habitat for fish. Fish habitat in the upper portion of the 2.0-mile section of river between the diversion structure and the powerhouse might remain unchanged or might be improved by the reduced flows. The lower flow regime would reduce water velocity substantially, and would facilitate the upstream migration of game fish.

Downstream of Auger Falls, the sharply reduced discharge would reduce fish habitat. The proposed minimum flow of 760 cfs would alter the available habitat for fish and food production. Low flows in the bypassed reach might limit trout densities. Low flows can increase overwintering mortality, decrease cover, allow sediment accumulation, and cause stranding (Petts, 1984). Decreased flows and decreased water velocity favor rough fish over large trout.

Changes in the velocity of flows influence the habitat that is available for fish: high velocities create turbulence and whitewater areas, which increase DO concentrations by reaeration and make trout less visible to predators; reduced flows concentrate fish in the remaining habitat and intensify fish predation. Low flows also cause trout to move to less suitable habitat, increasing competition with other fish.

Because of insufficient flows and water quality constraints, the project would not be operated continuously. Discontinuous operation would produce flow fluctuations in the bypassed reach that would be very detrimental to fish food organisms and to fish habitat. The project would operate as run-of-river, but because operation would not be year-round, some of the adverse effects on fish resources would be similar to those below peaking operations, where flow fluctuations cause invertebrate drift, stranding of periphyton, macroinvertebrates, and fish, and alterations in habitat.

Channel sedimentation in slow-flowing areas of the bypassed reach could induce a marked change in the composition of insect populations and could cause the loss of larger, more accessible food items for fish. If enough sediment settles, it would decrease the densities of invertebrates and would make the substrate unsuitable for spawning of many fish species. Further, many fish spend the winter near the river bottom, and heavy sedimentation could reduce the amount of substrate available for winter habitat. The filling of pools would deprive fish of necessary hiding places.

Summer temperatures in the bypassed reach would be somewhat warmer than at present, because of slight warming in the proposed reservoir and reduced discharges in the bypassed reach during project opration. Temperatures in the Auger Falls area are presently near the upper limit for rainbow trout, so slight alterations in temperature could be critical.

The white sturgeon, a state species of special concern, has been collected from the pool at the site of the proposed powerhouse location, but the population is severely depressed in the project area (Lukens, 1981). Sediments and rocks would be introduced into the pool during the construction of the tailrace, and spawning habitat for the white sturgeon could be lost. Other fish species of concern are discussed in section 3.5.

4.2.2.4.1.3.4.2 Aquatic Macroinvertebrates

Water diverted from the natural stream channel would reduce the wetted perimeter in the bypassed reach at all discharges except those at or below the minimum flows proposed to be released for April 15 to October 1. The reduction in wetted perimeter in

the bypassed reach would provide less wetted area for macroinvertebrate production; excessive velocity, however is currently a limiting factor for many species of invertebrates in some areas of the proposed bypassed reach. Reduced flows in the bypassed reach would allow species adapted to slower velocities to colonize the area.

Water quality changes resulting from reduced dilution of pollutants in the bypassed reach might cause compositional changes. Reduced discharges would reduce dilution of toxic materials (pesticides, herbicides, algicides, heavy metals) introduced through irrigation return flows. There would be some reduction in DO in the bypassed reach in the summer months, during years when the flow of the river exceeds the minimum flow requirement, plus the minimum hydraulic capacity of the project. Reduced DO concentrations would adversely affect benthic populations.

The elimination of high flows that flush the substrate of fine sediment would cause channel sedimentation. Sedimentation would fill the interstices of the substrate and could severly reduce the biomass of periphyton, greatly reducing habitat heterogeneity and limiting food sources for grazing invertebrates. The heterogeneity of substrate particle size is of critical importance in providing varied microhabitats that can support an abundant and diverse fauna (Hynes, 1970). Reduced velocities and the lack of flushing flows eventually would result in a silted substrate; burrowers or organisms such as nematodes and oligochaetes (worms), that favor fine substrate would dominate sites where sedimentation causes the build-up of organic sediments.

Macroinvertebrate communities in the springs and spring seeps that occur in the areas that would be used for the construction of the power canal would be destroyed. These areas have not been surveyed, so it is unknown whether any rare or endangered species occur.

4.2.2.4.1.3.4.3 Aquatic Plants

Increased deposition of suspended solids generated by construction activities and by lower flows in the bypass reach would adversely affect the production of periphyton.

At present, high-flow velocities, characteristic of the high-gradient reach, and high turbidities probably limit the growth of aquatic plants in the Star Falls area of the proposed bypassed reach, although periphytic growth was very evident during the staff's site visit in November 1986. Very high high current velocities scour attached algae. Slower velocities in the bypassed reach could increase plant biomass, if increased siltation does not reduce the suitability of the substrate for the

growth of periphyton. Species replacement and changes in community composition would be expected as a result of the marked change in current velocities. McIntire (1966) reported the development of diatoms at high velocities and long filaments of green algae under low-velocity conditions. A reduction in flow and water depth would provide conditions more suitable for the growth of aquatic plants; these conditions would lead to possible DO problems, organic load problems, and weed control problems.

4.2.2.4.1.3.5 Downstream Effects on Fish

Fish moving downstream through the project area would be subject to entrainment and to turbine-related mortality. It is likely that most drifting fish would follow the river channel in roughly the proportion of flow remaining in it. Downstream migration would still be possible over the diversion structure at high flows, through the radial gates at lower flows, or through the canal and turbines. Fish, especially juveniles, would enter the power canal and would pass downstream through the turbines. Some mortality of fish associated with passage through the turbines would be expected. Fish that are swept through the turbine and outlet works would encounter extreme turbulence and pressure changes and could be injured or killed.

Larger fish might be injured if the turbine clearance is small in relation to their size. Experimentation by Cramer and Oligher (1964) revealed that turbine mortality could fluctuate between 9 and 54 percent, depending upon tailwater levels, turbine type, an operational conditions.

The magnitude of loss that could be expected from turbine injuries and mortalities at the proposed project is unknown. Turbine-related mortality would depend on the size of downstream migrating fish. Reid (1972) reported that about 90 percent of the rainbow trout measured during the creel census were less than 14 inches in length. Fish less than 14 inches should experience less than 10 percent turbine mortality; higher mortality rates can be expected for fish larger than 20 inches. Nearly all of the fish larger than 20 inches in length that occur in the project area, however, are expected to be suckers, squawfish and carp; therefore, mortality of large fish would not be expected to have a significant negative impact on game fish populations.

Fish that have been disoriented, injured, or killed in the turbines would provide a food source for fish predators in the local area downstream from the project tailrace. As a result, fish would probably concentrate near the tailrace discharge.

Auger Falls provides a partial upstream barrier to fish migration at present; however, fish have historically moved upstream at certain flows. To ensure that the proposed diversion structure does not further impact upstream migration, COG would construct a vertical-slot fish ladder

at the diversion dam, to allow the upstream passage of fish that might be able to move upstream through Auger Falls at reduced flows.

4.2.2.4.2. Environmental Consequences with Staff-recommended Mitigation

The staff recommends that COG monitor the effects of project operation on game fish populations in the project area, and reevaluate the minimum flow schedule based on the results of the monitoring, to ensure that wetted perimenter and water velocities and depths are adequate for fish passage and rearing habitat. COG should monitor the effects of turbine mortality, if fish mortality is significant, COG should consider providing downstream fish passage facilities.

The staff recommends that COG develop a plan to limit the maximum rate of change in river flow in the bypassed reach during project startup and shutdown. After consultation with IDFG and FWS, COG should develop an appropriate ramping rate that would minimize the stranding of invertebrates and fish and the loss of invertebrates through catastrophic drifting.

4.2.2.4.3. Unavoidable Adverse Impacts

During construction, increased levels of suspended solids and excavation of the substrate would reduce periphytic cover and benthic invertebrate populations and would cause the displacement or loss of fish downstream of the proposed project. These effects would be limited to the duration of the construction period, plus the time required for recolonization after construction was completed.

Long-term unavoidable adverse impacts would include the following: (1) loss of habitat for riverine fish in the proposed reservoir; (2) fish mortality associated with passage through the project turbines; (3) loss of habitat for macroinvertebrates and for fish in the 2 mile-long bypassed reach; and (7) reduced upstream movement of fish caused by the construction of the weir.

4.3 TERRESTRIAL ENVIRONMENT

Impacts to wildlife from construction of each of the proposed projects would include the following: (1) the permanent loss of wildlife habitat and associated wildlife populations in areas occupied by project structures or impoundments; (2) the temporary loss of wildlife habitat in staging areas and other areas cleared for construction; (3) the short-term disturbance of resident and migratory species in the project areas and nearby areas caused by increased noise levels, human activity, dust and exhaust emissions, and competition for suitable habitat during the construction period; and (4) the creation of temporary and permanent barriers to wildlife movement.

The most important loss would be the loss of riparian habitat because of its scarcity on a regional and national level, its precarious future, and its value to wildlife. The importance of riparian ecosystems to wildlife can be attributed to specific biological and physical features, including these: the predominance of woody plant communities; the presence of surface water and abundant soil moisture; the diversity and interspersion of habitat features; and the distribution of habitat into long corridors that provide protective pathways for wildlife migration and wildlife movements between habitats (Brinson et al., 1981). Studies have shown that wildlife species use riparian habitat substantially more than other types of habitat (Thomas et al., 1979a; Stevens et al., 1977; Davis, 1977). Mule deer use the riparian zone disproportionately during the spring and summer because of the favorable microclimate (Thomas et al., 1979b). The survival of healthy fawns reguires the easily digestible foods found in the riparian zone (Wallmo, 1981).

Under natural conditions, the low-lying land adjacent to the river is inundated periodically by flood discharges. Flood discharges that submerge portions of the floodplain can be key events in maintaining riparian habitats. Floodplain communities are often characterized by a high degree of primary biological production because growth may be stimulated by nutrients that are introduced when silts are deposited on the banks during floods. Removal of silts containing nutrients and toxic materials may also serve the function of improving water quality in the river. In the Snake River, upstream impoundments have already changed the quantity and timing of flood events. Because flood events are reduced in magnitude and wetland communities are limited in area, periodic inundation is a minor component of wetland ecosystems in the study area. Some silts are presently removed from the river by terrestrial vegetation during high flows, and a minor reduction in water quality of the Snake River during high flows would occur in the bypassed reaches of the proposed projects if flooding of riparian vegetation is reduced. Some encroachment of riparian vegetation in the bypassed reaches would occur with

time, and the function of wetland vegetation in removing suspended soils would increase as vegetation was reestablished. In general, the loss of wetlands associated with the development of the projects would have a very minor effect on water quality of the Snake River during high flows.

Upland habitats (shrub-grassland and talus slope) are less productive than riparian habitats, but provide food and cover for raptor prey species and for a variety of game and nongame species. Many species rely on native sagebrush habitats after adjacent agricultural lands are plowed and left barren and there is little cover in the area until the following spring when the crops are planted.

Table 4-1 gives the acreages of riparian, shrub-grassland, and talus-cliff habitats that would be disturbed during construction of the four projects. For riparian and shrub-grassland habitats, the vegetation disturbed either would be permanently lost or would require a significant time for reestablishment because of the nature of the soil and climatic conditions. In addition to the vegetation directly affected by construction of the proposed projects, riparian vegetation within some reaches of the river could be affected by reduced flows. Although varying amounts of riparian vegetation are found along the Snake River within the study reach, the Auger Falls Project is the only project of the four that has significant riparian vegetation within the proposed bypassed reach.

Table 4-1. Acreages of major natural vegetation types that would be disturbed by the four proposed projects and acreages of riparian vegetation to be established as mitigation (Source: the staff).

Project	Vegetative type			Riparian habitat to be established
	Riparian	Shrub-grassland	Talus-cliff	
Milner	6.1	44.7	3.6	18.2
Star Falls	21.5	46.7	3.8	27.0
Twin Falls	-	-	-	not specified
Auger Falls	10.4	25.5	-	6.5 1/
Total	38.0	116.9	7.4	51.7

1/ An estimated 6.5 acres of wetland habitat would likely become established in the project area.

Because of the importance of riparian-wetland habitat, the staff recommends that each applicant, after consulting with the appropriate agencies, prepare a detailed, riparian-wetland habitat mitigative plan. The mitigative goal of each applicant should be to match the structural and functional relationships of the natural habitat as closely as possible. The plan should provide details of location of the mitigation areas, habitat development,

selection and sources of plant species, irrigation and fencing needs, management recommendations, provisions for monitoring and evaluating the success of the mitigation, and contingency measures to be used if revegetation does not meet the goals. The the goals. The plan should include construction procedures for minimizing the disturbance of existing riparian vegetation wherever possible. Full mitigation for the loss of wetland-riparian habitat would be consistent with the President's Executive Order 11990 on protection of wetlands.

Each acre of lost riparian-wetland habitat should be replaced with at least 1.25 acres of habitat. This ratio is necessary because reestablishment would not be completely successful, because of the 10- to 20-year lag time before the reestablished vegetation would provide wildlife habitat comparable to the lost habitat, and because of the poorer quality, in terms of structure and shape, that would characterize the reestablished vegetation. Where necessary, all mitigative areas should be fenced, to exclude livestock grazing, which can reduce the quality of riparian vegetation (Behneke and Raleigh, 1978).

The staff also recommends that each applicant, after consulting with the appropriate agencies, develop a plan to revegetate disturbed upland areas, with the goal of establishing cover plants and increasing forage production for wildlife. The plan should contain details of timing and method of planting, soil stockpiling, seedbed preparation, irrigation needs, and selection and source of plant species, as well as provisions for monitoring and evaluating the success of the revegetation.

4.3.1 Milner Project

4.3.1.1 Environmental Consequences of Project as Proposed

CC's proposal to develop 18.1 acres of herbaceous and woody riparian wetlands at four sites along the proposed canal (Twin Falls Canal Company and North Side Canal Company, Ltd., 1986) (figure 2-6) would eventually mitigate the loss of 6.1 acres of low quality herbaceous wetlands that would be affected by enlarging the canal. The mitigation would enhance the diversity of the wetland habitat and would increase the diversity of wildlife resources. The staff believes that the mitigation would have a high probability of success because of the presence of a reliable water source.

The project would temporarily disturb 21.7 acres and cause a permanent loss of 26.6 acres of upland habitat. Approximately 2 acres of the upland habitat that would be lost is included in the 20.85-acre BLM isolated tract no. 23. The Sikes Act (Public Law 93-452) provides for the development of habitat management plans, implemented by the BLM and the IDFG through a cooperative

agreement, for these isolated tracts. Tract no. 23 has been fenced since 1977 to protect the vegetation from overgrazing. The future wildlife potential of this isolated tract would be slightly reduced with the loss of the 2 acres.

Reduced flows from Milner reservoir at Milner dam would reduce ice-free waterfowl resting habitat between the dam and Milner Bridge during the winter months. Based on 1962 to 1981 flow records for the Snake River immediately below Milner dam, flows would be reduced to CC's proposed minimum flow release of 58 cfs during 35 percent of the time in December, 32 percent of the time in January, and 29 percent of the time in February. During reduced flows, the river would be restricted to a 50-foot-wide channel, with depths of less than 2 feet (Cochnauer, 1979), reducing waterfowl habitat above Milner Bridge by about 5 acres. If the flow is released from both ends of the dam, two pools below the dam would be maintained for waterfowl. Impacts would be of minor significance because of the low use of the Snake River between Milner dam and Milner Bridge by waterfowl. Since waterfowl seldom use the fast water in the canyon reach below Milner Bridge, reduced wintertime releases would have minimal impacts (figures 3-11 and 3-12). A 3-acre increase in surface water caused by forebay construction and canal enlargement would provide waterfowl resting habitat during milder winters when the water would not freeze, but would not offset habitat losses during severe winters.

The small amount of waterfowl nesting and brood habitat near the canal would be lost; the new wetland habitat and the proposed placement of goose nesting structures would provide new waterfowl nesting opportunities which would compensate for any losses. Krohn and Bizeau (1980) reported that goose nesting structures increased nesting success by providing secure nest sites.

Electrocution of large raptors and other large birds that perch on electric conductors is a concern, especially in the flat, treeless valleys of western deserts that typifies the study reach (Benson, 1982). The proposed 138-kV transmission line would not pose a hazard to large raptors because the spacing between the conductors makes it difficult for the birds to touch more than one line at a time. Transmission lines with capacities greater than 69 kV rarely are electrocution hazards to large raptors because of the wide spacing between conductors (Raptor Research Foundation, Inc., 1981; Ansell and Smith, 1980).

The proposed earth and rock canal with gradually sloping banks would allow relatively easy escape by deer and other mammals that may inadvertently enter the canal, but would still pose a hazard to fawns and yearling deer (Lathum and Verzuh, 1971). Deer mortality in the existing canal has not been reported. Deer mortality in the expanded canal is expected to be negligible.

CC's construction of platforms for ospreys and artificial burrows for burrowing owls could enhance use of the area by these species; Van Daele and Van Daele (1982) and Olenick (1987) report the success of these measures in Idaho.

4.3.1.2 Environmental Consequences with Staff-recommended Mitigation

To reduce long-term impacts to wildlife, CC should revegetate the 21.7 acres of disturbed upland habitats with plant species beneficial to wildlife. CC also should also file a final wetlands-riparian habitat mitigative plan that considers providing feeding and resting areas for geese.

The project reach between Milner Bridge and the proposed powerhouse is suitable raptor nesting habitat, but no nesting surveys have been conducted. Therefore, construction of the powerhouse and penstock should be prohibited from February 1 to June 1, unless a survey shows that no raptor nesting would be affected.

CC should consult with the appropriate agencies to determine the final design and location of goose-nesting structures, osprey platforms, and burrowing owl burrows.

CC's implementation of the recommended measures would reduce terrestrial impacts to a low level.

4.3.1.3 Unavoidable Adverse Impacts

The project would cause the loss of 26.6 acres of upland wildlife habitat and the loss of associated wildlife populations. Local wildlife populations would be disturbed during the 2-year construction period. A 5-acre loss of winter waterfowl resting habitat would occur during low-flow years.

4.3.2 Star Falls Project

4.3.2.1 Environmental Consequences of Project as Proposed

The project would result in the loss of 21.5 acres of riparian wildlife habitat. Wildlife inhabiting the lost habitat would be significantly affected for at least 10 to 20 years until the proposed replacement habitat becomes developed. Approximately 5,000 breeding and 500 wintering birds, primarily songbirds, would be lost. Mammalian predator species, such as the coyote and skunk, would be reduced by a loss of denning sites and a reduced prey base. Deer populations would be slightly reduced by the decrease in food and cover. Under the worst conditions, about 100 to 300 pheasant would be lost during severe winters.

Implementation of the proposed mitigative plan (CH_2M Hill 1985) would result in the development of 27 acres of wetland-riparian vegetation to replace the loss of 21.5 acres. Riparian ecosystems are very complex habitats, so it is likely that the structural diversity of the replaced communities would be lower than that of the lost vegetation. Further, the linear nature of the lost vegetation would not be replaced. A narrow band of vegetation, extending for about 3.4 miles on both sides of the river, would be replaced by six sites, varying from 0.3 acre to 15 acres; the majority of the replacement habitat would be located away from the river, 15 acres on the canyon rim downstream from the project and 5.8 acres at an upland site near the proposed dam. This loss would reduce the extent of the land-water interface, the amount of edge habitat, and the degree of interspersion of different habitat types. The interface between stream and woody plant communities may be one of the greatest values to wildlife of riparian habitats (Brinson et al., 1981). The above factors would result in a long-term loss in wildlife species diversity. The value of the riparian zone as a dispersal and migration corridor for wildlife, which is especially important in arid areas (Wauer, 1977), would also be reduced. A location suitable for riparian strip development has not been identified.

The replacement of the lost riparian vegetation would not be totally in kind. The small isolated wetlands formed from spring-seeps, and containing lush growth of watercress, would be lost as a result of canal construction and would not be replaced.

There is a certain degree of uncertainty in the success of any large-scale wetland habitat mitigative plan. The development of the 15-acre woody riparian and herbaceous wetland complex (figure 2-7) would have a high probability of success because of the existence of a natural water source. Revegetation of large areas of riparian vegetation (about 8 acres) has not been well documented in Idaho, although success in other arid areas have been reported (Anderson and Ohmart, 1979). A certain amount of plant mortality would be expected. The replacement of 5.5 acres of habitat beyond that which was lost, along with a long-term monitoring plan, would enhance the success of the mitigative plan.

An additional factor that would affect the potential success of the wetland mitigation is the level of existing and future human disturbance near the mitigative sites in the vicinity of the proposed dam and proposed power canal. Recreationists and sightseers could trample and destroy the vegetation (Manning, 1979), and could degrade the value of the wildlife habitat. Nearby human activity also could disturb the feeding and breeding activities of wildlife populations (Boyle and Sampson, 1983; Bart, 1977).

In summary, the proposed riparian habitat mitigative plan would provide substantial benefits to local wildlife populations. The staff believes, however, that because of a reduction in the linear nature of the riparian communities, some uncertainty in the success of the mitigation, and human disturbance, there would be a net reduction of wildlife value.

Upland habitat, such as that at Star Falls, is extremely limited within the canyon area between Milner dam and Murtaugh Bridge because of the steep slopes of the canyon. In the project area, a shelf on both sides of the river allows for the development of shrub habitat. This habitat, characterized by mature, moderately grazed sagebrush, provides good quality wildlife habitat, which serves as a refuge for species that use the surrounding agricultural habitat outside of the canyon during part of the year, and which also provides year-round cover for deer and upland game birds. The project would cause the loss of 50.5 acres of upland habitat. The loss of 50.5 acres would also diminish the amount of habitat for small mammals, an important raptor food source. About 1,500 breeding and 400 wintering birds, primarily songbirds, also would be lost. Further, approximately 10 acres of the lost upland habitat on the north bank is included in the 102.4-acre BLM isolated tract no. J-14. Constructing the proposed project would preclude the future use of the BLM land tract for wildlife improvement through a Sikes Act habitat management plan.

The project area provides waterfowl resting habitat, even during very cold winters. The river also provides an important food source for diving ducks, which feed on fish and invertebrates, and for surface-feeding ducks, which use aquatic food sources when the surrounding agricultural fields are covered by deep snow. The project would flood shallow areas of the river upstream of the dam, making a 3.4-mile-long stretch of river less attractive for foraging by geese and surface-feeding ducks. Diving ducks, however, likely would use the deeper water for resting, and were a suitable food supply to develop for feeding. During winters when both low flows and cold temperatures occur, which would happen 1 out of every 5 years, the reservoir would freeze, eliminating 3.4 miles of resting and foraging habitat for waterfowl and fish-eating birds; as many as 800 ducks and geese would be forced to use the remaining open water in the basin. Since shallow water and ice-free habitat are likely to be limited, the loss of these habitats would increase competition for the remaining open water and for the use of more marginal habitats. Because waterfowl make little use of the 0.5-mile-long bypassed reach, the effect of reduced flows in this reach would be minimal.

It is important to note the potential loss of habitat now used by 5 to 10 white-winged scoters, a diving duck species that feeds on crustaceans, aquatic insects, fish, and aquatic plants. During the winter, the scoter is abundant along the Atlantic and Pacific coasts, but is a casual visitor to portions of the United States from the interior of the country south to Arizona, New Mexico, south Texas, and the Gulf Coast (American Ornithologists' Union, 1983). Although the loss of suitable scoter habitat would not be biologically significant, the species is of interest because it is scarce in Idaho.

Increased water levels upstream of the proposed dam would cause the loss of at least 10 pairs of nesting mallards. The creation of 10 to 15 islands in the reservoir, with suitable nesting and brood habitat, would adequately mitigate the loss of waterfowl nesting opportunities. Waterfowl nesting islands are important because of the high nesting densities and high nesting success associated with them (Schnick et al., 1982). These islands provide security from terrestrial predators and from disturbance, and have a high ratio of water edge to land mass (Hammond and Mann, 1956). Many nongame species would benefit from the island development. The flooding of existing shoreline and riparian communities upstream of the proposed dam probably would prevent the use of these zones by beaver and river otter because of a lack of a food source and den sites.

The Snake River is a migration corridor for waterfowl and raptors. The erection of a transmission line across the Snake River, downstream of Star Falls, would produce a small but undeterminable amount of avian mortality from birds' collisions with transmission line towers, conductors, and shield wires. Birds would be most vulnerable during periods of low visibility and inclement weather (Anderson, 1978). Birds with low maneuverability, such as waterfowl, herons, and other large species, are more susceptible. Thompson (1978) summarized several studies and reported collision rates of 0.01 to 0.05 percent; although these studies are not directly applicable to this project, they provide insight on the magnitude of the problem. The small amount of potential waterfowl mortality that would result from collisions with the transmission lines is not expected to be biologically important (Faanes, 1984; Beaulaurier, 1981). Olendorff and Lehman (1986) do not believe that collisions with transmission lines have discernible effects on raptor populations. Because numerous existing transmission lines cross the Snake River in the study reach, waterfowl and raptors probably might be conditioned, to a certain extent, to the presence of any new lines. The proposed 138-kV transmission line would not pose an electrocution hazard to large raptors (Raptor Research Foundation, Inc., 1981; Ansell and Smith, 1980).

The powerhouse and canal would be built within 500 feet of two red-tailed hawk nests, one prairie falcon nest, and one great-horned owl nest. Construction activities can interfere with raptor courtship, nest building, incubation, and foraging (Raptor Research Foundation, Inc., 1981). Raptors tolerate the least disturbance during egg-laying, but more so after the eggs hatch (Call, 1979). The net result of such disturbance could be loss in productivity and lower recruitment of young into the population. Several researchers have recorded evidence that human disturbance lowers productivity and causes raptors to abandon nests (Swenson, 1979; Call, 1979; Bednarz, 1984). In contrast, other researchers have noted great tolerance to disruptive activities (White and Thurlow, 1985; Anderson et al., 1986). Raptors are more tolerant of human presence when they are exposed to people but not harassed by them (Newton, 1979), or when disturbances are of a steady, predictable nature (Bednarz, 1984). The three raptor nests would be susceptible to disturbance during the 2-year construction period. During this time, the raptors might abandon their nests. After project construction, the loss of foraging habitat, the increased recreational use, and the closeness to project structures might lead to long-term losses in raptor productivity. It is unknown whether alternative nest sites that would be better protected from human disturbance are available outside the project area.

4.3.2.2 Environmental Consequences with Staff-recommended Mitigation

To minimize long-term impacts to wildlife, B&C should prepare a detailed revegetation plan. B&C also should prepare a final riparian habitat plan, which includes necessary fencing and other measures to protect wetland areas from human disturbance and which maximizes the degree of interspersion of habitat types.

To offset in part the losses of the wildlife values of the lost upland habitat and the losses of the potential wildlife management opportunities on the BLM isolated tract, B&C should develop a plan to enhance 10 acres of upland wildlife habitat in the project vicinity. In the plan, B&C should concentrate on use of dryland and irrigated plantings to produce escape and winter cover for pheasants.

B&C should prepare, after agency consultation, a detailed design and construction plan for the proposed island development. The design should follow, where possible, the construction specifications described by Giroux (1981), to maximize waterfowl production.

Measures are available to increase the visibility of the transmission line to reduce bird strikes and mortality (Thompson, 1978). Measures, such as orange aviation markers, should be incorporated into the design of the transmission line.

Blasting is the activity most likely to disturb nesting raptors. All blasting should be prohibited from February 1 through June 1 to protect nesting raptors.

Even with implementation of the recommended mitigative measures, and B&C's proposed mitigative measures, the impacts to terrestrial resources would be substantial.

4.3.2.3 Unavoidable Adverse Impacts

The project would result in the loss of 50.5 acres of upland habitat and the associated wildlife populations. Local wildlife populations would be disturbed during the 2-year construction period. Wildlife associated with the lost riparian habitat would be impacted until replacement habitat is reestablished. The value of the riparian habitat for wildlife and the use of the riparian corridor for migration would be reduced. Winter waterfowl use in a 3.4-mile-long stretch of the Snake River would be reduced. Four nesting pairs of raptors would be disturbed and possibly lost. A small amount of bird mortality from collision with the transmission line would result. The future management of about 10 acres of a BLM isolated tract for wildlife would be precluded.

4.3.3 Twin Falls Project

4.3.3.1 Environmental Consequences of Project as Proposed

Local wildlife populations, especially the nearby pair of nesting golden eagles, would experience limited, short-term impacts as a result of blasting. The proposed vegetative plantings at Vinyard Creek would enhance wildlife populations that depend on riparian communities.

4.3.3.2 Environmental Consequences with Staff-Recommended Mitigation

To reduce the likelihood that the pair of nesting golden eagles would abandon their nest, all blasting should be prohibited during the critical phase of the nesting cycle (Section 4.1.4.2.1), unless a survey shows that the nest is not being used. Snow (1973) noted that prohibiting blasting from February 1 to June 1 should protect the eagle nesting.

Implementation of the staff-recommended mitigative measures would reduce impacts to wildlife to a minimal level.

4.3.3.3 Unavoidable Adverse Impacts

Local wildlife populations would be disturbed during the 2-year construction period.

4.3.4 Auger Falls Project

4.3.4.1 Environmental Consequences of Project as Proposed

The project would cause the loss of 10.4 acres of riparian habitat, reducing riparian habitat in the project vicinity by approximately 30 to 40 percent. This well-developed habitat is particularly important to deer, pheasant, and nongame birds. About 25.5 acres of upland habitat would be lost. The loss of existing vegetation, partially offsetting the effects of the project on wildlife.

The significant riparian vegetation within the proposed bypassed reach, next to the river, could be affected by reducing flows by about 40 to 50 percent during the summer. The reduced flows could change the extent of riparian growth, the community structure, and the productivity.

At the Auger Falls site, the primary factors controlling the distribution of riparian vegetation are streamside slopes, presence of suitable soils, seepage from springs, and seasonal river flows. Because of the complex interactions involved, it is difficult to predict the precise impact on riparian vegetation caused by reducing flows within the bypassed reach, but some observations can be made about the probable impacts at the site. In general, the vegetation downstream of the abandoned bridge would be less affected than the vegetation between the bridge and the proposed diversion site. Below the bridge, the slopes are steep, and except for a narrow band of willows, most vegetation is perched on a natural bench above the river. This vegetation is supported by springs and seepage from the north canyon wall and would not be affected by reduced flows. With reduced flows, and possibly with more suitable habitat, the sparse fringe of willows may respond by encroaching into the river channel (figure 3-10).

Above the abandoned bridge, slopes are more gradual, and riparian vegetation appears to be more directly influenced by river flows. Although the lower margin of riparian growth is adversely affected by flooding and scouring, this area supports the most well-developed riparian vegetation within the bypassed reach; here, the ultimate effect of reduced flows is more uncertain. With implementation of more stable flows during the growing season, the riparian community may expand into the river channel, but productivity and vigor of this expanded riparian community may be diminished by flooding and channel scouring during spring run-off. Further, the portions of the existing riparian community farthest from the river may be stressed by reduced water availability during the growing season. To what extent the stress would result in the loss of riparian growth is difficult to predict, but some changes in community structure are likely.

COG's proposal to manage an existing 2-acre pond and to construct an additional 2-acre pond would benefit nesting waterfowl. Shallow ponds, such as the proposed ponds, are ideal for surface-feeding ducks (Linde, 1969). The development of wetland vegetation around the margins of the ponds also would benefit deer, pheasant, and other wildlife species that rely on wetland vegetation.

The project would cause the loss of about 4 acres of ice-free waterfowl resting habitat, primarily in the vicinity of the diversion dam, during low-flow years when the minimum flow releases drop to 350 cfs; this loss is expected to occur about 1 in every 4 years. COG's proposal to install aeration systems at both 2-acre ponds would substantially mitigate the loss of waterfowl resting habitat during winter months. Compressed air would be released from the pond bottom through a perforated hose, and the rising air bubbles would carry slightly warmer bottom water to the surface (Smith et al., 1975). Aeration systems have been effective in maintaining ice-free areas in ponds and lakes (Patriarche, 1961; Anonymous, 1969; Wirth, 1970). The success of the pond and aeration system is enhanced because of the existence of a reliable power source, the small size of the ponds, and the opportunity for frequent monitoring of equipment to ensure the system's functioning as designed.

The 1.6-mile-long, concrete-lined canal would block and alter movement of deer and other mammal species, resulting in increased energy expenditure and stress. This would be especially important to the survival of pregnant does, weak deer, and fawns. The canal also would reduce available deer habitat; in particular, it would isolate a 250-acre parcel of potential deer habitat between the power canal and the river, making access to this parcel difficult. Most of this 250-acre parcel consists of abandoned waste water settling ponds, although there is important riparian vegetation near the diversion structure. These wastewater ponds are slated to be reclaimed within 5 years, and would create favorable habitat for deer and other wildlife. Further, the deer's access to the river for watering immediately downstream of the diversion structure would be blocked. The three proposed roadway crossings over the canal probably would provide some access to the 250-acre parcel by deer; the extent of deer use of the crossings cannot be determined.

Because of the potential importance of the area between the canal and the river for deer, the staff expects that deer would attempt to cross the canal to reach the habitat. Although the proposed roadway crossings would provide some passage by deer over the canal, the canal would still pose a hazard to deer. The steep side slopes or vertical walls, combined with slippery surfaces, make escape by deer difficult, and cause injury or mortality (Lathum and Verzuh, 1971). Lathum and Verzuh (1971) note that deer may enter a canal to cross to the opposite side, may jump into a canal when frightened, or may fall into a canal when trying to drink. Deer mortality in the concrete flume of the

nearby Rock Creek Project (FERC No. 6450) has been noted. It is difficult to predict the behavioral response of deer to the canal; accurate estimates of deer mortality therefore cannot be made.

The nests of a red-tailed hawk, a golden eagle, a prairie falcon, and a raven are located between 0.4 and 0.5 of a mile from project construction activities. As in the case of the Star Falls Project, there is a possibility that construction activities would reduce productivity or cause nest abandonment. This golden eagle nest was not abandoned during building of the Rock Creek Project, however, even though construction occurred within 100 feet of the eagle nest; so the birds may be accustomed to human disturbance. Canal construction would eliminate a northern harrier nest. In the long-term, increased access to the project area by recreationists could lead to decreased nesting productivity. The location of the nests high on the canyon walls could make human presence more tolerable to nesting raptors.

Potential collisions of waterfowl and raptors with the transmission line crossing the Snake River would cause a small, but undeterminable, amount of avian mortality (see Star Falls Project). The 138-kV transmission line would not pose an electrocution hazard to large raptors (Raptor Research Foundation, Inc., 1981; Ansell and Smith, 1980).

4.3.4.2 Environmental Consequences with Staff-recommended Mitigation

To reduce long-term impacts to wildlife, COG should develop and implement a detailed plan to revegetate disturbed areas with plant species beneficial to wildlife and to replace lost trees with similar species.

COG should develop and implement a plan to replace the 10.4 acres of riparian habitat that would be lost through project construction, and should consider in the plan the amount of riparian habitat that would develop naturally. As previously discussed, each acre of habitat destroyed should be replaced with at least 1.25 acres of riparian habitat, estimated to be about 6.5 acres. The creation of waterfowl nest and brood habitat should be a priority. In addition, COG should include in the plan provisions for mitigating the project's impacts on riparian vegetation within the bypassed reach. COG's plan for mitigating operational impacts should take one of two approaches: monitoring to determine impacts or determining a reasonable worst-case impact. Under the monitoring approach, COG, after consultation with the agencies, should develop a program to monitor riparian vegetation within the bypassed reach to determine the impacts of project operation, and based on the monitoring results, should propose mitigation to replace lost or adversely affected vegetation. As an alternative, COG, after consultation with the agencies,

should determine a reasonable worst-case impact on riparian vegetation and should incorporate mitigation for those effects into its plan for mitigating construction-related impacts.

The development of new riparian habitat would substantially mitigate the loss of riparian-associated wildlife. As discussed for the Star Falls Project, distribution of the habitat in clumps away from the river, uncertainty of the success of the mitigative plan, and increased access by recreationists would limit the ultimate success of the mitigation.

COG, after consultation with the agencies, should develop specific details of the design, construction, operation, and management of the wildlife ponds. Final design, maintenance, and monitoring of the aeration system should also be provided. COG should investigate the diversion of warmer water from the canal as a backup measure to ensure that the ponds remain ice-free during the winter months.

Methods of reducing deer losses in canals can be separated into two categories: those that prevent deer from entering canals and those that provide an escape route, once a deer enters a canal. Escape ramps, in combination with deflectors, have proven effective in reducing deer losses (Miller, 1986). Fences, when properly maintained, are more effective, but are more expensive (Seaman, 1977). Fencing is unnecessary if escape ramps are effective. To minimize the mortality of deer, COG should install two escape ramps and deflectors in the canal. COG should monitor the canal regularly to determine if deer mortality is a factor. If the escape ramps are ineffective, COG should fence the canal.

COG should also monitor deer use of the three roadway crossings over the proposed canal and any other crossings that may be required for human access across the canal to ensure that deer have adequate access to the 250-acre parcel between the canal and the river. COG should install additional canal crossings where needed to minimize the effects on deer.

COG's proposal to install orange aviation markers on the transmission line would reduce the potential for birds to collide with the section of the proposed transmission line that would cross the Snake River. COG should file a plan outlining the spacing of the markers and any other measures necessary to protect bird species.

Blasting should be prohibited from February 1 through June 1 to protect nesting raptors.

COG's implementation of these recommended measures should reduce impacts to terrestrial resources to a moderate level.

4.3.4.3 Unavoidable Adverse Impacts

The project would cause the permanent loss of 25.5 acres of upland wildife habitat and the loss of associated wildlife populations. Wildlife associated with the lost wetland habitat would be affected until replacement habitat is reestablished. The value of the riparian habitat for wildlife would be reduced by the increased recreational use of the project area. A small amount of mortality from birds colliding with the transmission line would be probable. Local wildlife populations would be adversely affected and raptor nesting would be disturbed during the 2-year construction period.

4.4 SOCIOECONOMIC FACTORS

4.4.1 Milner Project

4.4.1.1 Environmental Consequences of Project as Proposed

The proposed project construction would entail a 20-month period of project-related activities that would produce noise, dust, vehicle and machinery exhaust emissions, and some additional truck and automobile traffic along U.S. Route 30 between the cities of Twin Falls and Rupert. The proposed project would not displace any residences or business establishments and would not directly affect cropland.

Based on comparable projects, a maximum of 120 and an average of 80 onsite construction personnel would be employed. Assuming that none of the three other proposed hydroelectric projects under consideration in this EIS are constructed, most of the construction workers would be permanent residents of Twin Falls, Jerome, Cassia, or Minidoka County (the four-county area). Some workers would commute daily from Lincoln, Gooding, Camas, Blaine, Power, Elmore, and Owyhee Counties. A small percentage (probably less than 20 percent) of the total onsite workforce would be hired from the Boise, Idaho Falls, or Salt Lake City areas. These workers would be weekly commuters residing in a motel room or apartment in the Burley-Rupert area during the workweek and returning to their permanent residences on weekends. Project construction, therefore, would not induce the inmigration of more than a few families with school-age children to the project area, and there would not be any discernable impacts to local governments serving the four-county area.

The expenditures of construction workers at motels, eating and drinking places, gasoline service stations, and other local business establishments would represent a beneficial, albeit short-term impact. This additional spending could stimulate some minor, secondary employment in the local retail trade and services sectors, thereby benefitting unemployed and underemployed residents of the four-county area.

After the completion of onsite construction, the project would not produce any discernable socioeconomic impacts. Because CC is exempt from the payment of local taxes, the completed facilities would not generate real property taxes.

4.4.1.2 Environmental Consequences with Staff-recommended Mitigation

The staff has not suggested mitigative measures to offset the project's socioeconomic impacts, particularly since the socioeconomic impacts of the project as proposed would be predominantly beneficial.

4.4.1.3 Unavoidable Adverse Impacts

The project would cause an increase of traffic volume on U.S. Route 30 near the project site during construction.

4.4.2 Star Falls Project

4.4.2.1 Environmental Consequences of Project as Proposed

The proposed project construction would entail a 20-month period of project-related activities that would produce noise, dust, vehicle and machinery exhaust emissions, and some additional truck and automobile traffic along U.S. Route 30 between the cities of Twin Falls and Rupert. The proposed project would not displace any residences or business establishments and would not directly affect cropland.

Based on comparable projects, a maximum of 120 and an average of 80 onsite construction personnel would be employed. Assuming that none of the three other proposed hydroelectric projects under consideration in this EIS are constructed, most of the construction workers would be permanent residents of the four-county area. Some workers would commute daily from Lincoln, Gooding, Camas, Blaine, Power, Elmore, and Owyhee Counties. A small percentage (probably less than 20 percent) of the total onsite workforce would be hired from the Boise, Idaho Falls, or Salt Lake City areas. These workers would be weekly commuters residing in a motel room or apartment in the Twin Falls-Jerome or Burley-Rupert area during the workweek and returning to their permanent residences on weekends. Project construction, therefore, would not induce the inmigration of more than a few families with school-age children to the project area, and there would not be any discernable impacts to local governments serving the four-county area.

The expenditures of construction workers at motels, eating and drinking places, gasoline service stations, and other local business establishments would represent a beneficial, albeit short-term impact. This additional spending could stimulate some minor, secondary employment in the local retail trade and services sectors, thereby benefitting unemployed and underemployed residents of the four-county area.

After the completion of onsite construction, the project's socioeconomic impacts would be limited to the payment of yearly real property tax revenues to Twin Falls County, and to the school district and other special districts in which the project is located. B&C estimates that these taxes would total approximately $225,000 per year.

4.4.2.2. Environmental Consequences with the Staff-recommended Mitigation

The staff has not suggested mitigative measures to offset the project's socioeconomic impacts, particularly since the socioeconomic impacts of the project as proposed would be predominantly beneficial.

4.4.2.3 Unavoidable Adverse Impacts

The project would cause an increase of traffic volume on U.S. Route 30 near the project site during construction.

4.4.3 Twin Falls Project

4.4.3.1 Environmental Consequences of Project as Proposed

The proposed project construction would entail a 2-year period of project-related activities that would produce noise, dust, vehicle and machinery exhaust emissions, and some additional truck and automobile traffic along U.S. Route 30 between the cities of Twin Falls and Rupert. The proposed project would not displace any residences or business establishments and would not directly affect cropland.

Based on comparable projects, a maximum of 100 and an average of 60 onsite construction personnel would be employed. Assuming that none of the three other proposed hydroelectric projects under consideration in this EIS are constructed, most of the construction workers would be permanent residents of the four-county area. Some workers would commute daily from Lincoln, Gooding, Camas, Blaine, Power, Elmore, and Owyhee Counties. A small percentage (probably less than 20 percent) of the total onsite workforce would be hired from the Boise, Idaho Falls, or Salt Lake City areas. These workers would be weekly commuters residing in a motel room or apartment in the Twin Falls-Jerome area during the workweek and returning to their permanent residences on weekends. Project construction, therefore, would not induce the inmigration of more than a few families with school-age children to the project area, and there would not be any discernable impacts to local governments serving the four-county area.

The expenditures of construction workers at motels, eating and drinking places, gasoline service stations, and other local business establishments would represent a beneficial, albeit short-term impact. This additional spending could stimulate some minor, secondary employment in the local retail trade and services sectors, thereby benefitting unemployed and underemployed residents of the four-county area.

After the completion of onsite construction, the project's socioeconomic impacts would be limited to the payment of yearly real property tax revenues to Twin Falls County, and to the school district and other special districts in which the project is located.

4.4.3.2 Environmental Consequences with Staff-recommended Mitigation

The staff has not suggested mitigative measures to offset the project's socioeconomic impacts, particularly since the socioeconomic impacts of the project as proposed would be predominantly beneficial.

4.4.3.3 Unavoidable Adverse Impacts

The project would cause an increase of traffic volume on U.S. Route 30 near the project site during construction.

4.4.4 Auger Falls Project

4.4.4.1 Environmental Consequences of Project as Proposed

The proposed project construction would entail an 18-month period of project-related activities that would produce noise, dust, vehicle and machinery exhaust emissions, and some additional truck and automobile traffic in and near the city of Twin Falls and Jerome. The proposed project would not displace any residences or business establishments and would not directly affect cropland.

Based on comparable projects, a maximum of 300 and an average of 150 onsite construction personnel would be employed. Assuming that none of the three other proposed hydroelectric projects under consideration in this EIS are constructed, most of the construction workers would be permanent residents of the four-county area. Some workers would commute daily from Lincoln, Gooding, Camas, Blaine, Power, Elmore, and Owyhee Counties. A small percentage (probably less than 20 percent) of the total onsite workforce would be hired from the Boise, Idaho Falls, or Salt Lake City areas. These workers would be weekly commuters residing in a motel room or apartment in the Twin Falls-Jerome area during the workweek and returning to their permanent residences on weekends. Project construction, therefore, would not induce the inmigration of more than a few families with school-age children to the project area, and there would not be any discernable impacts to local governments serving the four-county area.

The expenditures of construction workers at motels, eating and drinking places, gasoline service stations, and other local business establishments would represent a beneficial, albeit short-term impact. This additional spending could stimulate some minor, secondary employment in the local retail trade and services sectors, thereby benefiting unemployed and underemployed residents of the four-county area.

After the completion of onsite construction, the project's socioeconomic impacts would be limited to the payment of yearly real property tax revenues to Twin Falls County, and to the school district and other special districts in which the project is located. COG estimates that these taxes would total approximately $375,000 per year.

4.4.4.2 Environmental Consequences with Staff-recommended Mitigation

The staff has not suggested mitigative measures to offset the project's socioeconomic impacts, particularly since the socioeconomic impacts of the project as proposed would be predominantly beneficial.

4.4.4.3 Unavoidable Adverse Impacts

The project would cause an increase of traffic volume on U.S. Route 30 near the project site during construction.

4.4.5 Socioeconomic Impacts of Staff-proposed Minimum Flows

Five irrigation canal companies currently divert water from Milner reservoir. The two largest water distributors are discussed below.

Twin Falls Canal Company, which has 110 miles of primary canal, delivers water to approximately 202,700 acres in Twin Falls County. Because the company has the water rights to divert most of the natural flow at Milner, it has not had to purchase much upstream water storage at American Falls, Palisades, or Jackson reservoirs.

North Side Canal Company distributes water to approximately 170,000 acres of agricultural land located mainly in Jerome County. Because North Side Canal Company has the right to divert only a relatively small share of the natural flow at Milner, it has acquired substantial (886,000 acre-feet) of upstream storage. During years with a small snowpack and, consequently, low reservoir levels upstream, North Side Canal Company must reduce its water deliveries. The company notifies its water purchasers before the planting season regarding the expected reduction in irrigation water. In response, area farmers usually alter their mix of crops; they tend to reduce acreage devoted to crops requiring irrigation water late in the growing season (for example, corn for canning and alfalfa) and increase acreage of crops that are harvested earlier in the growing season (spring wheat, barley) (table 3-12). Of course, the response of any given farmer depends on several factors, including contractual obligations to sell sugar beets, potatoes, beans, and other products to food processors; market prices soil types; yearly debt service payments; and alternative sources of income.

Because of evaporation and leakage, considerably more water is diverted at Milner than the amount actually delivered to area farmers. For example, North Side Canal Company diverts an average of 6 acre-feet of water from Milner to irrigate 1 acre of farmland for one season, but only 4.7 acre-feet of water is actually delivered to its water users. Moreover, area farmers may be able to operate with reduced water deliveries by spending greater amounts on more efficient irrigation equipment.

The previous discussion indicates that the magnitude of economic loss resulting from reduced deliveries of irrigation water is extremely difficult to predict. During the past few years, depressed market prices for wheat, barley, beans, and silage, together with high fixed annual debt service payments, have caused area farmers to experience declining revenue and income. Limited snowfall during the winter 1986-87, with resultant lower storage at upstream reservoirs, added to their problems.

The establishment of a minimum instream flow below Milner dam during the nonirrigation season would not affect the areas's agricultural sector. The establishment of minimum flows downstream of Milner dam during the irrigation season could affect irrigation diversions, depending on their magnitude and timing. During May and June of a normal water year, inflow to Milner reservir usually is sufficiently large to satisfy irrigation water requirements and to provide relatively high instream flows downstream; therefore, the requirement to provide instream flows below Milner dam during May and June to allow whitewater boaters the use of this reach of the Snake River would not necessitate a reduction in diversions for irrigation. During a below normal water year, however, this instream flow requirement could adversely affect the availability of water for irrigation. As discussed above, because various factors affect the farm sector, the staff cannot accurately predict how this minimum flow requirement would affect farm revenues and income.

4.5 LAND USE AND RECREATIONAL RESOURCES

The existing use of land adjacent to the Snake River is unlikely to change because of any of the proposed hydroelectric developments. However, the individual projects could affect sites that have been identified or designated as having wildlife habitat, historical, or public use values. These project-specific impacts are addressed in the appropriate sections of this document. In general, since hydropower development within the gorge is not prohibited under the applicable zoning authorities and since present uses of land outside the gorge would be unaffected by development of the proposed hydroelectric projects, it appears that overall land use would not be significantly impacted.

Each of the proposed projects has the potential to enhance public access to the Snake River in areas where such access is relatively limited. However, the operation of the proposed projects would alter the existing recreational environment, and in some cases, would substitute impoundments as the focus of public use in lieu of flowing water. In contrast to the recreational opportunities provided by the flow of a major river, the opportunities for recreational use of impoundments in this part of Idaho are relatively abundant. Therefore, the value of the enhanced access, at least for water-based activities, would be offset to some extent by the loss of river recreational opportunities.

Because of water management policies in Idaho that limit flows from Milner dam during the irrigation season, the Snake River in the study reach is a significant recreational resource that provides recreational opportunities only for limited periods of the year. The opportunities are most limited during the summer peak recreational use season. In general, because of these conditions, the development of hydropower projects on the Snake River should provide for recreational mitigation focused on river-based activities during the periods when the river flows are available, and should provide project-related recreational enhancements to support public use during other times of the year.

The recreational flows in the Snake River throughout the study reach are largely dependent upon the flows released from Milner dam. Below the study reach, near the Thousand Springs area, the inflow from springs is sufficient for recreational boating. The flows needed to maintain an adequate fishery resource in the study reach are quite different from the flows needed to maintain or enhance the whitewater boating use of the area.

The preferred range of flows for whitewater boating use is generally between 5,000 to 15,000 cfs, although some sections of the study reach can be run at somewhat lower flows. The exact range is not established, particularly for the proposed bypassed

reaches for the Milner and Star Falls Projects, due to a general lack of user experience on these sections over the range of available flows.

The ideal situation, considering only recreation use, would ensure that adequate flows are available for all potential users at least every weekend during the peak recreational months of June, July, and August, and that such flows would be also available at times during the months of May, September, and October. However, analysis of average flows for the period of record indicates that flows of the magnitude required for whitewater boating are presently available at least 25 percent of the time only during the months of May and June during an average water year. An analysis of the same data indicates that flows around 3,500 cfs may be expected at least 25 percent of the time during October; flows in this range represent the minimums required to navigate the Murtaugh reach, but are probably too low to accomodate any use of the Milner reach.

Based on the above, the only reasonable way to ensure that water is available for recreational use during the peak recreation season is to allocate upstream storage for mitigation, and to require that the flows be released on the weekends. Since the water is presently allocated to irrigators upstream of Milner dam, water availability for mitigation during the summer months would potentially impact the social and economic well-being of a large portion of the Idaho population. Therefore, the potential for mitigation for whitewater boating will only consider the flows available to the applicant for hydroelectric generation at the proposed Milner project. However, because of the unique character of the Milner and Star Falls reaches, and the scarcity of whitewater boating opportunities in south central Idaho, any loss would represent a significant impact on recreational resources.

4.5.1 Milner Project

4.5.1.1 Environmental Consequences of Project as Proposed

The project would adversely impact the whitewater reach located in the 1.6 miles of the river immediately downstream of Milner dam. Although this short turbulent section of continuous whitewater is primarily run by small numbers of expert boaters at high flows, it is an important component of the whitewater boating opportunities provided by the Snake River.

An analysis of the average flows for the period of record indicates that there is a 25 percent probability that flows would exceed project capacity by 5,000 cfs only during the months of May and June, and then by no more than 7,000 cfs. This would be at the bottom of the range of flows used by the whitewater boaters, some of whom have boated this section of the Snake River at flows in excess of 15,000 cfs. Although the flow patterns would change

with wet and dry water years, it appears that operation of the proposed project would virtually eliminate the massive whitewater boating experience that is the hallmark of the Milner section of the Snake River. CC proposes no mitigation for the loss of this resource.

Hunting and fishing opportunities would be reduced in the Milner Project area due to adverse impacts on terrestrial and aquatic resources; with the exception of Milner reservoir, the areas impacted receive little public use.

CC's recreational development plan would do the following: (a) enhance fisherman access at the existing Milner Bridge site; (b) enhance boater use of the launch ramp at BLM's Bicentennial Site on Milner Reservoir; and (c) enhance access to the river for boaters to run the low intensity, 6.5-mile reach of the river between the project powerhouse and Star Falls.

4.5.1.2 Environmental Consequences with Staff-recommended Mitigation

CC should provide partial mitigation for the loss of whitewater boating opportunities resulting from operation of the proposed project by developing a schedule of flow releases of between 5,000 to 15,000 cfs in the bypassed reach for a period of up to 10 days per year during the months of May and June to accommodate whitewater boating. The schedule should provide water on weekend days and holidays during daylight hours for periods not to exceed 10 hours per day. This recommendation is based on the limited availability of adequate flows and the relatively limited numbers of boaters that would likely use the resource.

The exact range of required flows and the schedule should be developed after consultation with the appropriate resource agencies and persons having expertise in whitewater boating on this section of the river, and should recognize the variations possible with wet, dry, and average water years. Any flow release program would require the incorporation of ramping rates to minimize impacts on downstream resources and public safety resulting from a drastic increase in flows over a short period of time.

The staff's recommendations generally establish the upper limits of partial mitigation for the loss of whitewater boating opportunities that can occur at any hour of the day or any day of the week under present conditions when flows are available. The recommendations recognize that much of the available river flow is not presently utilized and would not be utilized in the future, these unutilized flows could be used to generate power.

Primarily, the staff's recommendations establish the magnitude and duration of flows to facilitate economic analysis of the proposed project. However, since it is the foregone generation potential that influences the project economics, any combination of flows and duration of flows would approximate the same mitigation. For example, it is unlikely that flows would need to be provided 10 hours per day, and that for approximately the same foregone generation potential, flows could be provided on 2 days for 5 hours each day.

Accordingly, CC, after consultation with the appropriate resource agencies and the boaters, should develop an ongoing monitoring program that would allow refinements of the mitigative measures, based on actual user data.

The implementation of the staff's recommendations would continue to result in a reduction in whitewater boating opportunities during weekdays, and at other times when sufficient flows might be available on unscheduled days, but are used for generation. Even on these unscheduled days, flows in excess of project capacity would be spilled over Milner dam, and would occasionally be sufficient to allow some boating use.

4.5.1.3 Unavoidable Adverse Impacts

The project would restrict whitewater boating use of the river reach located between the dam and powerhouse.

4.5.2 Star Falls Project

4.5.2.1 Environmental Consequences of Project as Proposed

The project facilities and operation would alter the undeveloped appearance of Star Falls and Caldron Linn. During the periods of the year when flows approximating natural flows are present in the river, vistors to the site can associate with the natural phenomenon and historical events that have made the site worthy of inclusion on the National Register of Historic Places. Regardless of any mitigative measures, the construction of the diversion and intake structures would introduce an artificial element in the view of the falls that goes beyond impacts on the visual resources of the falls alone. The falls, while an important visual resource, cannot be considered apart from the historical context caused by the natural constriction of the river channel. While B & C proposes to release a flow of 160 cfs to maintain some visual focus at the falls, the opportunity to experience the unimpeded, violent action of the Snake River as it swirls through the narrow constriction, over the last remaining sheer drop waterfall on this part of the river, and into the foaming vortex of the pool, would be greatly reduced.

The project would bypass the uppermost of the two rapids located between the project dam and powerhouse. These two rapids (Basalt and Amnesia Falls) represent approximately 10 percent of the major rapids between Star Falls and Twin Falls (figure 3-15) Although the bypassed section of the river would be usable as the start of a Murtaugh trip when flows exceed the capacity of the project by approximately 2,000 cfs or more, the uppermost rapid would be physically altered by construction of the powerhouse and tailrace with undertermined impacts. In addition, the effect of the tailrace discharge on the hydraulic nature of the second rapid (Basalt Falls) is unknown. These changes, combined with reduced flows in the bypassed reach, as a result of project operation, would result in a significant adverse impact on the existing whitewater boating potential of the reach of river between Star Falls and the Murtaugh Bridge.

Hunting, wildlife observation, and fishing opportunities in the project area, would be reduced due to adverse impacts on terrestrial and aquatic resources. Other users of the area would find the undeveloped atmosphere of the area altered by the project facilities and operation.

CC's recreational development plan would enhance facilities and access for whitewater boaters who launch at Murtaugh Bridge, and provide day-use facilities at the project site. However, the facilities would be constructed in an area managed by the BLM for wildlife habitat.

The project reservoir would provide relatively minor flat-water recreational opportunities of a type fairly common in this part of Idaho. The slack water would hinder boaters using the river between Milner and the proposed project dam since, without the surface current, more paddling would be required.

4.5.2.2 Environmental Consequences with Staff-recommended Mitigation

B&C should develop a schedule of flow releases of between 2,000 and 8,000 cfs for a period of up to 20 days per year during the months of May, June, and October to accommodate whitewater boating use of the river between Star Falls and the project tailrace at times when inflows to the project are 2,000 cfs or greater. As with the proposed Milner Project, the exact range of flows that would be needed is unknown. The flow release schedule should provide water on weekend days and holidays during daylight hours for periods not to exceed 10 hours per day. The flow releases should incorporate ramping rates to minimize impacts on public safety and resources in the bypassed reach that could result from an increase in flows over a short period of time.

The availability of flows that could be used for whitewater boating is dependent upon the flows released at the Milner Project.

However, it makes no difference at Star Falls if the flows arriving from Milner have gone through the Milner powerhouse or the bypassed reach. Since the Star Falls area can be boated at lower flows than necessary at Milner, there is a greater degree of freedom in setting the schedule.

As discussed with respect to the Milner Project, the staff's recommended mitigation is also used to facilitate economic analysis of the proposed project. In addition, since it is the foregone generation potential that influences the project economics, any combination of flows and duration of flows would provide approximately the same mitigation.

Accordingly, B&C, after consultation with the appropriate resource agencies and the boaters, should develop an ongoing monitoring program that would allow refinements of the mitigative measures based on actual user data.

The ability to run the rapids in the Star Falls proposed bypassed reach would be adversely affected by changes in bottom structure and alteration of the present hydraulic conditions. However, the remaining portions of the rapids would provide whitewater with sufficient flows. Unfortunately, the project structures would be placed in the route presently used to negotiate this section of the river (along the south side of the channel). Sympathetic construction techniques and facility design enhancements, such as controlled blasting and construction of flow-diverting structures, could provide a suitable route through the remaining rapids. B&C after consultation with the appropriate agencies and boaters, should develop a plan to construct the project to retain or enhance whitewater boating use of the bypassed reach.

4.5.2.3 Unavoidable Adverse Impacts

The project would restrict whitewater boating use of the river reach located between Star Falls and the powerhouse.

The project would physically change a site that has remained essentially undeveloped since the time of the historical events associated with the natural geologic character of the site. Vistors to the site seeking an association with that part of early Idaho history would have to accept the imposition of the project structures on the natural character of the site. Visitors attacted to the visual experience of Star Falls and Caldron Linn would similarly find that the views have been altered by the imposition of manmade structures and the reduction in flows caused by project operation.

4.5.3 Twin Falls Project

4.5.3.1 Environmental Consequences of Project as Proposed

The primary impact on recreational use as a result of increasing capacity of the project is associated with the potential for enhanced public access resulting from construction of the access road to the existing powerhouse area.

Construction of additional generating capacity would disrupt recreational use of the Twin Falls Park because of the movement of heavy equipment, noise, dust, and traffic congestion.

The addition of generating capacity would extend the times when no flow or low flows are spilled over Twin Falls resulting in reduced visual quality for recreationists at the Twin Falls Park (see section 4.6.). However, since the period of peak public use at the project coincides with the traditional periods of lowest flows, the impacts would be most apparent to the relatively few visitors during the fall, winter, and spring when some reduced periods of flows in excess of project capacity would be expected.

4.5.3.2 Environmental Consequences with Staff-recommended Mitigation

IPC should schedule construction activities to minimize conflicts with the public during periods of peak recreational use. No other mitigative measures are recommended, and the environmental consequences would be the same as the proposed project.

4.5.3.3 Unavoidable Adverse Impacts

Construction of the project would disrupt public use at the Twin Falls Park. Project operation would reduce the periods when flows are spilled over Twin Falls resulting in reduced visual quality for recreationists at the project.

4.5.4 Auger Falls Project

4.5.4.1 Environmental Consequences of Project as Proposed

The project would cause reduced flows in a free-flowing section of the Snake River with resultant impacts on fishing opportunities and visual quality (see sections 4.2.2.4 and 4.6.4, respectively). Development of warmwater pond fishing opportunities at the site of the former Bluegill Lake would not adequately mitigate for the loss of these values since the type of fishing and the recreational environment are not comparable. The proposed recreational development would be enhanced by the hydroelectric development.

Opportunities for hunting and wildlife observation would be reduced as a result of adverse impacts on terrestrial resources; this impact would be offset to some extent by the potential enhancement of public access to the area.

The open canal portion of the project would cause hazards for recreationists attempting to gain access to the river, unless crossings are provided. The crossings would also benefit wildlife (see section 4.3.4).

The provision for trail-head parking, and a system of trails to the fishing ponds, the project powerhouse area, and the Rock Creek Project area, would enhance public use opportunities within the canyon. However, the proposed recreational development is generally oriented away from the river. While river-oriented recreational values would be diminished by operation of the project, the river would continue to be a focal point for public use and provide a strong contrast to the surrounding recreational environment on the flood plain. In addition, the placement of the parking lot at the entrance to the project area would require a long hike to the fishing ponds, and correspondingly longer hikes to the other features; the distances involved would discourage public use. Given the existing road system in the area, a requirement that vistors park at the entrance and hike-in to avoid impacts to private landowners is probably not a realistic management goal. off-road recreational vehicles (ORV), especially motorcycles and all-terrain-vehicles, would have no particular problem evading the restrictions. The fact that roads now lead to areas that visitors would be required to hike into, including public land within the canyon, would increase the likelihood that the restrictions on motorized vehicle use would be ignored. However, development of the project would ensure public access to the state and federally-owned lands to which no dedicated access is now provided.

4.5.4.2 Environmental Consequences with Staff-recommended Mitigation

COG should completely revise the plans for recreational development at the project after consultation with appropriate federal and state agencies to provide a better means of public access to the public lands and the recreational enhancements resulting from hydroelectric development.

COG should provide canal crossings that can be utilzed by the public and wildlife; provide in-kind replacement for the public land that would be converted to project purposes.

In summary, these measures proposed by COG would provide some enhancement of public use at the project, but would not provide mitigation for the environmental consequences of the proposed project.

4.5.4.3 Unavoidable Adverse Impacts

The project would reduce opportunities for coolwater angling and recreational activities associated with a free-flowing river environment. A small amount of public land used primarily for public access to the river and hunting would be converted to hydroelectric development.

4.6 Visual Quality

Identifying the impacts of the four proposed projects on the visual resources of the Snake River Basin is a subjective process that involves individual viewer sensitivity and other factors that detemine how people view landscapes.

Components of visual resources typically include stimulants to the senses of smell, sound, sight, and touch and ways that these feelings are affected by landscapes, vegetation, sky conditions, water modifications, cultural modifications, wildlife, and human activity. Some experts use these factors: (1) distance, (2) visual magnitude, (3) slope relative to view, (4) aspect relative to viewer, (5) number of times seen, (6) number of viewers, (7) duration of view, (8) focal point sensitivity, (9) lighting, and (10) seasons. Others use these factors: (1) slope, (2) vegetative pattern and diversity, (3) vegetative screening ability, (4) site recoverability, (5) soil color contrast, (6) landform diversity, (7) waterform diversity, (8) land suitability, and (9) soil erodability. Anderson et al., 1979; Nieman and Futrell, 1979; Forest Service, 1974; Bureau of Land Management, 1980).

The staff used all of these criteria to determine how the proposed projects would alter the visual qualities of the Snake River Canyon, an integral component of the Snake River Basin.

The Snake River Canyon is quite different from the rolling plains above the canyon and along the canyon rim, where farming has changed the land use from a desert to irrigated croplands. Intensive farming has replaced the sparse natural habitat, which offered little cover for wildlife, with habitat that seasonally creates cover for wildlife. In contrast to the gently rolling farmlands above the canyon, the canyon has steep cliffs, talus slopes, whitewater river segments, riparian habitats and a diversity of landforms, parts of which have been officially designated as important to history or as having recreational or visual importance. The steep topography of the canyon could not easily support visual disturbances by the proposed hydropower projects because it would be difficult to screen the expansive projects from view. Visual accessibility is somewhat restricted in the study reaches. The proposed projects would improve access into the canyon and would create new observation sites, but also would subject visitors to the effects of hydropower development.

Since there has been considerable hydropower development in the canyon, the assessment of the impacts of the proposed projects on the visual resources of the canyon requires consideration of mitigative measures proposed by the applicants, and by the staff, and a determination of whether implementing these proposals would significantly alter the visual quality of the canyon.

4.6.1 Milner Project

4.6.1.1 Environmental Consequences of Project as Proposed

At the proposed project site, the Snake River Canyon is natural and undeveloped; building the project would change the character of the canyon in the following ways. The project would adversely affect the views of a small number of recreational boaters who float through the canyon each spring and fall, or whenever water is available. Reduced flows in the bypassed reach would significantly reduce the visual quality of the large whitewater area during certain times of the year. When viewed from the canyon rim, the project's visual impacts would be slight, because the height of the canyon wall would dwarf the proposed powerhouse; the project's, visual impacts when combined with the height of the proposed large superstructure and penstock (figure 3-13) across the face of the canyon wall would be moderate. When viewed from the water level the project's facilities and loss of the whitewater areas would cause moderate impacts.

Visual impacts from the project above the canyon would be moderate, because there are other structures in the area (dams, roads, and canals) and because the additional project facilities would be noticeable only to occasional visitors. The proposed road that would be constructed on top of the new power canal embankment would let visitors see the new project facilities, but visitor usage would be infrequent and would consist primarily of hunters visiting the nearby BLM isolated tracts.

4.6.1.2 Environmental Consequences with the Staff-recommended Mitigation

CC's proposal to reseed areas disturbed by construction would be only a minor remedy for the project's visual impacts. CC should do the following: bury the penstock and transmission line and redesign and reduce the size of the large superstructure proposed for the top of the powerhouse; screen the access road and tailrace with rock and backfill so these facilities will not be readily visible to boaters and fishermen on the river; build the canal and forebay facilities in low-profile and color the facilities to blend with the surrounding area, and maintain minimum flows in the bypassed reach to retain the visual quality of the whitewater area. If CC carries out the staff's recommendations, the project would have moderate impacts on visual quality. Minimum flow releases recommended by the staff to protect whitewater boating (section 4.5.1), fishery resources, and water quality (sections 4.2.1 and 4.2.2) should provide partial mitigation for the loss of visual quality of the whitewater bypassed reach. Additional flows during the mitigation season are discussed in the cumulative impact section (4.2.4)

4.6.1.3 Unavoidable Adverse Impacts

The project would change the natural visual character of the Snake River Canyon at the project site. For a shortime, the normally quiet, natural, rural landscape of the area would be changed to a noisy, busy atmosphere by the mobilization of personnel, material, and construction related equipment. Reduced flows would alter, by exposing more bare rock, the beauty of the 1.6 mile-long whitewater section of the Snake River (figure 3-12) The manmade facilities associated with the project would moderately affect the visual quality of the rough-hewn canyon (figure 3-13).

4.6.2 Star Falls Project

4.6.2.1 Environmental Consequences of Project as Proposed

The proposed project would transform the visual character of the canyon from a natural to a developed character. Visitors coming to Star Falls to view the natural canyon and waterfall, which have remained relatively unchanged for over 100 years would see the numerous project facilities. Transmission lines would cut across the canyon and a dam would be built on top of Star Falls. The project would exceed BLM's Class II visual resource management classification by creating man made facilities that contrast with the basic elements of form, line, color, and texture and that attract attention (letter from Delmar D. Vail, State Director, Bureau of Land Management, Department of the Interior, Boise, Idaho, January 20, 1987). Star Falls is one of two naturally occurring waterfalls on the mainstem of the Snake River that have not been physically modified; flows over the falls are presently regulated by water releases from Milner dam, however, and this regulation can greatly change the seasonal flows at the site (figure 3-8 and 3-19). Flows over the falls are very low from June through September, when much of the river's flow is diverted for irrigation at Milner dam (figure 3-19). With construction of the proposed project, the site would become very similar to the existing projects at Shoshone Falls and Twin Falls, except on a much smaller scale. Even if the B&C releases proposed minimum low-flows of 160-cfs during project operation, the project would still have a significant, permanent adverse effect on the visual quality of the canyon and the falls. The 160 cfs flows proposed by B&C might not be available and 12 cfs would always be diverted through the power canal. Reduced flows over Star Falls would occur more frequently than at present, would have a major adverse impact on the natural appearance of the falls, and during high flows, could diminish the grandeur of the falls overall size including the smaller south-side falls, which enhances the total image (figure 3-8) and creates a caldron in the plunge pool. Flows over Amnesia Falls would also be reduced during project operation by the maintenance flow of 12 cfs needed at all times in the power canal. The proposed canal would change the natural beauty associated with the wetlands and the habitats along the bench on the south side of the

river, between the canyon cliff and the river. Because there would be no access across the canal, the canal would make it difficult to view the falls or other habitats between the river and the canal. The canal would not be visible from the canyon floor on the north side of the river. The proposed access road would provide visitor access and sites for viewing the canyon on the south side of the canyon that are not now available, but these views, which were previously unobstructed and natural would be changed substantially by project facilities.

4.6.2.2 Environmental Consequences with Staff-recommended Mitigation

B&C proposes a number of measures to reduce the visual impacts of the proposed project, including designing facilities that blend with the surrounding area and regulating flows over Star Falls and the side falls to maintain the beauty of the falls. B&C should take other mitigative actions. The availability of the proposed 160 cfs at certain times of the year does not seem feasible from the present flow regime of the river and makes B&C proposed mitigative measures suspect. B&C should make the dike along the proposed power canal look as natural as possible, by covering the dike with rock from nearby talus slopes, giving the dike a natural-looking alignment, and planting native vegetation along portions of the canal. B&C also should do the following: making the dam or capping the dam, with natural rock from the surrounding area; using an overflow crest design for the spillway, so that when water is spilled over the top it would resemble a waterfall; designing a powerhouse that is unobtrusive and low-profiled; and burying the transmission line wherever possible. Despite these proposed and recommended mitigative measures, the project's impacts to the visual quality of the site would be severe and cause significant adverse impacts to the visual quality of the Snake River Canyon and Star Falls.

4.6.2.3. Unavoidable Adverse Impacts

The project would change the natural character of the Snake River Canyon at the project site by erecting man made structures that would create a striking contrast to the natural canyon features. Water normally flowing over Star Falls would be diverted into a canal for power production, and the pleasing whitewater cascade at Star Falls would undergo changes that would reduce the visual quality of the falls. Flows over Amnesia Falls would be reduced during operation and during certain times of the year. The power canal would destroy upland and wetland habitats that are an integral part of the canyon bottomlands scenery.

4.6.3. Twin Falls Project

4.6.3.1. Environmental Consequences of Project as Proposed

The existing Twin Falls Project reduces flows about 50 percent of the time when water is available in sufficient quantities to operate the plant. Unfortunately, these reductions occur during the peak tourist season, when water levels in the river are reduced by irrigation diversions made at Milner dam. Figure 3-5 shows flows over the falls of about 10 cfs when the amount of water in the river reaching the falls was about 400 cfs; 380 cfs was used to operate the existing hydropower facility. The proposed project modifications would further reduce flows an additional 32 percent of the time when water is available for power production. The proposed Twin Falls Project would cause significant adverse impacts to the visual quality of Twin Falls by reducing the amount of water flowing over the falls and by increasing the frequency and duration of extended reduced flows over the falls. The construction of an 110-foot long bridge across the river to the proposed new powerplant would draw attention to the presence of hydropower facilities at the face of the cliff and would further detract from the beauty of the falls.

4.6.3.2. Environmental Consequences with Staff-Recommended Mitigation

IPC should release sufficient flows over Twin Falls to maintain and enhance the existing visual quality of the site.

For the purpose of protecting and enhancing the visual quality of Twin Falls for the nearly 6,000 visitors coming to the site each month in the spring and summer (Idaho Power Company, 1983), the staff recommends that IPC release a minimum of 500-cfs over Twin Falls from May 1 through September 30, during daylight hours and holidays, from sunrise to sunset. To protect and enhance the visual quality of the falls for the nearly 2,100 visitors coming to the site each month in the fall and winter (Idaho Power Company, 1983), the staff recommends that IPC release a minimum of 1,700 cfs over Twin Falls from October 1 through April 30, during daylight hours and holidays, from sunrise to sunset. The staff further recommends that IPC in consultation with the IDPR monitor the effectiveness of the 500-cfs and 1,700-cfs minimum flows over the falls to ensure that the visual quality of the falls is maintained; if the monitoring results show that modifications to the flow releases are necessary to ensure protection of the visual quality, the Commission could then require that IPC provide alternative flow regimes for spring and summer and for fall and winter.

IPC should combine the proposed transmission line with the existing transmission line to prevent further degradation of the site, and should provide public access on the south side of the river downstream from the powerhouse as part of the roadway recently

constructed for the existing Twin Falls Project. The bridge should be reduced to the minimum size needed for the project and should be made from materials that reduce the visual contrast formed with the surrounding canyon.

The significant impacts on visual quality caused by the project would be reduced to moderate impacts once the staff-recommended mitigation and enhancement measures are implemented.

4.6.3.3. Unavoidable Adverse Imapacts

Adding man-made facilities to the Snake River Canyon would create moderate, long-term impacts on the visual quality of of the site. The staff-recommended enhanced flows over Twin Falls should reduce to moderate levels the significant impacts associated with the addition of new power facilities and the relicensing of the existing project at the site. The proposed bridge and the recently completed access road would add man-made features to the canyon but should not significantly impact the visual quality of the site.

4.6.4 Auger Falls Project

4.6.4.1. Environmental Consequences of Project as Proposed

The proposed project would cause moderate, long-term impacts to the visual quality of the Snake River Canyon at the site. The few residents living along the north rim, within view of the proposed project, might rate the project as one that creates moderate impacts to their daily views, because of the construction of two 2-acre lakes and a long canal in the canyon bottomlands. Most of the project facilities would not be visible from existing public viewing sites. The project would be between the Perrine Bridge (4 miles upriver) and Rock Creek, an area where visual quality has already been moderately affected by commercial development. The proposed project would violate BLM's class II visual resource management classification by creating man made facilities that contrast with the basic elements of form, line, color, and texture, and that attract attention (letter from Delmar D. Vail, State Director, Bureau of Land Management, Department of the Interior, Boise, Idaho, January 20, 1987). BLM also states that the project would cause significant long-term visual impacts by dewatering Auger Falls. There is presently no public access to Auger Falls, but COG has proposed access to the lakes. No access is proposed to Auger Falls, and the falls are not visible from the lakes. The three large penstocks, the long open power canal, and the transmission line across the canyon are all project facilities that would reduce the visual quality of the site.

4.6.4.2. Environmental Consequences with Staff-recommended Mitigation

COG's proposals to revegetate disturbed areas with native species, to avoid excessive degradation of natural features during construction, to employ landscaping techniques, and to use earth-tone paints and nonreflective building materials that would blend with the surrounding area are measures that should minimize the visual impacts associated with the project, especially since the project would be some distance from any public viewing locations and since the scale of the project features would be reduced by the height and magnitude of the Snake River Canyon. The powerhouse would be partially hidden by the subcanyon, but the mitigation ponds, power canal, and transmission line would not be entirely camouflaged, and would have moderate adverse effects on the visual quality of the site. COG's proposals to release minimum flows over Auger Falls to protect fishery resources and water quality in the Snake River should serve to moderate project's impacts on the visual quality of Auger Falls.

The staff recommends that public access be provided to Auger Falls and that COG, in consultation with the IDPR, should monitor both COG's proposed minimum flows of 350-cfs into the bypassed reach during the peak tourist season (April 1 to September 30) and COG's proposed release of about 60 percent of the river flow (1,200 cfs) from October 1 to March 31 to determine if the visual quality of Auger Falls is maintained. If the monitoring results show that modifications to the flow releases are necessary to ensure protection of the visual quality of the falls, the Commission could then require that COG provide alternative flow regimes from April through September and from October through March. Implementation of the staff's recommended mitigative features should reduce the adverse impacts to Auger Falls, but it would be nearly impossible to reduce the visual impacts of all the other project facilities, because of their size, and as a result, moderate impacts would occur to the canyon scenery.

4.6.4.3 Unavoidable Adverse Impacts

The project would have moderate impacts on the visual quality of the Snake River Canyon. The canal, powerhouse, and transmission line would be visible to persons viewing the canyon from the rim and to those persons traversing the canyon bottomlands on the proposed access trails. The 15-foot-wide and 9,000-foot-long canal across the canyon floor would be the most significant adverse visual feature of the project, but when compared to the existing development of the canyon in the project vicinity (between the Perrine Bridge and Rock Creek), the canal and other project facilities would only have moderate impacts on the visual quality of the area. The periods of reduced flows over Auger Falls and over other rapids in the proposed reach would occur more frequently than under preproject conditions and would adversely affect the visual quality of Auger Falls. A transmission line across the canyon would detract from the canyon beauty.

4.7 CULTURAL RESOURCES

The proposed Auger Falls Project has no known potential for affecting properties listed on or eligible for listing on the National Register of Historic Places. The proposed Milner, Star Falls, and Twin Falls projects would affect properties on and eligible for the National Register. The Milner and Star Falls Projects would adversely affect properties on and eligible for the National Register (table 4-2).

Table 4-2. Impacts to properties listed on or eligible for listing on the National Register of Historic Places by project area (Source: the staff).

Property	Smithsonian designation	Period	Project area	Potential impact
Milner dam and associated structures	None	Historic	Milner	Adverse
Drytown	10-TF-724	Historic	Star Falls	No effect
China Cave	10-TF-726	Prehistoric and historic	Star Falls	Not adverse
Mining tailings	10-TF-725	Historic	Star Falls	Not adverse
Structures 7 & 8	10-TF-727	Historic	Star Falls	Not adverse
Large, open occupation site	10-JE-67	Prehistoric	Star Falls	Not adverse
Caldron Linn	10-TF-728-10-JE-52	Historic	Star Falls	Adverse
Rockshelter on north side of the river	10-JE-50	Prehistoric	Star Falls	Not adverse
Twin Falls dam and associated structures	None	Historic	Twin Falls	Not adverse

4.7.1 Milner Project

4.7.1.1 Environmental Consequences of the Project as Proposed

Constructing and operating the proposed project would substantially modifiy the 6,500-foot-long section of the Twin Falls Main Canal from its headworks in Milner reservoir to the proposed powerhouse site. The integrity of Milner dam's

design, setting, materials, and workmanship, and the pulic's attitude toward the historic dam would be adversely affected by these proposed actions: replacing the existing gates at Milner dam with raidal gates; constructing the forebay, penstocks, tailrace, powerhouse, transmission lines, and acess roads; widening the existing Twin Falls Main Canal; replacing the existing headworks; raising the bridge deck and its approaches; and lengthening the bridge by approximately 60 feet.

Applying the National Historic Preservation act to Milner dam would help protect the historic value of the dam.

Although the existing structures are eligible for the National Register, these structures are not currently protected by federal historic preservation laws from adverse modifications except as those modifications are the result of federal undertakings or the federal licensing of undertakings. One of the most effective of these laws is the National Historic Preservation Act, and particularly section 106 of the act. Section 106 of the act would only protect these historic properties against future adverse impacts in general if the historic properties are part of a federally licensed project. Licensing the proposed project would bring the historic structures within the project boundary under the Commission's jurisdiction and under the protection of Section 106. After licensing, all modifications beyond those modifications that would occur as a resulting of licensing the historic dam, bridge, headworks, and that portion of the Twin Falls Main Canal that lies within the project area would involve modifying a Federally licensed project, and therefore would have to be performed according to the protections afforded historic properties by the requirements of section 106.

4.7.1.2 Environmental Consequences with Staff-recommended Mitigation

CC should consult with the SHPO to develop a plan that would minimize the adverse effects of the project on the characteristics of the existing dam, headworks, Twin Falls Main Canal, and bridge that meet the National Register,s criteria of eligibility. Realistically, the adverse impact potential cannot be eliminated, if the project is licensed.

4.7.1.3 Unavoidable Adverse Impacts

The proposed project would affect those characteristics of the existing historic structures that meet the eligibility criteria of the National Register. Although there would be offsetting beneficial results of licensing the proposed project, the impact would be unavoidably adverse. The Milner dam-Twin Falls Main Canal complex, as a whole, would continue to satisfy the National Register's criteria of eligibility, though in a diminished capacity.

4.7.2 Star Falls Project

4.7.2.1 Environmental Consequences of the Project as Proposed

The proposed project would affect six properties that are either listed on or are eligible for listing on the National Register, but would adversely affect only one property, Caldron Linn. Building the power canal would destroy three sites associated with historic Drytown; these sites are China Cave, dry-laid wall structures 7 and 8, and the placer mining tailings. If B&C implements its proposed mitigation, the destruction of China Cave and of structures 7 and 8 would not have an adverse impact; however, B&C's miitigation would not eliminate the adverse impact at the placer mining tailings or at the large open occupation site on the north side of the river, primarily because of erosive wave action from the proposed project reservoir. In addition to B&C's mitigation, the placer mining tailings would require photographic documentation; the large open site would require substantial excavation of about 5 to 10 percent of the site area and also would require riprapping to protect it from erosion.

Although the rock shelter at the foot of the canyon wall on the north side of the river is well above the maximum elevation of the proposed reservoir, it is near a proposed recreation area. Recreationists could disturb the site, and B&C's proposed mitigation would not prevent it. In addition to B&C's proposed mitigation, this rockshelter would have to be scientifically excavated to record detailed information about the site before it is buried. The proposed project would not affect the Drytown site.

Constructing the project weir just above Star Falls, and building the power canal parallel to the falls for about 2,200 feet would adversely affect Caldron Linn. Diverting water into the power canal during project operation and diverting 12 cfs during nonoperating periods would reduce flows significantly in the natural channel for about 9 months of the year and would have a further adverse effect on Caldron Linn.

B&C's proposed 500-foot-long arched concrete weir would create a visual line across the river that would contrast with the natural features of the falls and of the surrounding landscape, which are all that remain of historic Caldron Linn.

The project would be designed to operate with flows between 1,600 cfs and 5,500 cfs (Table 2-1). Therefore, all flows substantially below 1,600 cfs, occuring primarily during July, August, and September, would be bypassed into the natural channel, except for the 12 cfs needed for the power canal during during nonoperating periods. Flows over Star Falls would be greatly reduced in dry years, when about half (12 cfs) of the 39 cfs

total flow would be diverted to the power canal. During the spring, flows often exceed 5,500 cfs, particularly in April and May. During April and May, bypassed flows into the natural river channel would be lessened, the amount of water flowing over Star Falls woulds be reduced, and the frequency of the occurrence of reduced flows would increase. Reduced flows over Star Falls in the spring would be least noticeable during the peak spring flows, but would be very noticeable near the beginning and end of the peak flows, when the diversion of water for power production could reduce flows over the falls by 50 percent or more.

4.7.2.2 Environmental Consequences with Staff-recommended Mitigation

The project's impacts at Caldron Linn could not be completely mitigated. Photographically recording the placer mine workings, excavating and riprapping the large open site, and scientifically excavating ther rockshelter before it is buried would reduce the potential adverse effect at these sites to no adverse effect.

4.7.2.3 Unavoidable Adverse Impacts

Project construction would have an unavoidable adverse effect only on Caldron Linn.

4.7.3 Twin Falls

4.7.3.1 Environmental Consequences of the Project as Proposed

If IPC constructs a proposed new intake, power tunnel, and powerhouse that are not compatable with the charateristics of the existing project that make the property eligible for the National Register, the property would be adversely affected.

4.7.3.2 Environmental Consequences with Staff-recommended Mitigation

IPC should design the proposed new project facilities after consultation with the SHPO, to avoid adverse effects to the characteristics of the existing project that render the property eligible for the National Register. If IPC makes the new project facilities compatible with the existing project structures, the impact would not be adverse.

4.7.3.3 Unavoidable Adverse Impacts

IPC, after consultation with the SHPO, designs new facilities that do not conflict with existing historic project structures, there would be no unavoidable adverse impacts.

4.8 CUMULATIVE IMPACTS

A number of entities have expressed concern that the four proposed projects could cause cumulative adverse impacts to the environmental resources of the Snake River Basin. The Council for Environmental Quality (CEQ) has defined cumulative impacts as impacts on the environment that result from the incremental impact of an action, when added to other past, present, and reasonably forseeable future actions (40 CFR, part 1508.7).

This section of the EIS examines the cumulative impacts of the projects on the selected resources of a segment of the Snake River. Mitigative measures proposed by the applicants and by the staff are analyzed for each project to determine the cumulative effects of the proposed projects. The staff has identified the potential short-term and long-term cumulative impacts of the projects on the selected or target resources of the basin.

A target resource is an important resource that could be adversely affected by two or more proposed hydropower projects. The staff has determined that resident trout, wintering waterfowl, raptors, riparian-associated wildlife, riparian vegetation, water quality, visual quality, recreation, local economy, and cultural resources are the target resources of concern for the four proposed projects.

This cumulative assessment takes into account the application of the staff's methodologies and technologies, private contractors' analyses of similar cumulative assessments, and the Cluster Impact Assessment Procedure (CIAP) studies of the Owens, Snohomish, and Salmon River Basins in California, Washington, and Idaho, respectively. This present assessment does not use the CIAP, but reflects a concern by the staff that the four projects, which would be in sequence and close to one another in a 32-mile stretch of the mainstem Snake River, should be evaluated for potential cumulative impacts.

The public's participation at the December 10, 1986, technical scoping meeting and public meeting in Twin Falls, Idaho, helped the staff to identify and clarify important environmental impact issues, including those associated with potential cumulative impacts, for the four proposed projects.

In addition to comments generated by the public meetings, the staff also used the following sources to identify target resources for the affected reach of the Snake River Basin: (1) three visits to the proposed project sites; (2) comments received on Scoping Document I, issued on November 26, 1986; (3) environmental assessments (EA), EIS's, and other documents prepared by the staff for existing and proposed projects in the basin, other than the four under consideration; (4) agency comments and public comments on applications for the proposed projects; (5) public documents; and (6) discussions with concerned groups and individuals about developed and pending projects in the basin.

4.8.1 Hydroelectric Development

The water resources of the Upper Snake River Basin (defined as an area between Weiser, Idaho, and the river headwaters in Yellowstone National Park, Wyoming) (figure 3-1) have been extensively developed; hydropower developers presently compete with other consumptive water resource users (for irrigation) and nonconsumptive users (for hydropower and flood storage), particularly with those entities that historically have diverted the basin's streams, springs, and rivers for irrigation. On September 1, 1987, in the Upper Snake River Basin, there were 130 proposed hydropower projects (tables 4-4 through 4-7). These projects included licensed projects, requests for exemption from licensing, and preliminary permits. (The lists in tables 4-4 through 4-7 also include applications for license or for exemptions from licensing). There are seven unlicensed projects in the Upper Snake River Basin; two projects are operated by a commercial entity, and five are federal projects operated by the Bureau of Reclamation (BR). The total of 130 projects includes 15 preliminary permits (table 4-6).

4.8.1.1 Licensed and Exempted Projects

In the Upper Snake River Basin, there are 31 licensed projects (table 4-5) and 61 projects exempted from licensing (table 4-7). Many of the licensed and exempted projects are scattered throughout the Upper Snake River Basin and are in separate subbasins that are quite different from the mainstem of the river. All of the projects are operating, except for the Gem State Project (FERC no. 2952) and the Rock Creek II Project (FERC no. 6015); the Gem State Project is under construction, and construction has not started on the Rock Creek II Project.

There nine hydropower projects on the mainstem of the Upper Snake River, in the Upper Snake River Basin. Seven of the nine projects are operating under a Commission license and two are nonlicensed projects operated by BR.

Of the nine projects on the mainstem of the Snake River, only two, the Twin Falls Project and the Shoshone Falls Project (FERC no. 2778), are in the 32-mile-long study reach under consideration. The other seven hydropower projects on the mainstem of the Snake River are scattered above and below the study reach. Of these seven projects, the Upper Salmon Falls Project (FERC no. 2777), the Lower Salmon Project (FERC no. 2061), and the Bliss Project (FERC no. 1975) are below the study reach; the Minidoka Project (BR), the American Falls Project (FERC no. 2736), the Idaho Falls Project, a complex of three facilities identified as the Upper Plant, City, and Lower New Projects, (FERC no. 2842), the Gem State Project, and the Palisades Project (BR) are above the study reach.

In addition to the four proposed projects, there are eight licensed (table 4-5) or exempted (table 4-7) hydropower projects in the study reach (figure 4-1). There is also one application for an exemption for the Wilson Lake Project (FERC no. 10454). The Twin Falls and Shoshone Falls Projects are on the mainstem of the Snake River. Three projects, (the Rock Creek Project [FERC no. 6450], the Rock Creek II Project, and the KTFI Creek Project [FERC no. 6663]), are on Rock Creek and on one of its tributaries. Three projects, the N-32 Project (FERC no. 6778), the Kasel-Witherspoon (K-W) Project (FERC no. 6410), and the Lower Low Line Canal Project, (FERC no. 8961) are on nearby canals or on unnamed tributaries to the mainstem of the Snake River, and receive their water supply from springs, seeps, or waste irrigation return waters. In the study reach, five projects, the KTFI Creek, K-W, N-32, Lower Low Line Canal, and Rock Creek II Projects have been exempted from licensing; these projects have a total generating capacity of 5.83 MW. The operating Rock Creek, Shoshone Falls, and Twin Falls Projects have a total generating capacity of 23.479 MW.

4.8.1.2 Federal and Nonfederal Unlicensed Projects

BR operates five unlicensed projects in the Upper Snake River Basin that are not subject to Commission jurisdiction: the Palisades and Minidoka Projects on the mainstem of the Snake River, the Black Canyon Project on the Payette River, the Boise Project on the Boise River, and the Anderson Ranch Project on the South Fork of the Boise River; these projects have a total generating capacity of 181.65 MW. In the basin there are two other existing, unlicensed, nonfederal hydropower projects, the Thousand Springs Project and the Clear Lake Project, both operated by IPC; the two projects have a total installed capacity of 11.3 MW, and are on major springs emptying into the Snake River near Hagerman, Idaho.

4.8.1.3 Proposed Projects

In addition to the four proposed projects under consideration, there are 13 hydropower projects proposed for the Upper Snake River Basin (table 4-4). Two of these are applications for exemptions from license for projects proposed for the North Side Main Canal, a large canal system that roughly parallels the Snake River from Milner dam to Bliss, Idaho. All of the proposed license applications are in separate subbasins within the Upper Snake River Basin, such as the Payette, Boise, and Big Wood Rivers. The Shelley Project (FERC no. 5090) is an exception; it would be located on the mainstem of the Snake River near Idaho Falls, Idaho and is presently undergoing analysis for a separate EIS. The total generating capacity of all 12 projects, including the four projects under consideration, is about 286 MW. The four projects under consideration would contribute about 159 MW (table 4-3), or nearly 60 percent of the total energy production of all

proposed projects for the basin. A summary of specific impacts produced by the proposed construction feature of each project is in table 4-3.

4.8.1.4 Sites Under Study

As of August 1, 1987, there were 15 preliminary permits issued in the Upper Snake River Basin (table 4-6). Three permits involve sites on the mainstem of the Snake River downstream from the study reach: the Boulder Rapids Project (FERC no. 9601), the Dike Project (FERC no. 8168), and the A.J. Wiley Project (FERC no. 9106). There are also six applications for preliminary permits in the basin; one of these, the Empire Project (FERC no. 10370), is the only one of the six in which a site is evaluated on the mainstem of the Snake River near Buhl, Idaho.

The Commission's issuance of a preliminary permit does not authorize project construction, but provides opportunities for applicants to study the feasibility of developing hydropower at a site.

The staff's recent estimates show that only about 20 percent of issued preliminary permits are converted to license applications, and only about 5 percent are converted to exemption applications. In addition, the details of project configuration often change between the time a preliminary permit is issued and the time when and if an applicant applies for a license or for an exemption from licensing. Consequently, evaluating potential environmental impacts at the preliminary permit stage would be conjecture.

This EIS does not address the potential for cumulative adverse impacts for preliminary permit applications because the staff does not consider that preliminary permits result in reasonably forseeable future actions. If any of the preliminary permits currently issued in the Upper Snake River Basin are converted to an application for license or for an exemption, then the staff will analyze potential site-specific and cumulative adverse impacts and will use information developed in this EIS to complete the analysis.

Pertinent information on the three preliminary permit applications for the mainstem Snake River are included in table 4-6, and site locations are in an area about 4 to 8 miles below Rock Creek near Buhl and Bliss, Idaho (figure 4-1).

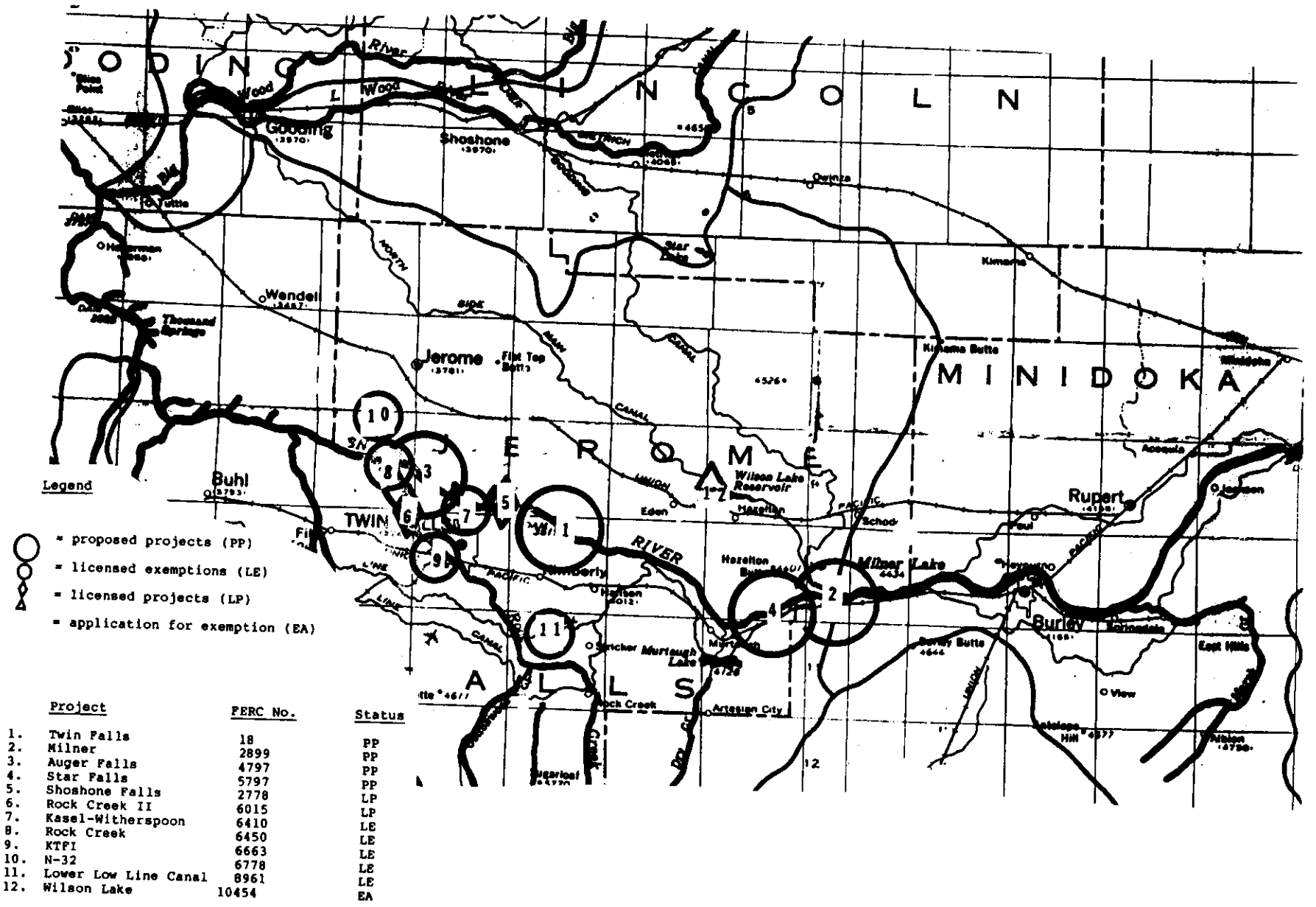


Figure 4-1. Existing and proposed hydropower projects in the vicinity of the 32-mile-long study reach between Milner dam and Rock Creek (Source: the staff).

Table 4-3. Summary of features proposed for the Milner, Star Falls, Twin Falls, and Auger Falls Projects and design alternatives, including bypassed stream reaches, reservoir lengths, pipeline and penstock lengths, new roads, and transmission lines (Source: the staff).

Project name	FERC no.	Capacity in megawatts	Bypassed stream in miles	New reservoir length in miles	Pipeline or penstock in in feet	New road in feet	Transmission line in miles
Milner	2899-003	43.65	1.6	None	385	2,300	1.4
Star Falls	5797-002	29.7	.6	3.5	190 (buried)	2,500	4.75
Twin Falls	18-001 18 (existing)	42 (9)	the falls	None	93 (tunnel)	110 (bridge)	1.0
Auger Falls	4797-001	43.6	2.0	.2	225	None	.75
Total		158.95	4.2	3.7	893	4,910	7.9
Milner Alt. no. 1		19.9	None	None	100	15,840	2.0
Milner Alt. no. 2		14.5	.4	None	50	10,560	2.0
Star Falls Alt.		32.9	.7	3.5	203 (buried)	2,500	4.75

Table 4-4. Proposed hydropower projects in the Upper Snake River Basin, by subbasin (Source: the staff).

Project by subbasin	FERC no.	Capacity (megawatts)	Stream name
Bannock Creek			
Fall Creek	7276	0.150	Fall Creek
Big Wood River			
Geo Bon 1	8612	1.12	Little Wood River
Dietrich Drop	8909	4.8	Milner Gooding Canal
Shoshone	9967	1.18	Little Wood River
Wilson Lake 1/	10454	5.7	N. Side Main Canal
Boise River			
Arrowrock	4656	60.0	Boise River
Kirby	10111	1.09	Middle Fork Boise River
Mainstem Snake River			
Twin Falls	18	51.0	Mainstem Snake River
Milner	2899	43.65	Mainstem Snake River
Auger Falls	4797	43.6	Mainstem Snake River
Shelly	5090	10.3	Mainstem Snake River
Star Falls	5797	29.7	Mainstem Snake River
Payette River			
Fisher Creek	6895	5.0	Fisher Creek
Deer Creek	8121	.383	Deer Creek
Upper Snake River			
Hagerman Hatchery	6175	0.118	Riley Creek
Hazelton A 1/	10164	8.94	North Side Main Canal
Hazelton B 1/	10326	7.50	North Side Main Canal

1/ Application for exemption.

Table 4-5. Licensed hydropower projects in the Upper Snake River Basin, by subbasin (Source: the staff) (continued)

Project by subbasin	FERC no.	Capacity (megawatts)	Stream name
Big Wood River			
Lower Malad	2726	20.7	Malad River
Magic	3407	9.0	Big Wood River
Malad High Drop	3924	5.0	Malad River
Lincoln Bypass	8971	1.96	Big Wood River
Boise River			
Lucky Peak	2832	87.48	Boise River
Barber Dam	4881	4.14	Boise River
Lost River			
Birch	7194	2.85	Birch Creek
Mainstem Snake River			
Twin Falls	18	8.437	Mainstem Snake River
Swan Falls	503	10.4	Mainstem Snake River
Bliss	1975	100.0	Mainstem Snake River
C.J. Strike	2055	82.8	Mainstem Snake River
Lower Salmon	2061	75.0	Mainstem Snake River
American Falls	2736	92.34	Mainstem Snake River
Upper Salmon River	2777	34.5	Mainstem Snake Falls
Shoshone Falls	2778	12.5	Mainstem Snake River

Table 4-5. Licensed hydropower projects in the Upper Snake River Basin, by subbasin (Source: the staff).

Project by subbasin	FERC no.	Capacity (megawatts)	Stream name
Idaho Falls	2842	27.0	Mainstem Snake River
Gem State	2952	22.3	Mainstem Snake River
Owyhee			
Owyhee	4354	4.34	Owyhee River
Owyhee Tunnel 1	4359	8.0	North Canal
Mitchell Butte Lateral	5357	1.5	Mitchell Butte Lateral
Payette River			
Cascade	2848	12.42	North Fork Payette
Clifford Rosenbalm	3073	.008	Bear Creek
Horseshoe Bend	5376	9.5	Payette River
Portneuf River			
Portneuf River	7447	0.744	Portneuf River
Salmon Falls Creek			
Salmon Falls Creek	7211	0.400	Salmon Falls Creek
Salt River			
Lower Swift	1651	1.55	Swift Creek
Strawberry	2032	1.5	Strawberry Creek
Upper Snake River			
Rock Creek II	6015	1.9	Rock Creek
Cedar Draw	8278	2.924	Cedar Draw Creek
Project 1	8865	0.075	Unnamed Creek
Project 2	8866	0.070	Unnamed Creek

Table 4-6. Hydropower projects in the Upper Snake River Basin, by subbasin, that have preliminary permits or applications (A) for preliminary permits (Source: the staff). 1/

Project by subbasin	FERC no.	Capacity (megawatts)	Stream name
Boise River			
GWP 13	9107	1.5	Boise River
N. Fork Boise River (A)	9679	10.0	North Fork Boise River
Gros Ventre			
South Pork Ditch	9588	1.425	South Park Pipeline
Lost River			
South Creek	10106	0.250	South Creek
Badger Creek	10107	0.450	Badger Creek
Lower Cedar Creek (A)	10236	2.66	Cedar Creek
Mainstem Snake River			
A. J. Wiley	9106	75.0	Mainstem Snake River
Boulder Rapids	9601	6.6	Mainstem Snake River
Empire (A)	10370	3.3	Mainstem Snake River
Dike (A)	10465	50.0	Mainstem Snake River
Payette River			
Box Creek	8131	2.0	Box Creek
Deadwood (A)	10178	5.2	Deadwood River
Banks Lower(A)	10396	320.0	N. Fork Payette River
Portneuf River			
Marsh Valley (A)	10236	2.66	Portneuf River
Upper Snake River			
Ririe	9348	2.5	Willow Creek
Hardy Box Canyon	9452	2.86	Box Canyon Creek
Rim View	9543	0.548	Niagara Springs
Willow Creek	9633	0.693	Willow Creek
Blackfoot Canyon	9725	9.9	Backfoot River
Weiser River			
East Fork Ditch	8133	4.07	East Fork Ditch
Mesa II	8497	5.0	Middle Fork Weiser River

1/ Applicants competing for the same site are not indicated.

Table 4-7. Hydropower projects exempted from licensing in the Upper Snake River Basin, by subbasin (Source: the staff) (continued).

Project by subbasin	FERC no.	Capacity (megawatts)	Stream name
Big Wood River			
Koyle Ranch	4052	0.9	Malad River
Ravenscroft Ranch	4055	0.714	Malad River
Shoshone	4182	0.184	Little Wood River
Y-8	6630	0.085	North Side Y Canal
Hailey	7016	0.046	Indian Creek
Kirtley-York	7318	0.600	Big Wood River
Little Wood	7427	1.925	Little Wood River
Little Wood River Ranch	7530	1.038	Little Wood River
Geo-Bon 2	7548	1.115	Little Wood River
Faulkner	7592	0.750	North Side Y Canal
Jim Knight	7686	0.315	South Gooding Main Canal
Bypass	9070	3.3	Main Canal
Boise River			
Mora Canal	3403	1.9	Mora Canal
Arena Drop	4858	0.540	Golden Gate Canal
Main Canal	5038	1.055	Main Canal
Golden Gate	5039	0.700	Golden Gate Canal
Fargo Drop 2	5040	0.175	Frago Highland Canal
Main Canal 10	5041	0.500	New York Canal
Fargo Drop 1	5042	0.650	Deer Flat Lowline Canal
Waldvogel Bluff	5043	0.300	Waldvogel Canal
Low Line 8	5056	0.385	Low Line Canal 8
Macks Creek	6631	0.010	Macks Creek
Gros Ventre			
Kinky Creek	5066	0.012	Kinky Creek
Lost River			
Parcheri	5637	0.150	Telford Plain
Nicholson	7865	0.350	Fallert Spring Pipeline
Amy Ranch	8700	0.600	Deep Creek
Dry Creek	9134	3.6	Dry Creek
Payette River			
Black Canyon	6137	0.100	Gooding Main Canal
Portneuf River			
Mill Creek	7719	0.260	Mill Creek

Table 4-7. Hydropower projects exempted from licensing in the Upper Snake River Basin, by subbasin (Source: the staff).

Project by subbasin	FERC no.	Capacity (megawatts)	Stream name
Salmon Falls Creek			
Lateral 10	6250	1.615	Irrigation Canal
Upper Snake River			
Low Line Canal Drop	3216	9.0	Low Line Canal
White Ranch	4115	0.150	Mud Creek
Jones and Sandy	4188	0.105	Billingsley Creek
Briggs Creek	4360	0.750	Briggs Creek
LeMoyne	4563	0.034	tributary
Kaster River-view	4608	0.316	Box Canyon Springs
Mud Creek	4769	0.850	Mud Creek
Ten Springs Power Well	5422	0.220	fish hatchery outflow
Kaster River-view	5448	0.316	unnamed tributary
Kanaka Creek	5650	0.090	Kanaka Creek
Snake River Pottery	5651	0.097	unnamed spring
Rocky Mt. Embryos	5731	0.175	Coulee Creek
LQ-LS Drains (Pigeon Cove)	5767	1.79	LQ-LS Drains
Billingsley Creek	6208	0.140	Billingsley Creek
Reynolds	6229	0.350	Reynolds Idaho Main Canal
Whitewater Ranch No. 1	6271	0.185	Stoddard Creek
Slaughterhouse	6375	0.116	Slaughterhouse Creek
Kasel-Witherspoon	6410	1.0	unnamed stream
Little Mac	6443	0.253	Cedar Draw Creek
Rock Creek	6450	2.542	Rock Creek
Box Canyon	6543	0.546	Box Canyon Creek
Idaho Falls	6636	0.008	Elk Creek Tributary
KTFI Creek	6663	0.034	Rock Creek
Doug Hull-lateral	6676	0.259	Twin Falls Creek
N-32	6778	0.550	N-32 Canal
Deep Creek	6788	0.280	Deep Creek
Hidden Springs	7878	0.073	Hidden Springs
Fisheries 1	7885	0.308	Billingsley Creek
Blind Canyon	8375	1.2	irrigation return
Lower Low Line Canal	8961	2.35	Low Line Canal
Weiser River			
Sagebrush	8046	0.350	South Gooding Main Canal

4.8.2 Land Features and Geology

4.8.2.1 Sediment Sources, Transport, and Deposition

4.8.2.1.1 Cumulative Impacts of Existing Projects

The existing Kasel-Witherspoon (K-W), KTFI Creek, and Rock Creek I Projects make minor additions to the levels of turbidity and sedimentation within the Snake River (figure 3-14). Construction of the licensed Rock Creek II Project and of an access road at the existing Twin Falls Project would cause moderate to minor increases in turbidity and sediment within the Snake River during construction activities, and would cause minor to negligible increases in sedimentation, when disturbed land surfaces have been stabilized. As a result, these existing projects, in combination with the proposed projects, would contribute to minor, long-term cumulative adverse increases in sedimentation within the Snake River.

The existing Shoshone Falls Project would not contribute to cumulative impacts on sedimentation, because no additional construction is proposed and because any sedimentation from existing reservoir shoreline erosion is contained within the project reservoir. The existing Low Line Canal Drop Project and the N-32 Project would not contribute to cumulative adverse impacts on sedimentation within the project reach, because the projects are located on canals and the projects discharge into the canals rather than directly into the Snake River; in addition, the projects do not eliminate filtering from a natural stream channel or have large, long-term sediment sources.

Existing hydropower projects in the mainstem Upper Snake River have altered the natural pattern of sediment transport and deposition. Dams placed across the river channel act as obstacles to bedload transport and create impoundments which reduce the movement of water and promote sediment deposition. Sediment would be generated by continuing construction of an access road at the existing Twin Falls Project until the road was completed. If the fragile, sand-covered, steep side of the ravine is not destabilized by construction of the road, impacts would be brief. If these sandy cohesionless soils are destabilized, however, this slope would become a long-term source of sediment, and would contribute to a minor, long-term increase in sedimentation in the Snake River. Sediment that reaches the Snake River would eventually be deposited in the downstream Shoshone Falls reservoir.

Existing irrigation returns are a major source of sediment to the Snake River. Existing hydropower projects on tributary streams capture irrigation returns and increase turbidity and the levels of suspended sediment in the Snake River above preproject levels by diverting flows through pipelines or canals, eliminating the filtering and deposition that occurs within a natural

stream channel (figure 3-14). Dams on the mainstem Snake River at the existing Milner, Shoshone Falls, and Twin Falls Projects interrupt bedload transport within the river channel. Sediment is deposited in the reservoirs, where the impoundments act as large sediment traps for river flows entering the reservoirs. Sediment from the erosion of reservoir shorelines also tends to be deposited within the impoundments rather than being transported downstream.

Existing projects on Snake River tributaries that capture irrigation returns are the K-W Project, located on an unnamed stream that enters the Snake River downstream of Shoshone Falls, and the KTFI Creek and Rock Creek I Projects, located on Rock Creek. Rock Creek enters the Snake River downstream of the K-W Project and just downstream of the proposed Auger Falls Project. These K-W, KTFI, and Rock Creek I Projects have altered sediment transport and deposition within the affected stream reaches and have caused minor, long-term increases in sedimentation within the Snake River above preproject levels. These projects have reduced natural filtering and sediment deposition within the natural stream channel by diverting flows through the project pipelines (figure 3-14). Land surfaces that were disturbed during construction of these projects and that have not been revegetated are an additional long-term source of sediment to the Snake River.

Construction of the Rock Creek II Project would cause short-term, moderate levels of erosion and sedimentation within Rock Creek and moderate to minor, short-term increases in turbidity and suspended sediment within the Snake River. Disturbed land surfaces that are not revegetated would be a minor, chronic source of sediment to the Snake River. Project operation would eliminate the filtering effects of flows through the natural channel, which would make a minor, long-term increase in sedimentation in the Snake River. A settling pond is needed to filter tailrace discharges from the project and to reduce sedimentation within the Snake River. Use of a settling pond during operation of the Rock Creek II Project would reduce the project's contribution to cumulative increases in sedimentation within the Snake River from minor to negligible levels.

4.8.2.1.2 Cumulative Impacts of Proposed Projects With Staff-recommended Mitigation

The proposed Milner, Star Falls, and Auger Falls Projects would cause moderate, short-term and minor, long-term cumulative increases in sedimentation within the Snake River, because of land-disturbing activities during construction, because of placement and removal of the cofferdams used to dewater construction areas, and because of reduced flows within the bypassed reaches, which would promote deposition within these reaches during project operations. Within the affected reaches, sediment would be deposited primarily

in pools where water velocity is reduced; sediment would tend to be transported through rapids where water velocity increases. Any disturbed land surfaces that are not stabilized with vegetation also would be long-term sources of sediment to the Snake River.

Placing and removing cofferdams used in constructing the proposed intake and powerhouse at the existing Twin Falls Project would cause minor, temporary increases in turbidity and suspended sediment within the Snake River and minor, short-term cumulative increases in sedimentation within the Snake River. The Twin Falls Project would not contribute to long-term cumulative sedimentation, because new, long-term sediment sources would not be created and because there would not be a bypassed reach associated with the new powerhouse.

The cumulative impacts on sedimentation from multiple hydropower development focused on river or stream reaches are affected by sedimentation from more than one project. The project impact zone is a reach where sediment generated by project construction and operation is transported and deposited until it reaches an eventual point of deposition, such as the headwaters of a reservoir, or becomes so diluted that it is insignificant compared to the existing sediment load.

Cumulative impacts are intensified when projects are so close that an additional increase in sedimentation occurs where the project impact zones overlap. Increased sedimentation within overlapping of project impact zones is greatest during simultaneous construction of more than one project; sedimentation within overlapping zones can be reduced by constructing the projects in sequence, so that sediment generated by construction of one project is transported through the affected reach before construction of another project begins.

Between the proposed Milner, Star Falls, and Auger Falls Projects and the existing K-W, KTFI Creek, Rock Creek I, and Rock Creek II Projects, there would be two reaches within the study section of the Snake River where project impact zones would overlap. The project impact zone at the powerhouse of the proposed Twin Falls Project would not overlap with sedimentation from reservoir shoreline erosion at the existing downstream Shoshone Falls Project, because the amount of sediment generated at the Twin Falls Project would be so small that it would be diluted by the time it reached the headwaters of the Shoshone Falls reservoir, and it would be insignificant, compared to existing sediment loads that are deposited in the headwaters of the reservoir.

Project impact zones from the Milner and Star Falls Projects would overlap between the proposed Star Falls reservoir and the Twin Falls reservoir. Project impact zones from the proposed Auger Falls Project and the existing K-W, KTFI Creek, Rock Creek I,

and Rock Creek II Projects would overlap in the reach from the confluence of Rock Creek and the Snake River to the Upper Salmon Falls Project reservoir downstream, where sediments from these projects would eventually be deposited. Project impact zones from the existing K-W Project and the proposed Auger Falls Project would overlap within the Snake River, from the Auger Falls diversion site to the confluence of Rock Creek, because the unnamed stream where the K-W Project is located discharges into the Snake River upstream of the proposed Auger Falls Project.

Within overlapping project impact zones of the Milner and Star Falls Projects, the focus of increased sedimentation would be the relatively low gradient reach of the Snake River, just downstream of the proposed powerhouse at the Star Falls, Project, where sedimentation effects would be moderate. Sediment from the Milner and Star Falls Projects eventually would be deposited in the headwaters of the Twin Falls reservoir located downstream. The staff recommends that CC and B&C avoid simultaneous construction of the proposed Milner and Star Falls Projects to reduce cumulative impacts on sedimentation within the overlapping of project impact zones.

Within the overlapping project impact zones of the proposed Auger Falls Project and the existing K-W, Rock Creek I, Rock Creek II, and KTFI Creek Projects. The focus of increased sedimentation would be just below the confluence of Rock Creek and the Snake River. If the proposed Auger Falls Project and the licensed Rock Creek II Project are constructed simultaneously, sedimentation impacts in this reach would be moderate to major. The staff recommends that COG and the licensee of the Rock Creek II Project avoid simultaneous construction of the Auger Falls and Rock Creek II. Projects to reduce cumulative impacts on sedimentation within the overlapping project impact zones.

Construction of the proposed Milner, Star Falls, and Auger Falls Projects would alter existing patterns of sediment transport and deposition by creating obstacles to bedload movement from the proposed dams and by increasing sediment deposition in the slow-moving waters of the proposed reservoirs. Reduced flows in the bypassed reaches probably would increase deposition during operation of the projects.

The existing lack of sediment accumulation in the proposed bypassed reach at the proposed Milner Project suggests that flushing flows would not be needed at this project. B&C should evaluate the need for flushing flows at the proposed Star Falls Project and after the magnitude and duration of adequate flushing flows is determined, and should provide flushing flows, if necessary. Flushing flows would be needed for the bypassed reach of the Auger Falls Project, and COG should determine the magnitude and duration of adequate flushing flows.

Since construction at the proposed Twin Falls Project does not involve a new dam or a bypassed reach, the new tailrace discharge would alter existing patterns of sediment transport and deposition only marginally. The use of cofferdams to dewater construction areas at the Twin Falls Project would confine sediment and rock debris to the cofferdam areas, from which the debris could be mechanically removed. IPC's implementation of staff recommendations to use clean sand or gravel to construct cofferdams would reduce the cumulative impacts on sedimentation within the Snake River from minor to negligible levels.

4.8.3 Aquatic Environment

4.8.3.1 Cumulative Impacts on Loss of Reaeration Capacity

4.8.3.1.1 Cumulative Impacts of Existing Projects

The existing Milner, Twin Falls and Shoshone reservoirs have caused a loss of reaeration capacity within the study reach of the Snake River and thus have reduced the DO levels of the river. In addition, by increasing the retention time of water in the study reach, the existing reservoirs have increased the temperature of the river. A number of point and nonpoint source discharges into the Snake River have contributed to the BOD in the river and have reduced DO concentrations; the existing reservoirs have further reduced the DO levels by increasing the retention time. Because of the large number of rapids and falls within the project reach, however, there are only occasional problems in complying with state DO standards. DO concentrations are presently low during months when plant biomass is high, flows are low, and temperatures are high; DO is also low at night, when plant respiration contributes significantly to the oxygen demand, and during periods when plant decomposition creates a large oxygen demand.

4.8.3.1.2 Cumulative Impacts of Proposed Projects

The proposed minimum flows for the Milner and Star Falls Projects are very low, and these flows would have major adverse effects on the reaeration capacity in the bypassed reaches of the projects. All four proposed projects would adversely affect the reaeration capacity of the Snake River, and would contribute to the adverse cumulative impacts on the DO levels of the river. The reaeration capacity of the rapids and falls within the bypassed reaches for the Milner, Star Falls, and Auger Falls Projects would be reduced considerably. The proposed Star Falls and Auger Falls reservoirs would inundate rapids and would have an additional effect on reaeration losses. The reaeration capacity of Twin Falls would be reduced by the increased capacity of the powerplant and by reductions in flows over Twin Falls.

The reduction in DO levels at each successive project could adversely impact fish resources, and ultimately could make it difficult for operators of downstream hydropower facilities and for holders of National Pollution Discharge Elimination System (NPDES) permits to meet state water quality standards during summer low-flow events.

4.8.3.1.3 Cumulative Impacts with Staff-recommended Mitigation

To mitigate the impacts of the four proposed projects on DO levels, the staff recommends releasing higher minimum flows from the Milner and Star Falls Projects and spilling water over the

dams at all four projects, when DO concentrations are below state standards in project releases or at the point of maximum oxygen sag downstream of the projects. Higher minimum flows and spillage would enable the NPDES permit holders in the immediate project area to meet the conditions of their permits; overall DO concentrations downstream from the project areas would be reduced, form the present levels, and could, however, have cumulative impacts on fish resources. Higher minimum flows during the nonirrigation season at the Milner and Star Falls Projects would add reaeration capacity to the study reach. Spilling water at the projects to avoid water quality violations would ensure that DO concentrations in the study reach remain at or above state standard levels, but overall DO concentrations in the river would be lowered.

4.8.3.2 Cumulative Impacts on Nutrients and Toxic Materials

4.8.3.2.1 Cumulative Impacts of Existing Projects

The existing reservoirs act as settling basins for toxic materials entering the study reach, and thus improve the water quality of the river. Construction of the existing project reservoirs has increased phytoplankton growth; in addition, the high inorganic nutrient content and the organic matter released from the reservoirs has stimulated plant growth in the river.

4.8.3.2.2 Cumulative Impacts of Proposed Projects

The proposed Milner, Star Falls, and Auger Falls Projects would have minor, cumulative effects on the cycling of nutrients and of toxic materials within the study area. The additive effects of developing the Twin Falls Project would be negligible on the cycling of nutrients. The three projects would reduce the potential for diluting incoming pollutants within the bypassed reaches of the projects and would increase the overall retention time of nutrients and toxic substances within the study reach.

The anticipated overall increase in productivity within the study reach would remove more nutrients from the water column and would incorporate additional nutrients within the biomass of plants, thus slowing the export of nutrients from the study reach. Lower discharges within the proposed reservoirs and bypassed reaches would lead to increased sedimentation of toxic materials and increased retention time within the study area. Increased processing and increased biomass of primary producers per unit area within the Snake River might cause increased uptake of toxic materials by the biota and increased bioconcentration and biomagnification within the food chain.

4.8.3.2.3 Cumulative Impacts of Proposed Projects with the Staff-recommended Mitigation

Higher flows in the bypassed reaches of the Milner and Star Falls Projects would decrease the retention time for toxic materials in the reaches.

4.8.3.3 Cumulative Impacts on Fish Habitat Loss

4.8.3.3.1 Cumulative Impacts of Existing Projects

Hydropower development in the Snake River has had a profound influence on fish habitat. There have been significant losses in the mileage and acreage of riverine habitat available for game fish production. Surface releases from Milner reservoir have produced warmer temperatures in the Snake River downstream; warmer summer temperatures have exerted stresses on the coldwater fish species and have increased the production of rough fish.

4.8.3.3.2 Cumulative Impacts of Proposed Projects

Three of the proposed projects involve bypassed reaches that would have significantly lower flows during project operation (table 4-3). The proposed Milner Project would bypass 1.6 miles, the Star Falls Project would bypass 0.64 miles, and the Auger Falls Project would bypass about 2 miles of the Snake River. The cumulative loss of much of the wetted perimeter in over 4.2 miles of river would significantly reduce wetted area in the study reach. CC's proposed minimum flow for the Milner Project would provide 0 cfs for 6 months of the year from April 15 through October 15 and 58 cfs during the remainder of the year; 58 cfs would wet only a small percentage of the riverbed, and a large amount of habitat would be lost during that portion of the year that currently is characterized by high flows. B&C's proposed minimum flow of 160 cfs at Star Falls would also reduce a significant loss of wetted area in the bypassed reach. The loss in wetted area at Auger Falls would probably be less, because COG's proposed minimum flows would be higher.

Because proposed flow releases from the Milner and Star Falls Projects would be very low, cumulative losses of the habitat available to the aquatic biota would be significant. Reductions in wetted areas would result in the loss of rearing habitat for fish, the loss of habitat for macroinvertebrates, and the loss of area for periphytic production. The applicants propose no mitigation for the cumulative losses of fish habitat or for the losses of a significant part of the food base.

Trout production habitat would also be lost in the Star Falls reservoir, which would inundate 3.5 miles of the Snake River. This loss would leave less than 3 miles of unimpacted river between Milner dam and the proposed powerhouse for Star

Falls, a distance of about 8 miles, and would severely reduce the fishery in the upper reaches of the study area.

The significantly reduced flows would make temperatures in the bypassed reaches somewhat warmer in the summer and somewhat colder in the winter. Summer temperatures in the Snake River currently approach the maximum tolerated by rainbow trout, so slight increases in temperature might affect trout production adversely and might make much of the study area unsuitable for coldwater fish species.

The loss of habitat for game fish production at the proposed projects would be significant for the Milner, Star Falls, and Auger Falls Projects. Providing higher flows, based on the wetted perimeter method, would reduce the adverse impacts of these projects and would maintain and enhance the existing fishery, in accordance with the IDFG's management plans for this section of the Snake River.

4.8.3.3.3 Cumulative Impacts of Proposed Projects with the Staff-recommended Mitigation

The staff recommends minimum flows for the Milner and Star Falls Projects that provide 60 percent of the discharge necessary to wet the riverbed (the wetted perimeter method) during the nonirrigation season; provision of these higher flows would significantly reduce the habitat losses that would accompany the development of the Milner and Star Falls Projects.

4.8.3.4 Cumulative Impacts on Fish Resources Resulting from the Increased Frequency and Magnitude of Flow Fluctuations Associated with Power Production

4.8.3.4.1 Cumulative Impacts of Existing Projects

The Twin Falls and Shoshone Projects are run-of-river and presently cause large flow fluctuations in the Snake River (figures 3-3 and 3-7). Periodic releases for power production from American Falls reservoir, upstream of the study area, and from Milner reservoir, at downstream powerplants, presently cause large flow fluctuations in the study reach. Flow reductions during the irrigation season also cause large seasonal flow fluctuations (figure 3-12).

4.8.3.4.2 Cumulative Impacts of Proposed Projects

Since the four proposed projects would be operated in a run-of-river mode, the effects of flow fluctuations during project operations would be minimal. The Milner, Star Falls, and Auger Falls Projects, however, would be operated only when adequate flows are available. Intermittent power production at these three projects combined with the periodic releases from the

American Falls, would produce large variations in flows within the bypassed reaches. The mininum hydraulic capacity of the proposed Milner turbine would be 4,000 cfs (table 2-1). Because this project could only be operated at relatively high flows and because proposed minimum flows during project operation would be very low, flow fluctuations in the bypassed reach would be greatest at the Milner Project. Because the proposed minimum flows for the Milner and Star Falls Projects are very low, increased discharges from planned power releases and from storms and other natural variations in discharge would cause flow fluctuations within the bypassed reaches. Thus upstream reservoir releases, purchased by downstream hydropower operators, and emergency releases at American Falls, Walcott, and Milner dams would cause large flow fluctuations in the bypassed reaches of the Milner and Star Falls Projects. Flow fluctuations adversely affect fish and invertebrates by stranding and by loss of biomass through downstream drift. The Milner and Star Falls Projects, and to a lesser extent, the Auger Falls Project would have significant adverse effects on fisheries, as a result of large fluctuations in flow and large changes in wetted area within the bypassed reaches.

4.8.3.4.3 Cumulative Impacts of Proposed Projects with Staff-recommended Mitigation

Higher minimum flows in the bypassed reaches of the Milner and Star Falls Projects would reduce the magnitude of the differences in discharge between periods of generation and nongeneration at the powerplants.

4.8.3.5 Cumulative Impacts on Fish Passage and Turbine-related Mortality

4.8.3.5.1 Cumulative Impacts of Existing Projects

Upstream fish migration within the study reach is presently limited by dams at the Milner, Twin Falls, and Shoshone Falls Projects and to some extent by the natural falls at Star Falls and Auger Falls.

The existing Twin Falls and Shoshone powerplants do not have screened intakes and presently cause turbine-related fish mortality and injury. The magnitude of the cumulative adverse impacts from these two projects has not been studied.

4.8.3.5.2 Cumulative Impacts of Proposed Projects

COG proposes upstream fish passage facilities for the Auger Falls Project, and this project would not significantly reduce fish passage.

None of the applicants propose to prevent fish entrainment by installing screens at the entrance to irrigation canals or on turbine intakes to prevent fish entrainment. All of the projects would cause turbine injury and mortality of fish, thus reducing the number of catchable game fish in the reach affected by the four projects.

COG has proposed stocking of fish, as compensation for project-induced fish losses, but details regarding compensatory measures have not been agreed upon; IPC has proposed a cash payment to IDFG to mitigate for fish lost through turbine mortality, and B&C is offering funds to IDFG for fisheries enhencement at some other over in southern Idaho.

4.8.3.5.3 Cumulative Impacts of Proposed Projects with Staff-recommended Mitigation

The staff recommends that the applicants implement monitoring programs to determine the magnitude of fish losses associated with turbine-induced fish mortality. If the results of the monitoring programs indicate that significant fish mortality results from project operation, the applicants should modify project structures and operations or should provide appropriate compensation.

4.8.3.6 Cumulative Impacts on the Food Base for Fish

4.8.3.6.1 Cumulative Impacts of Existing Projects

Wetted area for primary and secondary production is severely limited, especially in the upstream area of the project reach during the irrigation season, as a result of the zero minimum flow at Milner dam (figure 3-12). High turbidity in irrigation return water presently reduces plant growth through reduced light penetration and abrasion, and as a result, increases light penetration and corresponding plant growth. The reservoirs act as settling basins. Macroinvertebrate biomass in Milner reservoir is very low, possibly as a result of the accumulation of toxic materials in the sediment.

4.8.3.6.2 Cumulative Impacts of Proposed Projects

Development of the four projects would change the sources of organic matter and would affect the functioning of the trophic base of the fishery. There would be an additional shift towards autotrophy, with reduced input of particulate organic matter from riparian vegetation. Riparian vegetation has already been significantly reduced along the Snake River, but inundation of terrestrial vegetation by the Star Falls and Auger Falls reservoirs would further reduce terrestrial production within the canyon, thus reducing allochthonous input to the river. Removal of the stream channel from the riparian shrub community in the bypassed reaches would also reduce the input of food (leaves, insects) from terrestrial sources.

Modifications in streamflow would have a major affect on the growth of plants in the proposed bypassed reaches and reservoirs. Greater streambed stability, moderate current speeds without large flow fluctuations, and decreased turbidity are factors that might lead to increased biomass of algae and rooted plants in the bypassed reaches. The decreased velocities and turbulence would cause phytoplankton to proliferate in the reservoirs and bypassed reaches; however, the reduced wetted perimeter would cause a loss of area for aquatic primary productivity in the bypassed reaches. Also, sedimentation in low gradient areas of the river might remove additional areas from production. Reduced flows in the bypassed reaches and reservoirs would increase biomass where siltation is not a problem; overall, biomass and production of aquatic plants would probably increase in the study reach.

Phytoplankton from the reservoirs, decaying algae and macrophytes sloughed from the riverbed, and terrestrial vegetation contribute to the particulate organic matter (POM) in the water column of the Snake River. POM is processed by leaching of dissolved organic material by respiration of associated bacteria and by consumers (invertebrates and fish), and is lost from the water column by sedimentation. The Star Falls and Auger Falls dams would provide barriers and would interrupt organic matter transport, affecting food webs both within the reservoirs and downstream. Flow is positively correlated with POM concentrations in the water, reduced flows in the bypassed reaches and reservoirs would reduce POM concentrations through sedimentation in low gradient areas. Overall, the new dams and the reduced discharges would increase the processing of POM within the study area. Because of the proposed development of new dams, the Star Falls and Auger Falls Projects would contribute the most to alterations in the processing of organic matter within the study reach. These changes in the food base would directly and indirectly influence the composition and biomass of the macroinvertebrate and fish communities.

Reduced wetted area within the bypassed reaches would reduce overall macroinvertebrate biomass. Reduced discharges could provide flows that are more suitable for invertebrates in the high-gradient areas presently characterized by rapid velocities, but increased sedimentation in low gradient areas would reduce the area for invertebrate production. Much invertebrate production occurs within fast flowing riffle areas; invertebrates are exported from these areas and become available food for fish in pools downstream from the riffle areas. Macroinvertebrate habitat would also be reduced in Star Falls reservoir, especially in the upstream portion of the reservoir now characterized by fast currents. A reduction in macroinvertebrate production would adversely affect the fishery in the Snake River. The Milner, Star Falls, and Auger Falls Projects would have significant adverse cumulative effects on food production for game fish.

4.8.3.6.3 Cumulative Impacts of Proposed Projects with Staff-recommended Mitigation

In the bypassed reaches of the Milner and Star Falls Projects, higher minimum flows during the nonirrigation season would provide some benefit for food production, but insects with life cycles longer than a few months would not benefit from areas wetted only during the nonirrigation season. Midges and a few other tolerant species with short life cycles would dominate the fauna and would provide a food source for fish. Higher flows during the nonirrigation season would increase the amounts of food coming from the reservoir. Higher flows recommended by the staff for the bypassed reaches of these two projects would provide an adequate food source that would allow some trout to survive in the upper reaches of the study area.

4.8.4 Terrestrial Environment

4.8.4.1 Riparian Vegetation

4.8.4.1.1 Cumulative Impacts of Existing Projects

The construction of water projects that have flooded lowlying areas and diverted water from the river accounts for much of the past losses of riparian vegetation in the Upper Snake River Basin. Significant losses of riparian vegetation are closely associated with the conversion of free flowing reaches of the river to pools and impoundments. Using information from Cochnauer (1977) and the IDFG (1986), the staff estimates that about 30 percent of the Snake River, from its headwaters to Weiser, has been converted from its former free-flowing condition. Grazing, trout culture, and other land-use activities have also contributed to the loss of riparian habitat in the study reach.

In the 32-mile-long study reach, the river remains free-flowing, except where the Twin Falls and Shoshone Falls Projects have impounded about 1.5 miles and 2.2 miles, respectively, of the river; flows, however, are controlled by releases from Milner dam. There are no records to indicate how much riparian vegetation was lost in the construction of the Twin Falls and Shoshone Falls Projects, but the projects did not totally eliminate riparian vegetation in the affected river portions of the two reservoirs. Approximately 54 acres of various riparian vegetative types occur in the 1.5 mile-long canyon upriver from Twin Falls dam. In the study reach, in addition to the two large projects, there are three small projects, the Rock Creek Project, the N-32 Project, and the K-W Project (figure 4-1). Construction of these small projects has eliminated a small amount of riparian vegetation, probably no more than 2 or 3 acres in total (figure 3-14).

Overall hydropower development in the study reach, compared to the diversion of water from the river for irrigation at Milner dam, has had a minor effect on riparian vegetation. During most periods of the growing season, from April 15 to October 15, the water diverted at Milner dam removes nearly all natural flows from the river. The rugged topography and lack of suitable soils throughout much of the canyon study reach (figures 3-10 and 3-12) limit the loss of riparian habitat to that caused by irrigated farming and other land uses. Grazing has not been a major influence on vegetation within the reach of the canyon under study, though some grazing has occurred at the Auger Falls and Star Falls sites.

The total amount of riparian vegetation in the study reach has not been inventoried, but several free-flowing reaches of the Snake River, both upriver and downriver from the study reach, have been inventoried. These inventories, two by the

staff and one by FWS, were done in conjunction with three proposed projects which were never licensed), the A.J. Wiley Project, the Clear Lake Project (FERC no. 3079), and the Eagle Rock Project (FERC no. 2789). The three river reaches that have been inventoried are the Wiley reach, an 8 mile-long reach between Bliss and Lower Salmon Falls (Federal Energy Regulatory Commission, 1982), the Clear Lake reach, an 8-mile-long reach from Kanaka Rapids to about 3 miles below Auger Falls (U.S. Fish and Wildlife Service, 1982), and the Eagle Rock reach, a 4.7-mile-long reach near American Falls (Federal Energy Regulatory Commission, 1984). The extent of riparian vegetation in these three river reaches is about 251 acres for the A.J. Wiley reach (31 acres per river mile), 1,094 acres for the Clear Lake reach (136.7 acres per river mile), and 38 acres for the Eagle Rock reach (8 acres per river mile). Based on the descriptions of these three sites, general field observations of portions of the sites, and observations of the study reach, the staff concludes that the Eagle Rock river reach is most similiar to the 32-mile-long study reach under consideration in this EIS. The staff recognizes that there are areas between Milner dam and Rock Creek where the amount of riparian vegetation is much less than 8 acres per mile (figure 3-14), most notably in the 6-mile-long river segment immediately below Milner dam. The Snake River canyon in this reach is narrow, with steep walls dropping to the river's edge (figures 3-11, 3-12, 3-13). Riparian vegetation is almost absent throughout this reach of the river. The staff estimates that about 250 acres of riparian vegetation, both herbaceous and woody, remain in the study reach from Milner dam to Rock Creek. (This estimate was derived from the vegetation estimated for the Wiley, Clear Lake, and Eagle Rock river reaches, excluding the 6-mile river segment below Milner dam, and adjusting the figure of 8 acres per mile to include the 54 acres of riparian habitat quantified for the Twin Falls reservoir.)

4.8.4.1.2. Cumulative Impacts of the Proposed Projects with Staff-recommended Mitigation

Building the four proposed projects would disturb or eliminate about 40 acres, or 16 percent, of the 250 acres of riparian vegetation estimated for the 32-mile-long study reach between Milner dam and Auger Falls. Without mitigation, the staff would consider the loss of 16 percent of the riparian habitat within the study reach as a significant cumulative adverse impact, because riparian habitat is very important to fish and wildlife resources and because the past water development projects in the basin have made riparian habitats scarce. With the applicants' proposed mitigative measures, however, approximately 51.7 acres of riparian vegetation would be established to replace the riparian habitat that would be eliminated. If the new land areas are properly managed, the replacement of the lost riparian habitat with new riparian habitat should adequately mitigate the long-term impacts of project construction on riparian vegetation within the study reach.

Because of a lag in time of perhaps as much as 20 years before comparable riparian vegetation is fully established on the 51.7 acres of proposed mitigation land, there would be some short-term losses of riparian habitat following construction. During this lag time, the overall diversity, structure, and vigor of riparian habitat at the mitigative sites would be less than that at the sites where habitat would be lost. The impacts of this poorer quality habitat would be minimized by three factors.

First, the applicants would be required to replace lands at a ratio of 1:1.25; thus, some of the effects of the reduced quality of the replacement habitat would be offset by the greater extent of the mitigative lands. Second, during the lag time necessary for comparable vegetation to become fully established, the mitigative lands could still be a valuable component of the riparian system. Herbaceous riparian vegetation, an extremely valuable habitat type, does not require a lengthy period for establishment under suitable environmental conditions. Woody riparian communities, though having long lag times, can contribute to the overall riparian system before reaching full maturity and productivity. A third factor mitigating the short-term effects on riparian communities is that all four projects would not be constructed simultaneously; thus, the impacts would be spread over time. For these reasons, the staff concludes that the short-term, cumulative impacts on riparian vegetation would not be significant.

In addition to being affected by the construction of the four projects, riparian vegetation adjacent to the river could be affected by reduced flows within the river channel. The proposed Auger Falls Project is the only project where there is significant riparian vegetation that could be adversely affected by reducing flows in the bypassed reach. The staff recommends that COG mitigate adverse impacts on vegetation in the bypassed reach, by replacement if necessary. The staff's recommendation would ensure that there would be no net long-term losses in riparian vegetation from the reduced river flows in the bypassed reach at Auger Falls, the only project with significant riparian vegetation in the bypassed reach. Thus, operating the four proposed projects should have little or no cumulative effects on riparian vegetation.

In summary, the staff concludes that with the mitigation proposed by the applicants, plus the staff's recommended mitigation, construction and operation of the four proposed projects would have only minor cumulative adverse impacts to riparian vegetation in the Upper Snake River Basin.

4.8.4.2 Riparian-associated Wildlife

4.8.4.2.1 Cumulative Impacts of Existing Projects

The cumulative effects of existing projects on riparian-associated wildlife are proportional to the loss of riparian habitats, discussed in section 4.3, resulting primarily from the conversion of free-flowing reaches of the Snake River to pools.

4.8.4.2.2 Cumulative Impacts of Proposed Projects with the Staff-recommended Mitigation

Although some applicants have proposed mitigative measures and the staff has recommended measures to compensate for impacts to riparian communities on a site-specific basis, the cumulative effects on riparian-associated wildlife would be adverse. Significant losses in riparian-associated wildlife populations would result from the removal of 40 acres of riparian habitat during construction; these populations would be affected until replacement habitat is fully developed in 10 to 20 years. In the long term, even though 29 percent more riparian habitat would be developed than lost, the wildlife value of the replaced habitat would not equal the value of the lost habitat. The location of the replacement habitat in clumps away for the river instead of in a band adjacent to the river would reduce the value of the habitat as a result of a decrease in the amount of edge habitat and in the interspersion of plant and water habitats. The likelihood of human disturbance in the vicinity of the replacement habitat would also limit the value of the habitat to wildlife. These factors would be most pronounced for the Star Falls and Auger Falls Projects.

The combined effects of hydropower in the relatively small area near Rock Creek could cause cumulative adverse impacts to mule deer, an important wildlife species associated with riparian habitats. The construction of the proposed 1.8-mile-long Auger Falls canal in close proximity to the existing 0.6-mile-long Rock Creek Project (FERC no. 6450) flume and licensed, but unconstructed, 0.5-mile-long Rock Creek II Project (FERC No. 6015) above-ground penstock would alter deer movement patterns, increase the vulnerability of deer to predation, and increase energy expenditures by deer. The proposed Auger Falls canal would add to the risk of deer mortality in an area where mortality is currently occurring at the Rock Creek Project flume.

A number of measures are under construction or proposed to reduce mule deer impacts at specific sites. The IDFG is involved in the design of protective measures to minimize mortality at the

Rock Creek flume; the future success of these measures is unknown. The construction of dirt ramps over the Rock Creek II penstock, as required by the Commission, would improve deer movement over the penstock.

As discussed in section 4.3.4, the staff recommends that the Auger Falls canal be constructed with escape ramps, and, if necessary, fencing to protect deer. With implementation of these recommended protective measures and correction of the existing problem at the Rock Creek flume, long-term deer mortality would be minor and would not cause significant cumulative adverse impacts. The presence of one canal, one flume, and one penstock, however, would restrict movement of deer, resulting in a small reduction in productivity of the local deer population.

4.8.4.3 Nesting Raptors

4.8.4.3.1 Cumulative Impacts of Existing Projects

Nesting raptors along the Snake River have been affected by the conversion of large areas of native rangeland to agriculture, which has reduced the total biomass of prey available to raptors. Past hydroelectric development likely affected nesting raptors where project facilities were built in close proximity to nest sites, but data is not available to document the effect. It is likely that increased road access and human disturbance also precluded some nesting. Additional conversion of rangeland to agricultural uses continues to be a threat to nesting raptors because of the reduction in raptor prey species.

4.8.4.3.2 Cumulative Impacts of Proposed Projects with the Staff-recommended Mitigation

The four projects have the potential to cause cumulative adverse impacts to the prairie falcon, red-tailed hawk, and golden eagle. Construction of the four projects would result in the likely long-term disturbance of two red-tailed hawk nests and one prairie falcon nest at Star Falls, and the possible short-term disturbance of one red-tailed hawk, one prairie falcon, and one golden eagle nest at the Auger Falls area and one golden eagle nest near the Twin Falls Project. In the worst case, all seven nests would be abandoned permanently. In the 32-mile-long study reach, the loss of seven nests would represent a significant reduction in local raptor populations.

With staff-recommended mitigation, the likelihood of abandonment of the three nests at the Auger Falls area and the one nest at Twin Falls would be greatly minimized. Considering the numbers of these three species in different segments of the Upper Snake River Basin (table 4-8), the expected impacts to basin-wide populations would not be cumulatively significant.

Table 4-8. Raptor nests in various stretches of the Snake River Canyon.

Stretch of the Snake River	Length (miles)	Number of nests: Prairie falcon	Red-tailed hawk	Golden eagle
Walter's Ferry Bridge to Hammett 1/	80	209	62	34
Hammett to Bliss 1/	5.6	7	9	12
Kanaka Rapids to Shoshone Falls 2/	22.75	5	12	5
Star Falls Area 3/	3.5	3	2	1

1/ Bureau of Land Management, 1979b.
2/ U.S. Fish and Wildlife Service, 1982.
3/ B&C Energy, Inc., 1984.

4.8.4.4 Winter Waterfowl Habitat

4.8.4.4.1 Cumulative Impact of Existing Projects

Use of the Snake River by wintering waterfowl has been positively and negatively affected by irrigation and hydroelectric development. Cereal grain crops associated with agricultural development of the Snake River Basin is beneficial as winter feeding areas for geese, mallard, pintail (Anas acuta), and wigeon (A. americana) (Bureau of Land Management, 1979a). The mallard, in particular, has significantly benefitted from past agricultural development in the basin (Chattin, 1964). Although no data are available for the Snake River Basin in Idaho, the development of 500,000 acres of farmland as a result of the Bureau of Reclamation's Columbia Basin Project resulted in a reported increase in mallards from 200,000 to more than 700,000 in the Columbia and Snake River Basins of Washington and Oregon (Chattin, 1964). Development of river impoundments in the vicinity of small-grain and corn areas have also enhanced waterfowl winter habitat (White and Malaher, 1964). Conversely, creation of these impoundments have resulted in decreases in food supplies from the flooding of wetlands, and have resulted in reduced winter resting habitat from increased river ice cover.

Of the approximately 550 miles of the mainstem Snake River in the Upper Snake River Basin, about 180 miles (29 percent) of the river are no longer free-flowing, and thus are likely to freeze during severe winters. For the 32-mile-long study reach, construction of the existing Twin Falls and Shoshone Falls Projects reduced the amount of ice-free habitat by 3.7 miles (12 percent).

4.8.4.4.2 Cumulative Impacts of Proposed Projects with the Staff-recommended Mitigation

Only the Milner, Star Falls, and Auger Falls Projects have the potential to cause significant cumulative adverse effects on waterfowl winter habitat. The reduction in waterfowl habitat at Auger Falls because of reduced flows, however, would be mitigated (section 4.3.4).

With construction of the 3.5-mile-long Star Falls reservoir, ice-free waterfowl habitat in the study reach during cold winters and low river flows would be reduced from 28.3 miles to 24.9 miles, a 12 percent reduction. In addition, reduced flows between Milner dam and Milner Bridge would slightly reduce the waterfowl use in that 0.5-mile-long reach. Overall, the Star Falls and Milner Projects would eliminate much of the waterfowl habitat in the 8.5-mile-long stretch of river from Milner dam to Murtaugh Bridge during winters when the proposed Star Falls reservoir would freeze.

For the Upper Snake River Basin, the loss of waterfowl habitat from the four projects would not be cumulatively significant. Year-round, ice-free habitat in the basin would be reduced by about 1 percent. Further, the quality and use of the affected habitat is low compared to other areas upstream and downstream of the study reach, especially at the C.J. Strike and Hagerman State Wildlife Management Areas and of the Minidoka and Deer Flat National Wildlife Refuges. The number of wintering waterfowl using the river stretch between Milner dam to Murtaugh Bridge, based on once per year aerial censuses, represents only 0.165 percent of the total population of the Snake River from Massacre Rocks (about 10 miles downstream from American Falls dam) to Hagerman Refuge (table 3-6), which represents less than 25 percent of the mainstem Snake River in the basin. Although limited survey data collected by a single flyover each year does not reflect true population numbers, it does provide a useful index of the relative use of the Snake River by wintering waterfowl.

4.8.5 Socioeconomics

The magnitude of local socieoconomic impacts resulting from construction of the four proposed projects would depend upon the timing of onsite activity. If the projects were constructed consecutively, a relatively small number (50 to 100) of new construction jobs would be created for an extended period (8 to 9 years). If, on the other hand, the four projects were constructed concurrently, a relatively larger number (640) of construction jobs would become available for a fairly brief period (20 months) (table 4-9.). Consecutive construction would benefit a core group of local workers who would move from project to project. If the projects were constructed concurrently, local construction trades would be unable to supply the required number of workers, and construction contractors would be forced to hire persons from the Boise, Idaho Falls, and Salt Lake City areas. The staff estimates that during the combined peak construction period, from May through October, approximately 300 of the 640 new construction jobs would be filled by nonlocals.

As discussed earlier, most workers from the Boise, Idaho Falls, and Salt Lake City areas would prefer to commute weekly, living in a motel room in the Twin Falls-Rupert corridor during the week and returning to their permanent residences on weekends. Assuming that workers prefer a single room, there would be a need for 300 transient rooms. The staff's analysis of the current motel inventory in the Twin Falls-Rupert area indicates that there are 925 motel rooms there that could be made available at reasonable daily or weekly rates. Thus, the staff concludes that there is sufficient transient housing to meet the needs of nonlocal construction personnel, and licensees and their contractors should not be required to provide housing such as mancamps or trailer parks.

In addition to generating considerable revenue for local motels, concurrent construction of the four projects also would benefit local eating and drinking establishments. The temporary influx of workers could cause crowding and long waits for seats at some of the area's more popular cafes and restaurants. Most nonlocal personnel, however, would have dinner at local establishments on Mondays through Thursdays, days when there usually are many available seats.

Following construction activities, there would no longer be any cumulative socioeconomic impacts, except for those associated with minimum flow requirements at certain project sites (table 5-1). For example, minimum flow requirements at Milner dam during the irrigation season could cause slight reductions in profit, offsetting the positive benefits associated with collection of property taxes (table 5-1).

Table 4-9. Summary of onsite construction labor requirements for the four proposed projects (Source: the staff).

Project	Construction period (months)	Number of onsite construction personnel	
		Average	Peak
Twin Falls	24	60	100
Auger Falls	18	150	300
Star Falls	20	80	120
Milner Dam	20	80	120
Total labor requirement		370	640

4.8.6 Land Use and Recreational Resources

4.8.6.1 Whitewater Boating

Whitewater boating as a recreational activity was generally restricted to a few hardy individuals until recent times. When the Outdoor Recreation Resources Review Commission (ORRRC) released its trend-setting report in 1962, perhaps fewer than 5,000 people had rafted a river; 25 years later, the President's Commission on Americans Outdoors (PCAO) estimates that some 35 million people have experienced a whitewater rafting trip (President's Commission on Americans Outdoors, 1987a). In fact, the PCAO analysis indicates that paddling (canoeing, kayaking, rafting) experienced the greatest percentage increase in participation between 1960 and 1982 compared to any other outdoor recreational activity, and that river use continues to increase at a rapid rate. The PCAO recommended that special efforts be made by federal, state, and local interests to maintain and enhance opportunities for river-based recreation (President's Commission on Americans Outdoors, 1987b).

The growth of the commercial whitewater rafting industry has been a major factor in the increasing interest in whitewater boating, introducing millions of people, who would otherwise not have the skills and equipment to safely run rivers, to this recreational activity. In this respect, the availability of outfitters has contributed to the demand for whitewater boating opportunities. For example, the rafting industry in Maine was created in 1976, when one outfitter provided trips for 600 customers on the Kennebec River. In 1986, 22 state-registered outfitters ran about 48,000 people on the Kennebec, Penobscot, and Dead Rivers under a state-managed allocation system that controls the numbers of outfitters, boats, and customers that can be on a river at any time. In 1983, the whitewater boating industry in Maine generated $3 million in direct expenditures and an estimated $12 million in economic benefits to the state (Kimber, 1987).

Whitewater runs are location-specific, requiring the proper availability of flows, gradient, bottom configuration of the river channel, and accessibility. The availability of suitable runs to support commercial operations are even more critical because of factors involving trip length, trip support, and generally, the availability of other recreational attractions or population concentrations nearby to provide potential customers. Although a few remote rivers provide multi-day trips that are ends in themselves, such as the Colorado or Salmon, such trips require a great deal of pre-planning and expense. The most popular trips are 1- or 2-day trips that can be taken on a weekend or in conjunction with other vacation activities. Considering these factors, it seems reasonable to expect that commercial operations on the Murtaugh reach will increase, but

will be constrained by the fact that the season is short, and that the river is not usable during the peak summer recreation season.

Although whitewater river reaches suitable for commercial operations are usually suitable for paddlers skilled in whitewater boating, most paddling activity consists of individuals and groups who seek a lower-intensity experience comparable to Class I and II rapids. Such waters are suitable for family boating and use by the casual boater with simple equipment. At the other end of the spectrum, challenging Class V and above runs are sought by the most skilled paddlers who use specialized techniques and equipment. Within the study area, the A. J. Wiley reach provides for the first group, while the short reach downstream of Milner dam provides a challenge for the most experienced kayaker. As indicated in section 3.7, these three sections of the Snake River (Murtaugh, Milner, and A.J. Wiley), contain the only significant whitewater runs in south-central Idaho.

4.8.6.1.1 Cumulative Impacts of Existing Projects

The construction of dams on the Snake River within the study area has affected the availability of whitewater to some extent. The downcutting action of the river flowing over the basalt formations created the gorge, interrupted at intervals by the rhyolite intrusions that create the steep waterfalls characteristic of the river in the study area. From Milner downstream to Shoshone Falls, the rate of change in the elevation of the river channel is fairly high, becoming more gradual as the river flows towards Bliss. The rapids are larger and more continuous upstream of Twin Falls (figure 3-15). The rhyolite formations would have caused pools to form upstream of the waterfalls, so that flatwater would exist under natural conditions. Although the existing dams built atop the rhyolite obstructions are relatively small, they have increased the elevations of existing pools and further slowed the current into and through the reservoirs. While these changes have affected whitewater resources, the magnitude is unknown.

The history of the area has focused primarily on the waterfalls, but the trip of the Astorians down the Snake River (section 3.9) indicates that whitewater did not become a significant problem until the party reached the present site of Milner dam. The topography of the area indicates that any rapids that may have been inundated by the reservoir were likely of relatively low intensity and widely spaced. The presence of the Idaho Connection rapid at the head of the Twin Falls Reservoir and the rapid located between the tailwaters of the Twin Falls Project and the headwaters of the Shoshone Falls reservoir, combined with the geology of the area and the rate of change in the river channel elevation, suggests that the increase in elevation of the natural pools, caused by the dams, resulted in the inundation of

some rapids that were probably similar to those found on the Murtaugh section of the river. The extent of the whitewater that may have been lost is unknown. In the same way, the construction of the Upper Salmon Falls (FERC No. 2777) and Lower Salmon Falls (FERC No. 2061) Projects probably inundated some rapids similar to those found in the A. J. Wiley section of the river, but the exact extent is unknown.

The primary cummulative impact on whitewater boating resources in the study area comes as a result of water management rather than dam construction. The diversion of flows at the American Falls and Milner dams for irrigated farming causes the river virtually to dry up during what would otherwise be the peak whitewater boating season. The Idaho State Water Plan requires the following: (1) that ground and surface water in the Snake River Basin be managed to meet or exceed a zero-cfs minimum flow at the Milner gauging station (Policy 5A); (2) that water sufficient for recreational navigation is provided by the established minimum flows (Policy 5F); and (3) that the minimum flows established are sufficient and necessary to meet the minimum requirements for aquatic life, fish, and wildlife, and to provide water for recreation in the Snake River below Milner dam (Policy 5H) (Idaho Water Resource Board, 1986). Essentially, the state depends upon groundwater discharge from the Snake River aquifer into the river channel to provide the minimum flow requirements for users of Snake River waters downstream of Milner dam; these flows do not become significant however, until the Thousand Springs area. Regardless of any other consideration, these water management policies significantly impact recreational use of the river between Milner dam and Thousand Springs, and especially whitewater boating opportunities on the Milner and Murtaugh sections of the river. The impacts are most acute during dry water years, but even in wet water years the flow restrictions result in truncated boating seasons.

4.8.6.1.2 Cumulative Impacts of the Proposed Projects with Staff-recommended Mitigation

Two of the proposed projects, Milner and Star Falls, would cause cumulative adverse impacts on whitewater boating opportunities, even with implementation of the applicants' and the staff's proposed mitigative measures.

At Milner, the construction and operation of the proposed project would essentially eliminate whitewater boating use of the bypassed reach except on those infrequent occasions when flows might exceed project capacity by 5,000 cfs or more. Even with the staff-recommended mitigation, there is no assurance that flows sufficient for whitewater boating would be available on the scheduled days. Under existing water management policies and upstream control of flows, the opportunity for storage and release of water on the scheduled days appears limited. Should

an alternative project be constructed that would place the powerhouse upstream of the rapids, however, the project would likely have a minimal effect, if any on whitewater boating opportunities.

At Star Falls, construction and operation of the proposed project would reduce flows in the bypassed reach to levels below that needed for whitewater boating use on most days during the boating season. The project would affect Basalt and Amnesia rapids, which represent approximately 10 percent of the available whitewater on the Murtaugh reach. On the days when there are insufficient flows available, boaters entering the area from upstream would have an extended portage around the project or would have to leave the river at Star Falls and drive to the put-in at Murtaugh Bridge.

Even with the staff-recommended mitigation, the opportunity to begin a trip on the Murtaugh reach would be restricted to days when flow releases are scheduled, or flows exceed project capacity by 2,000 cfs or more, and the remnants of the natural rapids are likely to be less challenging than at present. These conditions would negate, to some extent, the value of any road improvements to enhance access to Star Falls and Caldron Linn for boaters or others.

The whitewater sections of the Snake River in the study area provide three distinct whitewater boating opportunities, each appealing to different skills and interests. As such, each section is unique in south central Idaho. The Milner and Murtaugh reaches, in particular, represent resources scarce in the northwest United States. The restriced availability of these resources caused by Snake River water management policies increase the value of the whitewater opportunities that remain in this part of Idaho.

4.8.7 Visual Quality

It is difficult to quantify cumulative impacts of the four proposed projects on the visual resources in the Snake River Basin because of the subjectivity associated with determining individual project impacts on visual quality, and because the entire river basin is so vast. For example, it is unrealistic to compare the visual quality of the Snake River Canyon with other nationally recognized features in the basin such as the Sawtooth National Forest, Sun Valley, and Craters of the Moon National Monument. The Snake River Canyon offers viewscapes (an individual's selected viewing position of an area) that are important basin features that contrast with the surrounding land areas, much as the Sawtooth Mountains contrast with the gently rolling, sparsely vegetated plains in the northern portion of the basin. Consequently, this interpretation of cumulative impacts on visual quality incorporates the same perceptual factors used to determine individual project impacts (for example, stimulants to smell, sound, sight, and touch and a relation to biophysical features, such as landforms, vegetation, and others used in Section 4.6). It also incorporates the staff's best professional judgement and a general comparison of the visual quality of the study river reach with other Snake River in the Upper Snake River Basin and of other similar Snake River segments reaches outside the basin (for example, a comprision of the visual quality of Hell's Canyon and an 8-mile long river reach between Lower Salmon Falls and Bliss, Idaho, the A.J. Wiley reach).

4.8.7.1 Cumulative Impacts of Existing Projects

The Snake River Canyon is an impressive gorge that has been carved, through centuries, by the Snake River cutting into the underlying geologic structures deposited after the Bonneville Flood. In the study reach, the gorge is similar to Hell's Canyon gorge, located downstream and outside the Upper Snake River Basin, except that the river has not cut as deep a gorge as Hell's Canyon, nor does the river have as steep a drop in elevation per mile. In some respects, the study reach is most similar to the A.J. Wiley reach, except that the study reach has a deeper canyon, more waterfalls, and fewer terraces or subcanyons. The visual quality of the study reach is unlike any other sections of the Snake River segments in the Upper Snake River Basin, and this analyses evaluates a viewer's perspective in determining the cumulative impacts of the four projects on the visual quality of the canyon.

The present water development projects for hydropower and irrigation have greatly altered and caused major, long-term cumulative adverse impacts to the visual quality of the Snake River Canyon. Present operating conditions allow all water to be removed from the Snake River at Milner dam for irrigation purposes, (figure 3-12) and were it not for some water leaking

through the base of the dam, the Snake River would be dry for some distance below Milner dam during the irrigation season, until the river could be recharged by springs, runoff, and irrigation return waters. Converting a raging, 1.6 mile-long whitewater area of the Snake River near Milner dam into a dry, rocky, streambed during the irrigation season creates significant adverse visual impacts.

The spectacular Shoshone Falls, taller than Niagara Falls, undergoes seasonally diverse changes in water flows (figure 3-3 and 3-4) which, in conjunction with irrigation diversions and hydropower generation, can reduce water passage over the falls to a trickle during years of unusually scant precipitation. The summer flows in the Snake River below Milner dam in 1987 indicate how severely flows can be affected by water diversion practices. Unfortunately, removing water from the river at Milner dam occurs during the peak tourist season, and Shoshone Falls and Twin Falls have experienced adverse visual impacts because of this. The visual beauty of both falls (Twin Falls and Shoshone Falls), has been reduced also by the construction and operation of hydropower facilities at these locations for over 50 years (figures 3-4 and 3-7). Twin Falls once consisted of twin waterfalls (figure 3-5). In 1935, the waterfall closest to the south bank of the river was destroyed by the erection of a dam across the crest of the ledge as part of the Twin Falls Project. In addition, the dams at Milner, Twin Falls, and Shoshone Falls have changed the visual quality of the 32-mile-long study segment of the Snake River from a natural river to a regulated Snake River consisting of a series of reservoirs separated by dams with few portions of the natural river channel resembling predevelopment conditions. Changing the study reach of the Snake River from a natural to a regulated stream is not unique as the river has undergone similar changes throughout much of its length leaving very few segments of river exhibiting natural flow and channel characteristics.

Auger Falls and Star Falls are the last two waterfalls remaining on the mainstem of the Snake River that are relatively unmodified (flows over the falls are influenced by water releases at Milner dam) by commercial development, and the visual quality at each waterfall is relatively unimpaired, especially at Star Falls. The water at these two waterfalls drops over a bench to form a true waterfall appearance, unlike other rapids or whitewater areas in the study reach such as Pillar Falls, Amnesia Falls, and Basalt Falls. Auger Falls was given a moderate natural feature value (rating of 3) in the Pacific Northwest Rivers Study (Allen et al., 1986). This value may reflect the study's comparison with the other waterfalls located immediately upstream from Auger Falls. For instance, the Shoshone Falls and Twin Falls were given an outstanding natural feature value (rating of 1), and the Perrine Coulee Falls was given a substantial natural feature rating (rating of 2). The moderate rating for Auger Falls may also reflect the limited public access to the falls. Star Falls

was not identified in the Pacific Northwest Rivers Study, but it is listed on the National Register of Historic Places. Star Falls (Caldron Linn), is listed on the National Register because of an accident that occurred to fur trappers in the 1800's near the site. The accident occurred during high flows over the falls and high flows are needed to fully appreciate the beauty and power associated with Star Falls.

Smaller tributaries entering the Snake River Canyon have also been harnessed for power (for example, Rock Creek by the Rock Creek I and Rock Creek II Projects, unnamed tributaries by K-W, N-32 and other hydroelectric projects) and have altered the natural features associated with these streams by building long concrete flumes, removing riparian habitat, and erecting buildings and other structures that contrast with the natural surroundings.

Visitors travelling through Idaho should visit the scenic Snake River Canyon. The canyon adds an important visual sensitivity and distinctiveness relative to other landscapes and riverscapes in the basin. The visual resources are as worthwhile to visit as other resources in the basin. Portions of the rugged, undeveloped canyon that have escaped development are recognized by a growing number of whitewater enthusiasts and the beauty and excitement of the canyon and river are growing in popularity among local and regional visitors. The study reach was included in a river segment (Milner dam to King Hill) identified by the Pacific Northwest Rivers Study (Allen et al., 1986) as having outstanding recreational, fisheries, and natural features. The BLM recognizes the importance of visual quality in the area and manages public lands to protect the aesthetics of the properties.

4.8.7.2. Cumulative Impacts of the Proposed Projects with the Staff Recommended Mitigation

The four proposed hydropower projects would contribute to significant cumulative adverse effects to the visual quality of the Snake River Canyon in the Upper Snake River Basin even after implementation of the staff's proposed mitigative plans. The physical dimensions of the proposed projects incorporate features that generally cover large tracts of land (such as transmission lines and power canals) and that erect large structures (such as dams and powerhouses), difficult to screen from view. The features contrast sharply with the natural vegetation and terrain in the canyon. The projects are visible from the canyon rims and are particularly imposing when viewed from the river or shoreline at sites where there formerly were no manmade facilities. The projects enhance access and viewpoints into the canyon; however the dramatic change of the scenery especially at Milner dam and Star Falls where the river and the canyon are undeveloped and provide a natural setting, offset this gain. Two of the projects, Star Falls and Auger Falls, would cause cumulative adverse impacts to lands managed by the BLM by exceeding its visual management criteria (Class II).

Dispersed recreational activities integrally associated with the visual and scenic quality would be adversely affected by manmade structures (in previously undisturbed areas) or by the diminished volume and velocity of river flows in river reaches where individuals enjoy recreational activities. Ultimately, the impacts of the four proposed projects on the visual quality and the quality of any recreational experience within the canyon depends on an individuals personal aesthetic values, the type of activity, and the user's expectations. Whitewater enthusiasts and people fond of waterfalls would experience cumulative adverse impacts to visual quality because of the magnitude of scenery adversely impacted by the projects. The waterfalls that would undergo cumulative adverse effects are Star Falls, Twin Falls, and Auger Falls. The proposed projects would cause an increase in the frequency and an extension in the duration of reduced flows over the falls. The four projects would also destroy or modify geological structures by dredging (for example, Basalt Falls) or bypass river reaches that would destroy whitewater areas. The projects would erect dams and buildings directly on top of the scenic features or on waterfalls. The whitewater areas within the Murtaugh reach would generally be unaffected by the Star Falls and Milner Projects, except for any abrupt changes in flow releases at Milner dam. The Murtaugh reach is inacessible to most visitors except those travelling on the surface of the river, while the other affected falls and whitewater areas are more readily visible to a wide variety of visitors because of the proximity of the projects to the canyon rim or access to other viewpoints near the features (for example, observation sites at Twin Falls and Star Falls).

The four proposed projects would cause significant, cumulative adverse impacts to the visual quality of the Snake River Canyon. The projects affect water flows in the 32-mile-long study reach, and any changes to those flows would affect waterfalls and white-water areas of the Snake River.

The four proposed projects would alter water flows over Star Falls and Auger Falls, the last two undeveloped waterfalls on the mainstem of the Snake River, would alter flows over Twin Falls, and would alter flows in the unique 1.6-mile-long bypassed whitewater reach of the Snake River below Milner dam and in other rapids and whitewater areas of the river. The value of some of these visual resources can be estimated by determining the numbers of persons visiting the sites or the number of people rafting a river section. Values for sites like Star Falls and Auger Falls are more difficult to assign and are invaluable because these two falls represent the last two undeveloped waterfalls on a river that has been so intensively managed for qualities other than for scenic or aesthetic purposes, such as for irrigation, flood control, and generating electricity. Once these two waterfalls are developed, their character will change considerably, and there will be no more natural waterfalls on the mainstem of the Snake River.

Flow of water at Milner dam is crucial to reducing the significant cumulative adverse impacts of the projects proposed below Milner dam. For Star Falls, significant flows for visual quality are unimportant because the construction of a large dam immediately above the falls precludes the enjoyment of the natural setting or the waterfall.

The staff recommends minimum flows for whitewater boating, water quality, and fishery resources for all the projects. If implemented, these flows would partially mitigate the cumulative adverse impacts on visual quality caused by the projects. The staff believes that the proposed Milner Project, because it greatly affects the amount of water reaching the other projects downstream, should release a minimum flow during the irrigation season (April 15 to October 15) to offset cumulative adverse impacts on visual quality. The visual quality of the river, as well as other resources of the Snake River (for example, water quality, whitewater boating, fish resources), have been greatly impacted over the years by the use and removal of water from the river at Milner reservoir for delivery to irrigators along a 100-mile stretch of the river between Milner dam and Bliss, Idaho. The study reach does not accrue the amount of water lost to the irrigators.

The dispersion of water from the Snake River to users at, above, and below Milner dam is complex and may at times seem paradoxical. For example, in 1987, when much of the Milner area was experiencing drought conditions, IPC obtained, through a lease-purchase agreement, 150,000 acre-feet of water for power generation at their Twin Falls facility. IPC has leased additional waters annually (except for 1980) from sources above Milner dam for the last 8 years, the average releases for July, August, and September were about 38,000 acre feet per month or about 1300 acre feet per day (which is about 630 cfs per day) (letter from Roger Fuhrman, Power Resource Coordinator, Idaho Power Company, Boise, Idaho, October 14, 1987). The staff views these actions to indicate that although water is a very valuable and limited commodity in the Upper Snake River Basin, there appears to be times when water could be made available for uses other than for irrigation and power generation. The leasing of water by IPC also points out the complexities of trying to allocate waters for protecting the environmental resources when two of the proposed projects (the Twin Falls and Milner Projects) would operate independent of one another and yet impact shared resources.

The staff believes the management of the water resource at Milner dam should include multiple purpose usage for protecting and enhancing water for visual quality, water qulaity, and for fish resources. For these reasons, the staff recommends that a minimum flow of 300 cfs be released from Milner dam into the by-passed reach from April 15 to October 15 to enhance the visual quality of the Snake River. After consultation with the IDPR, the

staff recommends that CC monitor the flow in the bypassed reach to ensure enhancement of the visual quality. If the results indicate modifications to the flow release is necessary to ensure protection of visual quality, an alternative flow regime can be required by the Commission at a later date.

The proposed Milner and Star Falls projects would both reduce the visual quality of Star Falls; the Milner Project would control the movement of water reaching Star Falls, and the Star Falls Project would control the movement of water going over the falls by building a dam and diverting the water elsewhere.

The four proposed projects also would cause cumulative adverse impacts to visual quality of the Snake River Canyon by creating multiple projects that are visible at one viewing location and by building projects that are visible at different times and different places by the same viewers. For example, the Auger Falls Project would be built in the close proximity of two other hydropower projects, Rock Creek I and N-32 (figure 4-1). All three projects would be seen from the river bank or from the north rim of the canyon, especially with the increased public access proposed for the Auger Falls site. The project facilities of the proposed Auger Falls Project (transmission line, penstock, and large open canal) would adversely affect the visual quality of that section of the canyon site by by creating manmade facilities that are strikingly similar to the Rock Creek I Project, nearby, and increase development in the canyon to a point where the visual quality of area is greatly reduced.

Any visitor coming to the study reach to see waterfalls can see a variety of waterfalls; seasonal, hanging waterfalls like Perrine Coulee, the commercially developed Shoshone Falls and Twin Falls, and the undeveloped Star Falls and Auger Falls. After licensing (relicensing for Twin Falls) the proposed projects, a visitor would see losses of whitewater areas at Milner, Star Falls, and Auger Falls, reduced flows over Star Falls, Twin Falls, and Auger Falls; hydropower facilities in areas that were previously undeveloped (such as at Star Falls), and a proliferation of hydropower facilities in a confined area (such as the floodplain at Auger Falls). The cumulative adverse impacts of the four projects would likely be most noticeable to boating enthusiasts travelling down the river.

Whitewater enthusiasts would experience cumulative adverse impacts to visual quality of the Snake River and Snake River Canyon with the development of the four proposed projects because of the proximity of two of the projects to one another (Milner and Star Falls Projects), the losses of whitewater boating areas, and the impacts the large structure have on the boaters when viewed from the water surface. For example, whitewater enthusiasts would have new river access sites built near the Milner and Star Falls powerhouses. These two new access sites

would improve access to the river, but would also bring with them a commercial development (hydropower structures) that changes the visual quality of the area from undeveloped to developed. Other visitors formerly travelling the river from the vicinity of Milner dam to the Murtaugh bridge, or from Star Falls to Twin Falls (the Murtaugh reach) experienced the peace and tranquility of a natural setting, whereas, after construction of the new projects, the boaters would see imposing structures in the canyon (figure 3-13). In conjunction with the existing developments at Shoshone Falls and Twin Falls, a visitor travelling between Milner dam and Rock Creek now would experience the cumulative adverse effects on visual quality caused by an ever increasing number of hydropower projects in the Snake River Canyon.

4.8.8 Cultural Resources

4.8.8.1 Cumulative Impacts of Existing Projects

In 1905, a portion of the historic Oregon Trail near the town of Murtaugh was obliterated by the construction of the Twin Falls Main Canal. In recent years, a large prehistoric Indian village site was excavated in preparation for the construction of the Rock Creek Project. The staff is not aware of any other National Register properties or properties eligible for the National Register that have been affected by existing development within the study reach of the Snake River.

4.8.8.2. Cumulative Impacts of Proposed Projects With Staff-recommended Mitigation

Three of the four projects proposed for the Upper Snake River would affect properties that are either listed on or eligible for listing on the National Register of Historic Places: the Milner Project, the Star Falls Project, and the Twin Falls Project. The proposed Auger Falls Project would not affect National Register or eligible properties.

The Milner Project would adversely affect the existing historic dam, Twin Falls Main Canal, headworks, and bridge. A beneficial effect would result from the federal protection that would be extended to this historic property as a result of licensing and from increased long-term usefulness.

The Star Falls Project would adversely affect the historic Caldron Linn; and would affect, though not adversely, two of the sites associated with historic Drytown, China Cave, and the drylaid wall structures 7 and 8, and the large open occupation site on the north side of the river. This would

be the second large occupation site to be excavated in preparation for hydropower development in this reach of the Snake River in recent years. The earlier excavation took place at a prehistoric Indian village prior to the construction of the Rock Creek Project near the location of the currently proposed Auger Falls Project.

The existing Twin Falls Project's characteristics that make the property eligible for the National Register, would be impacted as a result of constructing the proposed new intake, power tunnel, and powerhouse, but not adversely. The Twin Falls dam would be the second of two eligible dams to be impacted if all four projects are licensed, Milner would be the first.

The Oregon Trail, a segment of which was obliterated in construction of the Twin Falls Main Canal, would not be further affected by any of the four proposed projects.

4.9 DESIGN ALTERNATIVES

The staff analyzed three structural design alternatives to determine environmental impacts to the target resources. The alternatives are described in section 2.2. All three alternatives are economically feasible (table 5-2).

The two alternatives for the Milner Project were recommended by public participants in the scoping meeting held in Twin Falls, Idaho, on December 10, 1986. The staff recommended the Star Falls alternative to maximize the head available at the site. The two Milner alternatives are tentative; the Star Falls alternative is more detailed, and the staff can therefore assess it more completely.

4.9.1 Land Features and Geology

4.9.1.1 Milner Design Alternative No. 1

4.9.1.1.1 Environmental Consequences

Locating the powerhouse at Milner dam would produce considerably less impacts on erosion, sedimentation, and slope stability than CC's proposal, and less impacts than Milner Design Alternative No. 2. Alternative No. 1 would disturb the smallest area of land, and would not require enlarging the existing Twin Falls Main Canal to accommodate power operations. Impacts of the access road construction would also be least with Alternative No. 1, because access to the dam already exists.

4.9.1.1.2 Environmental Consequences with Staff-recommended Mitigation

To minimize effects on soils and geologic resources, CC should provide a detailed site-specific plan to control erosion, sedimentation, and slope stability at the site. To minimize impacts on turbidity and sedimentation in the Snake River, CC should provide for dewatering the construction area and for filtering water pumped from the excavation.

4.9.1.1.3 Unavoidable Adverse Impacts

During project construction these effects in the Snake River would be unavoidable: Minor, temporary, localized erosion, minor, localized movement of loose rock; and minor, temporary increases in turbidity and sedimentation.

4.9.1.2 Milner Design Alternative No. 2

4.9.1.2.1 Environmental Consequences

Compared to CC's proposal, locating the proposed powerhouse in the vicinity of the bridge below Milner dam would substantially

reduce the amount of land disturbance. A much shorter length of canal would have to be modified, and access to the powerhouse would be over a shallower section of the canyon rim; consequently, this alternative would have considerably less erosion and sedimentation and potentially less rockfall than CC's proposal. Construction of the alternative would also generate a smaller quantity of spoil materials than the original proposal.

4.9.1.2.2 Environmental Consequences with Staff-recommended Mitigation

CC should provide a detailed, site-specific plan to minimize erosion, sedimentation, and slope-stability impacts; a spoil-disposal site would also be needed for excess excavated materials. If CC implements the staff's recommended mitigative measures, the effects on soils and geologic resources would be minor and short-term.

4.9.1.2.3 Unavoidable Adverse Impacts

During project construction, minor, temporary erosion and sedimentation, potential, minor, localized rockfall, and minor, temporary increases in turbidity in the Snake river would be unavoidable; impacts during project operation would be negligible.

4.9.1.3 Star Falls Design Alternative

4.9.1.3.1 Environmental Consequences

Compared to B&C's proposal, extending the tailrace by making an additional excavation in the river channel at the proposed Star Falls powerhouse site would not cause any additional impacts to soil and geologic resources, except to generate a slightly larger amount of rock fragments, river powder, and other spoil materials. The effects of the alternative on erosion, sedimentation, and slope stability also would be moderate, and would be similar to those of B&C's proposal.

4.9.1.3.2 Environmental Consequences with Staff-recommended Mitigation

Additional sediment control measures, such as the use of a cofferdam, would be needed within the river channel to direct the river from the larger construction area where excavation for the tailrace extension would occur. Turbid water pumped from the excavation should be filtered through a settling pond before being returned to the river. If B&C implements the mitigative measures recommended by the staff for B&C's proposal, and also installs sedimentation control measures for the tailrace extension, the impacts of this alternative on erosion, sedimentation, and slope stability would be moderate to minor.

4.9.1.3.3 Unavoidable Adverse Impacts

During project construction, moderate to minor short-term impacts on erosion, sedimentation, and slope stability would be unavoidable; long-term impacts would be minor.

4.9.2 Aquatic Environment

4.9.2.1 Milner Design Alternative No. 1

4.9.2.1.1 Water Quality

4.9.2.1.1.1 Environmental Consequences

Milner Design Alternative No. 1 would have significantly fewer adverse environmental impacts on water quality than CC's project.

The adverse impacts of project construction would be limited to the area downstream of the existing dam, and would not include the impacts on water quality of excavation at the entrance to the Twin Falls Main Canal or in the area of the proposed powerhouse. Turbidity and siltation associated with construction therefore would affect a smaller area of the Snake River.

Under Milner Design Alternative No. 1, the adverse impacts of project opration on water quality in the bypassed reach would be eliminated. Because the rapids would be retained, reaeration potential would be maintained at a high level.

4.9.2.1.1.2 Environmental Consequences with Staff-recommended Mitigation

The staff makes no recommendations.

4.9.2.1.1.3 Unavoidable Adverse Impacts

This alternative would avoid most of the adverse impacts of CC's proposal, because those impacts would result from the presence of a bypassed reach. During construction, turbidity, suspended solids, and dissolved solids would increase in the Snake River downstream from the project, but to a lesser extent than with CC's proposal.

4.9.2.1.2 Fish

4.9.2.1.2.1 Environmental Consequences

Milner Design alternative No. 1 would have significantly fewer adverse impacts than CC's proposal. Degradation of the aquatic habitat during construction of a powerhouse at the dam would be less than with CC's proposal. If Milner Design

Alternative no. 1 is used instead of CC's proposal, the amount of habitat and food available to fish would be substantially increased, because no bypassed reach would be required.

Under Milner Design Alternative No. 1, the adverse effects of fish entrainment and turbine mortality could increase. With CC's proposal, fish entering the Twin Falls Main Canal would have the opportunity to escape entrainment in the turbines by swimming upstream or downstream in the canal; with Milner Design Alternative No. 1, higher numbers of fish swimming downstream in the area of the dam might be entrained in the turbines.

4.9.2.1.2.2 Environmental Consequences with Staff-recommended Mitigation

The staff makes no recommendations.

4.9.2.1.2.3 Unavoidable Adverse Impacts

Construction activities would reduce available food resources and fish habitat, but to a lesser extent than under CC's proposal. The death of fish from passage through the project turbines would be unavoidable. Under Milner Design Alternative No. 1, the impacts associated with a bypassed reach would not occur.

4.9.2.2 Milner Design Alternative No. 2

4.9.2.2.1 Water Quality

4.9.2.2.1.1 Environmental Consequences

Milner Design Alternative No. 2 would have fewer short-term, adverse impacts than CC's proposal. The adverse impacts associated with project construction would be limited to the area downstream of the existing dam and county road powerhouse site and would not include the effects on water quality of excavation at the entrance to the Twin Falls Main Canal or in the area of the powerhouse site. The turbidity and siltation of construction therefore would affect a smaller area of the Snake River.

Using Milner Design Alternative No. 2 would eliminate the adverse impacts of project operation in water quality in the bypassed reach.

4.9.2.2.1.2 Environmental Consequences with Staff-recommended Mitigation

The staff makes no recommendations.

4.9.2.2.1.3 Unavoidable Adverse Impacts

Using this alternative would avoid most of the adverse impacts of CC's proposal, because there would be a much shorter

bypassed reach. During construction, turbidity, suspended solids, and dissolved solids would increase in the Snake River downstream from the project, but to a lesser extent than with CC's proposal.

4.9.2.2.2 Fish

4.9.2.2.2.1 Environmental Consequences

There would be less degradation of the aquatic habitat during construction of a powerhouse near the dam than with CC's proposal. If CC uses Milner Design Alternative No. 2 and creates a bypassed reach of 500 yards instead of 1.6 miles, the amount of habitat and food available to fish would be substantially increased.

The adverse effects of fish entrainment and turbine mortality could increase under Milner Design Alternative No. 2. With CC's proposal, fish entering the Twin Falls Main Canal would have the opportunity to escape entrainment in the turbines by swimming upstream in the canal; with Milner Design Alternative No. 2, greater numbers of fish swimming downstream in the area of the dam might be entrained in the turbines.

4.9.2.2.2.2 Environmental Consequences with Staff-recommendded Mitigation

The staff makes no recommendations.

4.9.2.2.2.3 Unavoidable Adverse Impacts

Construction activities would reduce available food resources and fish habitat, but to a lesser extent than would CC's proposal. The mortality of fish passing through the project turbines could not be avoided. Under Milner Design Alternative No. 2, the impacts of a bypassed reach would be reduced; these impacts would include reductions in fish habitat and food resources.

4.9.2.3 Star Falls Design Alternative

4.9.2.3.1 Water Quality

4.9.2.3.1.1 Environmental Consequence

The Star Falls Design Alternative would require excavation of the river channel to a depth of 1 to 12 feet and the removal of 40,000 cubic yards of material from the river bottom; the excavation would increase suspended and total solids, dissolved nutrients, and turbidity. Construction would take place during the summer, when other hydropower sites also would be under construction and when turbidity could be high in the Snake River because of the high levels of suspended solids entering the river in irrigation returns.

This alternative would extend the length of the bypassed reach through a series of rapids known as Basalt Falls, about 800 feet downstream from the location of B&C's proposed powerhouse. The loss of reaeration capacity provided by the 10-foot drop through Basalt Falls would be a long-term adverse impact. Using this alternative would have significantly more adverse environmental effects than would B&C's proposal.

4.9.2.3.1.2 Environmental Consequences with Staff-recommended Mitigation

The staff makes no recommendations.

4.9.2.3.1.3 Unavoidable Adverse Impacts

The impacts would be generally the same as with B&C's proposal, except that the adverse construction effects and the loss of reaeration capacity would be greater.

4.9.2.3.2 Fish

4.9.2.3.2.1 Environmental Consequences

The increased sedimentation and turbidity of construction within the tailrace excavation area would cause additional habitat degradation, loss of food items, and displacement of game fish.

The longer bypassed reach and the reduced reaeration potential would change water quality, producing long-term, adverse effects on game fish. The loss of additional rapids would reduce the area available for macroinvertebrate habitat and would result in fewer insects in the drift; additional long-term reductions in the food base also would adversely affect game fish.

4.9.2.3.2.2 Environmental Consequences with Staff-recommended Mitigation

The staff makes no recommendations.

4.9.2.3.2.3 Unavoidable Adverse Impacts

The impacts would be the same as those of B&C's proposal, except that the effects of construction and the long-term effects of the loss of fish habitat, food resources, and reaeration capacity would be greater.

4.9.3 Terrestrial Environment

4.9.3.1 Milner Design Alternative No. 1

4.9.3.1.1 Environmental Consequences

This alternative would disturb less than 5 acres of grass-shrub habitat that has low value to wildlife.

4.9.3.1.2 Environmental Consequences with Staff-recommended Mitigation

Revegetating disturbed areas would reduce terrestrial impacts to a negligible level.

4.9.3.1.3 Unavoidable Adverse Impacts

Local wildlife populations would be disturbed during the 2-year construction period, but less than 5 acres of low-value wildlife habitat would be affected.

4.9.3.2 Milner Design Alternative No. 2

4.9.3.2.1 Environmental Consequences

This alternative would disturb less than 10 acres of grass-shrub habitat with low wildlife value. When flows are reduced to the minimum flow release, approximately 5 acres of ice-free, waterfowl resting habitat between Milner dam and Milner Bridge would be lost; the habitat receives limited waterfowl use. Although a site-specific survey has not been conducted, very small acreages of wetland habitat are expected to be affected. Use of Milner Design Alternative No. 2 with the same mitigation the staff recommends for CC's proposal would reduce terrestrial impacts to a low level.

4.9.3.2.2 Environmental Consequences with Staff-recommended Mitigation

CC should construct osprey platforms, goose nesting structures, and burrowing owl burrows to enhance the use of the project area by these species. Disturbed areas should be revegetated and any affected wetlands should be replaced in kind. Five acres of ice-free waterfowl resting habitat woud be lost during some winters.

4.9.3.2.3 Unavoidable Adverse Impacts

Local wildlife populations would be disturbed during the 2-year construction period; less than 120 acres of low-value wildlife habitat would be affected.

4.9.3.3 Star Falls Design Alternative

The environmental consequences and the unavoidable adverse impacts of the Star Falls alternative and the staff's recommended mitigation would be the same as for B&C's proposal.

4.9.4 Socioeconomics

The three design alternatives would not significantly change the socioeconomic impacts of the proposed Milner and Star Falls

Projects described in the sections on site-specific impacts and cumulative analyses; for this reason, the staff makes no further socioeconomic analysis of the design alternatives.

4.9.5 Land Use and Recreational Resource

4.9.5.1 Milner Design Alternative No. 1

4.9.5.1.1 Environmental Consequences

Construction of the powerhouse at Milner dam would have no significant effect on the existing recreational use of the river.

4.9.5.1.2 Environmental consequences with Staff-recommended Mitigation

CC should schedule construction activities to minimize conflicts with the recreational use of the river downstream of Milner dam.

4.9.5.1.3 Unavoidable Adverse Impacts

This alternative would not have adverse impacts on recreation.

4.9.5.2 Milner Design Alternative No. 2

4.9.5.2.1 Environmental Consequences

Construction of the powerhouse at the Milner Bridge could adversely affect the access to the Snake River for boaters and fishermen who use the public road right-of-way.

4.9.5.2.2 Environmental Consequences with Staff-recommended Mitigation

If the powerhouse design and the tailrace discharge hinder public access to the river, CC should reconsider its plans for developing public access at Milner Bridge. CC also should schedule construction activities to minimize conflicts with the recreational use of the river downstream of the powerhouse.

4.9.5.2.3 Unavoidable Adverse Impacts

This alternative would have minimal adverse impacts on recreation.

4.9.5.3 Star Falls Design Alternative

4.9.5.3.1 Environmental Consequences

Except for the impacts of B&C's proposal on the two rapids and on the bypassed reach, the environmental consequences of this alternative would be the same as those of B&C's proposal.

Using this alternative would physically alter both of the rapids located between the project dam and powerhouse; part of the river between Star Falls and Murtaugh Bridge would be useable for whitewater boating, except when flows exceed the capacity of the project by approximately 2,000 cfs or more.

4.9.5.3.2 Environmental Consequences with Staff-recommended Mitigation

B&C should carry out the same mitigative measures the staff recommends for B&C's proposal.

4.9.5.3.3 Unavoidable Adverse Impacts

The impacts of this alternative would be the same as those of B&C's proposal.

4.9.6 Visual Quality

4.9.6.1 Milner Design Alternatives No. 1 and No. 2

4.9.6.1.1 Environmental Consequences

Moving the proposed powerhouse to Milner dam or to county road 1300S would greatly reduce the moderate impacts of locating the powerhouse below the 1.6-mile-long bypassed river reach, as CC proposes. The long-term effects of either Milner Design Alternative No. 1 or No. 2 on visual resources would be minimal, because there would be little disruption of natural features and the project would blend with the man-made features of Milner dam.

4.9.6.2 Star Falls Design Alternative

4.9.6.2.1 Environmental Consequences

This alternative would have the following effects: slightly increasing the adverse visual impacts of the proposed project; destroying or greatly modifying Basalt Falls; diminishing the beauty of the whitewater in the Star Falls reach of the river; and further reducing the importance to recreationists of Basalt Falls and Amnesia Falls.

4.9.7 Cultural Resources

4.9.7.1 Milner Project Design Alternative No. 1

4.9.7.1.1 Environmental Consequences

This alternative would have a greater adverse effect on the historic Milner dam than would CC's proposal, but would significantly reduce the adverse effect on the historic Twin Falls Main canal. The overall impact would still be adverse.

4.9.7.2 Milner Design Alternative No. 2

4.9.7.2.1 Environmental Consequences

This alternative would not reduce the adverse affects on the North Side Main Canal, headworks, and dam.

4.9.7.3 Star Falls Design Alternative

4.9.7.3.1 Environmental Consequences

This alternative would have the same effect on properties listed on or eligible for listing on the National Register of Historic Places as would B&C's proposal.

4.9.8 Comparison of Design Alternatives

The staff assumes that the existing environment would be the same for the three design alternatives as for the proposed Milner and Star Falls Projects. The staff's mitigative measures and analyses are tentative, because specific information on the design alternatives was either lacking or unavailable at the time of the assessment. This is particularly true for the Milner alternatives, which are based on a number of assumptions.

Both Milner Design Alternatives No. 1 and No. 2 would have fewer adverse environmental impacts on resident trout, wintering waterfowl, raptors, riparian-associated wildlife, riparian vegetation, water quality, visual quality, and recreation than would CC's proposal (table 5-1). The two Milner alternative designs would adversely affect cultural resources in much the same manner as would CC's proposals, because the dam and its facilities would be modified. The two Milner alternatives would eliminate the moderate adverse environmental impacts on resident trout, water quality, recreation, and visual resources of CC's proposal.

The Star Falls alternative would have moderate adverse environmental impacts on resident trout, wintering waterfowl, riparian-associated wildlife, visual quality, and cultural resources (table 5-1). When compared to B&C's proposal, this alternative would increase the adverse environmental effects on resident trout and would cause major impacts to recreation, visual quality, and water quality, primarily because of the modification of Basalt Falls.

In summary, the staff favors Milner Design Alternatives No. 1 and No. 2, which would cause less environmental damage than CC's proposal. Because the Star Falls Alternative Design would increase the adverse environmental impacts of B&C's proposal, the staff favors B&C's proposal more than the alternative.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 SIGNIFICANT ENVIRONMENTAL IMPACTS

In Section 4, the staff evaluated and discussed the potential environmental impacts (both project-specific and cumulative) of the four proposed projects and the three design alternatives. The staff subjected the target resources (resident trout, wintering waterfowl, raptors, riparian-associated wildlife, riparian vegetation, water quality, visual quality, recreation, local economy, and cultural resources) to detailed project-specific and cumulative impact analysis. Potential environmental impacts were also evaluated for nontarget resources, including threatened and endangered species, geology and soils, aquatic macroinvertebrates, and aquatic plants.

Based on these evaluations, the staff concludes that significant environmental impacts would occur if some of the proposed projects or alternative project designs are licensed. The project-specific and cumulative impacts of the four proposed projects, listed by environmental resource, appear in table 5-1. The staff summarizes the significant impacts in the two subsections that follow. The first subsection identifies significant project-specific impacts, and the second subsection identifies significant cumulative impacts.

Table 5-1 shows the scale the staff used to draw conclusions about how the projects would cause site-specific and cumulative impacts for each target resource; the scale is not quantitative, and reflects an analysis of the target resources in comparison with other areas and target resources in the basin and along the mainstem of the Snake River. All target resources did not receive preferential treatment by the staff and should be considered by the reader to be of equal value with no single target resource having more importance than another. For example, raptors are no more important than water quality, nor are cultural resources more important than riparian habitat.

5.1.1 Significant Project-specific Impacts

5.1.1.1 Milner Project

The proposed Milner Project is the linchpin for determining the magnitude of environmental impacts to the resources in the entire 32-mile-long study reach, because the Milner Project is closely associated with Milner dam, and because operations at Milner dam almost entirely control the amount of water available for water dependent resources, including target resources, in a significant portion of the study reach. The Milner applicant's proposal to dewater a 1.6-mile-long section of the Snake River by releasing no minimum flows during the irrigation season, from April 15 to October 15, would have significant adverse effects on resident

Table 5-1. Summary of individual and cumulative impacts of the four proposed projects on target resources without (WO) and with (W) the staff-recommended mitigative measures. Also shown for comparison are the site-specific impacts of the three design alternatives on target resources without (WO) and with (W) the staff-recommended mitigative measures (Source: the staff).

Project name	Resident trout		Wintering waterfowl		Raptors		Riparian-associated wildlife		Riparian vegetation		Water quality		Visual quality		Recreation		Cultural resources		Local economy	
	WO	W	WO	W	WO	W	WO	W	WO	W	WO	W	WO	W	WO	W	WO	W	WO	W
Cumulative Impacts	---	--	-	-	-	-	--	—	-	-	---	--	---	---†	---	---†	---	--	+	0
Milner	---	--	-	-	0	0	-	0	-	0	---	--	—	--	---	--	---	—†	+	0
Star Falls	---	-	--	--	-	-	--	--	--	-	---	--	---	---†	---	---†	---	--	+	+
Twin Falls	-	0	0	0	-	0	0	0	0	0	-	-	---	--	-	0	-	+	+	+
Auger Falls	--	-	-	-	-	-	--	—	-	0	—	--	—	--	--	--	0	0	+	+
Milner Alternative no.1	--	-	-	-	0	0	0	0	0	0	-	-	-	-	0	0	---	—†	+	0
Milner Alternative no.2	--	-	-	-	0	0	-	0	-	0	-	-	-	-	-	0	---	—†	+	0
Star Falls Alternative	---	--	--	--	-	-	--	--	--	-	---	--	---	---†	---	---†	---	--	+	+

Key
0 = no or very little impact
+ = a positive benefit
- = minor impacts
— = moderate impacts
--- = major or significant impacts
† = major or significant impacts even after the staff-recommended mitigative measures

trout, water quality, and recreational boating. Because of the interrelationship between water quality and the survival of food organisms and fish species, minimum flow releases during the summer months from Milner dam are extremely important. The staff's proposed release of 58 cfs (an amount equal to what has been leaking through the dam) during the irrigation season would maintain the existing river water quality and resident trout resources with moderate impacts to these resources, without requiring reappropriation of water from existing upstream users; the staff's proposed release of 58 cfs would not support whitewater boating and for this reason the staff recommends a specific minimum flow (described below) to protect whitewater boating.

The Milner applicant's proposal to release a minimum flow of 58 cfs into the 1.6-mile-long bypassed reach immediately below Milner dam during the nonirrigation season would significantly change the normal river conditions during that time of year and would significantly affect resident trout by reducing their habitat and subjecting them to overwintering mortality. Loss of the reaeration function of the river reach during the winter months is not as crucial as during the summer months; the staff's recommended flow of 1,260 cfs would wet about 60 percent of the stream channel during the nonirrigation season, and would be sufficient to protect water quality and resident trout and reduce the project's impacts from significant to a moderate level (table 5-1).

The proposed 1.6-mile-long bypassed reach of the Snake River immediately below Milner dam contains more than a mile of continuous class V whitewater rapids that are important to whitewater boating. The Milner applicant's proposal to generate power whenever there is more water available than is needed for irrigation would eliminate or greatly curtail whitewater boating activities in the bypassed reach during the normal spring and early summer whitewater boating season below Milner dam. To accommodate whitewater boating, the staff recommends releases of from 5,000 to 15,000 cfs into the proposed bypassed reach for 10 hours per day for a total of 10 days during the months of May and June; these releases would reduce the project impacts on whitewater boaters to a moderate level; because of the unique character of the bypassed reach, however, the losses to regional recreational users would be significant.

Milner dam, the Twin Falls Main Canal, a timber bridge, and other structures associated with Milner dam would be modified to accommodate the proposed hydropower project. The 82-year-old Milner dam is eligible for listing on the National Register of Historic Places. The Milner applicant's proposal would alter the cultural features of the dam significantly, even with the addition of the staff's recommended mitigative measures of developing the site in concert with the SHPO's recommendations. If the Milner Project is licensed, the licensee would be required to protect

these structures against any further degradation or significant adverse impacts. Either Milner Design Alternative would affect the dam or a canal system similar to the proposed project and therefore would cause similar adverse impacts to cultural resources.

5.1.1.2 Star Falls Project

The Star Falls Project area is undeveloped, and remains in much the same condition as it has for nearly 115 years, with Star Falls as the focus of the Snake River Canyon. In addition to visual features of the Canyon area, the river has been classified as a class II high priority fishery resource, for which IDFG has set a a management goal of maintaining or creating a high-yield trout fishery.

The proposed Star Falls Project would produce significant adverse effects on visual quality and recreational resources. The Star Falls applicant's proposal to provide a minimum flow of 160 cfs over Star Falls and into the 2,200-foot-long bypassed reach of the Snake River during periods of project operation and to provide the inflow (minus 12 cfs) of the river during the other times of the year would cause a significant loss to the visual quality of Star Falls and other rapids such as Amnesia Falls.

Caldron Linn, an integral component of Star Falls, is listed on the National Register of Historic Places. The Star Falls applicant's proposal would change the visual quality of the falls by decreasing the amount of water flowing over Star Falls more often and for longer periods by building a 20-foot-high, 500-foot-long dam near the crest of the falls. These features would significantly diminish the cultural values and visual quality associated with Caldron Linn. The Star Falls applicant also proposes a 2,200-foot-long power canal, a 2,500-foot-long access road that would be built from the south canyon rim, a new transmission line into and across the canyon, and a powerhouse, all of which would despoil the visual quality and character of the area, even with implementation of the staff's and the Star Falls applicant's proposed mitigative measures.

Since the repair of the BLM access road to Star Falls this past spring, whitewater boaters now have ready access to the river reach between Star Falls and Murtaugh Bridge. The Star Falls applicant's proposal to release 160 cfs into the bypassed reach of the Snake River during project operation would eliminate the whitewater boating associated with Amnesia Falls, and depending on how water is released from the powerhouse, could adversely affect the boating quality of Basalt Falls.

The staff recommends minimum flow releases of between 2,000 and 8,000 cfs to accommodate whitewater boating, when inflows to the Star Falls project are 2,000 cfs or greater. Specifically,

the staff recommends that a whitewater boating minimum flow release be made for a total of 20 days in the months of May, June, and October. Minimum flow releases of 10 hours per day for up to a total of 20 days in May, June, and October would reduce project impacts on whitewater boating opportunities, but because of the scarcity of whitewater boating in south central Idaho, the losses caused by the Star Falls applicant's proposal, even with the staff's recommended minimum flows, would still be significant. The Star Falls Design Alternative would slightly increase the adverse impacts caused by the proposed Star Falls Project because the Design Alternative would destroy or greatly modify Basalt Falls.

5.1.2 Significant Cumulative Impacts to Target Resources

The Snake River and the Snake River Canyon, where the four proposed projects would occur, are integral components of the Upper Snake River Basin. In section 4, the staff analyzed the potential of the four proposed projects to cause cumulative adverse impacts to the target resources of the basin (table 5-1). The staff's conclusions include adjustments for the staff's recommended mitigative measures developed for each project.

The staff made an assessment of cumulative impacts by analyzing data submitted to the Commission for each of the projects, information from other licenses or license applicants in the basin, published and unpublished information about the basin, and discussions with federal, state, and private entities familiar with the resources of the basin.

The staff has determined that the proposed Milner, Star Falls, Twin Falls, and Auger Falls Projects, with the applicant's and the staff-recommended mitigative measures, would cause significant cumulative adverse impacts to visual quality and recreational resources, 2 of the 10 target resources evaluated for the Upper Snake River Basin. The four proposed projects, analyzed in section 4.8, would have minor cumulative adverse impacts on wintering waterfowl, raptors, riparian vegetation, and moderate cumulative adverse impacts on resident trout, riparian-associated wildlife, water quality, and cultural resources. The four projects would have very little cumulative impacts on the local economy after construction because the positive gain caused by the influx of workers would be offset by mitigative measures requiring minimum flows which could cause water to be diverted from crops.

The three design alternatives, analyzed in section 4.9, would not cause significant cumulative adverse impacts on the target resources identified for the basin if considered by themselves, but when considered with or in combination with one or more of the proposed projects, would cause minor to moderate cumulative adverse impacts on the target resources.

The Star Falls Design Alternative is nearly identical to the proposed Star Falls Project and for all practical purposes would have the same cumulative adverse impacts as the proposed project. The Star Falls Design Alternative contains detailed information that makes the staff interpretation of potential cumulative impacts more precise. In contrast, the staff-generated Milner Design Alternatives do not contain the same types of detailed information as the proposed Star Falls Alternative and the potential cumulative adverse impacts on the target resources is a more subjective staff interpretation.

For the most part, the two Milner Design Alternatives would potentially have significantly less cumulative impacts on the target resources than the proposed Milner Project because of the reduced bypassed stream reach. Either design alternative is preferable to the proposed Milner Project. Both Milner Design Alternatives would still seasonally control flows in the river downstream from the project and would require minimum flows from either project to reduce cumulative impacts to the target resouces in the study reach. To reduce the cumulative impacts on target resources from the four projects or a combination of the proposed projects and alternatives, the staff is recommending a minimum flow of 300 cfs. The 300 cfs minimum flow would be released for 24 hours a day from Milner dam during the irrigation season and would offer protection to water quality, resident trout, and visual quality in the study reach. The staff's proposed minimum flow of 300 cfs from Milner dam during the irrigation season might require reappropriation of water usage by proponents of the proposed Milner Project.

Specific discussions about how the four proposed projects would cause significant cumulative adverse impacts on visual quality and recreational resources follow.

5.1.2.1 Visual Quality

All four proposed projects would alter flows over waterfalls and whitewater river reaches. The proposed Milner Project is the most important link in the study reach in contributing to cumulative adverse impacts on visual quality. During prolonged periods when no minimum flows are released from Milner dam, typically in the summer months, during the irrigation season, suitable habitat for fish resources, water quality, and stream flows for visual quality over waterfalls (Star Falls, Twin Falls, Shoshone Falls, and Auger Falls) and rapids (the 1.6-mile-long Milner bypassed reach, Amnesia Falls, Basalt Falls, and others) in the Snake River Canyon have been severely affected.

Star Falls and Auger Falls are unique visual resources because they are the last two remaining undeveloped mainstem waterfalls on the entire 1,038-mile-long Snake River; in their present condition

these two waterfalls represent an invaluable resource to the Upper Snake River Basin and to the Snake River. Present irrigation diversions upstream of both waterfalls at Milner dam affect water flows over these two waterfalls; both waterfalls have not been structurally disturbed by man and there have been few to no man-made features erected nearby, this is particularly true for Star Falls which is the focal point of a portion of the Snake River Canyon that is in much the same condition as it was 115 years ago. The proposed Star Falls and Auger Falls Projects would drastically change the character of the two waterfalls by erecting buildings or dams nearby, placing the waterfalls in bypassed stream reaches, and by changing the frequency and duration of reduced flows over the waterfalls.

Existing hydropower development in the basin and in the study reach has had drastic cumulative adverse impacts on visual quality; the adverse impacts on Shoshone Falls and Twin Falls are two good examples of the type of visual impacts that have occurred. The construction and operation of the proposed Star Falls and Auger Falls Projects would reduce the visual quality of Star Falls and Auger Falls and cause significant cumulative adverse impacts to visual quality of the basin.

The proposed Star Falls Project would contribute to noticeable cumulative adverse impacts to visual quality of the study reach, because the project would change the natural character of a river reach which is accessible to the public. One of the major features of Star Falls is the waterfall and its association with Caldron Linn, which is recognized as having having cultural significance through its listing on the National Register of Historic Places.

There is no public access to Auger Falls, although the waterfall is visible to residents living along the north canyon rim above the falls, to persons at certain access points along the north rim, and to other persons who obtain permission from private landowners to use the private roads built on the floodplain between Perrine Bridge and the Auger Falls. The visual quality of Star Falls and Auger Falls should not be measured by visitor usage alone, or based on comparisons with the height or quality of such nearby falls as Shoshone Falls, Twin Falls, and Perrine Coulee Falls; Star Falls and Auger Falls are invaluable because they are the last two undeveloped waterfalls on the mainstem of the Snake River.

5.1.2.2 Recreational Resources

The study reach of the Snake River provides whitewater boating opportunities unique in southern Idaho, and uncommon in the Pacific Northwest. Existence of limited boating opportunities for adventure-level big water at Milner dam, day-long trips on the Murtaugh reach by commercial outfitters, and enjoyment of the river's recreational opportunities by private boaters are becoming known outside the local area, at a time when participation in whitewater boating activities is accelerating nationally.

The proposed Milner and Star Falls Projects would severely reduce opportunities to travel through whitewater in the Milner reach and over rapids downstream from Star Falls throughout the life of the projects. Providing flow releases for whitewater boating at the Milner Project and at the Star Falls Project would not totally eliminate these impacts, and would produce long-term, significant cumulative adverse impacts to whitewater boating. The staff's proposed minimum whitewater flows would not offset the total whitewater boating opportunities lost over an entire season and over the life of the two projects.

The four proposed projects would also cause cumulative adverse impacts to recreational resources by degrading visual resources in the study reach that are an integral part of the recreational experience associated with whitewater boating and with other recreational activities in the Canyon. For example, thousands of sightseers annually visit Shoshone Falls and Twin Falls, the two resources in the Canyon that draw the largest number of tourists to the study reach each year. Many visitors, on their way to other points of interest in the basin and in the state, stop at Perrine Bridge to view the Snake River Canyon. Any loss of visual quality caused by the reduction of river flows during certain times of the year, could affect the casual visitor and the whitewater recreationist. The flows needed to provide for whitewater boating also would enhance the visual quality of the river and its waterfalls and rapids.

5.1.2.3 Recommendations to Mitigate Cumulative Impacts

To reduce the significant cumulative adverse impacts to target resources the staff recommends licensing an array of projects. These projects, with the applicant's and the staff-recommended mitigation, include the Twin Falls and Auger Falls Projects, and Milner Design Alternative No. 1 or Milner Design Alternative No. 2. To further reduce the significant cumulative adverse impacts associated with the staff suggested array of recommended projects, the staff recommends that all projects not be constructed during the same period in order to reduce the potential construction impacts on the resources of the Snake River. The staff also recommends that in addition to the site-specific mitigative measures recommended by the staff and by the applicants for each project, that a minimum flow of 300 cfs be released from Milner dam during the irrigation season to reduce the cumulative impacts in the study reach associated with all the projects on visual quality, resident trout, and water quality.

The proposed Milner and Star Falls Projects and Star Falls Design Alternative would cause significant site-specific impacts to whitewater boating and visual quality even with the applicant's and the staff's recommended mitigative measures. The potential impacts

of the Milner and Star Falls Projects and Star Falls Design Alternative on whitewater boating and visual quality, in conjunction with the moderate impacts at the Star Falls Project site on wintering waterfowl, riparian-associated wildlife, and water quality, would create impacts that, when combined with any of the other proposed projects or design alternatives, would cause significant cumulative adverse impacts to the target resources and therefore are not preferred by the staff.

5.1.3. Economics of the Proposed Projects and Design Alternatives Under the Staff's Recommended Mitigation

The staff's analysis of the four proposed projects and the three design alternatives indicate that only the Milner Project, the Milner Design Alternative No. 1, and the Auger Falls Project are economically feasible with the staff's recommended mitigative measures; the levelized net benefits of the three economically feasible projects are 3.8 mills, 12.9 mills, and 6.7 mills/kWh, respectively (table 5-2). The staff's analysis shows that with the recommended mitigative measures, primarily the minimum flows to protect water quality and whitewater boating, would reduce the levelized net benefits of the Milner Project from 25.2 mills/kWh to 3.8 mills/kWh. In its economic analysis, the staff assumed that the recommended 300 cfs minimum flow downstream of Milner dam for the Milner Design Alternative No. 1 would not impact power generation, because the powerhouse discharge would be located at the base of Milner dam, and because the minimum hydraulic capacity of the proposed turbine is 900 cfs. However, the staff's proposed continuous minimum flow of 300 cfs from Milner dam during the irrigation season could reduce the amount of water available for irrigation above Milner dam and the staff's economic analysis did not include the costs for such irrigation water losses. The staff's recommended mitigative measures for the Auger Falls Project are the same as the applicant's proposed project and therefore would not significantly affect the economics of the proposed project.

The staff's economic analysis indicates that the proposed mitigative measures for the Star Falls Project, Star Falls Design Alternative, Twin Falls Project, and Milner Design Alternative No. 2 would be economically infeasible with levelized energy costs that are greater than the cost of alternative energy by 27.0 mills, 26.8 mills, 2.6 mills, and 6.8 mills/kWh, respectively (table 5-2).

5.1.4 The Staff's Preferred Action

Based on the staff's environmental analyses, the staff prefers the development of an array of projects that includes the Milner Design Alternatives No. 1 or Milner Design Alternative No. 2, the Twin Falls Project, with the staff's recommended mitigative

Table 5-2. Economic comparison of the net benefits of the proposed Milner, Star Falls, Twin Falls, Auger Falls Projects, the Milner Design Alternatives No.1 and No. 2, and Star Falls Design Alternative, with and without the staff's and the applicant's recommended minimum flows (Note: the 300 cfs minimum flow proposed by the staff for mitigative measures at Milner dam may not affect project generation because the water may come from irrigation users.)(Source: the staff).

Proposed project	Estimated Average Annual Energy (GWh)		Net benefits (mills per KWh)	
	With applicant's proposed minimum flows	With staff-recommended minimum flows	With applicant's proposed minimum flows	With staff-recommended minimum flows
Milner	142	104	25.2	3.8
Star Falls	90.4 1/	52	8.5	-27.0
Twin Falls	120	101	12.6	-2.6
Auger Falls	157.6	157.6	6.7	6.7
Milner Alt. no. 1	—	44.5 2/	—	12.9
Milner Alt. no. 2	—	46.8 3/	—	-6.8
Star Falls Alt.	99.4	57.2	10.4	-26.8

1/ The staff's average annual energy estimate for the Star Falls Project using the applicant's minimum flow of 160 cfs is 80.4 Gwh. The staff believes that the applicant's estimate is high because the historical flow record was used without taking into into account depletion of flows for irrigation.

2/ Calculated using 300 cfs proposed by the staff.

3/ Calculated using 300 cfs mitigative flows proposed by the staff during the irrigation season from April 15 to October 15 plus 1200 cfs proposed by the staff for the nonirrigation season from October 16 to April 14.

measures, and the Auger Falls Project, with the staff's recommended mitigative measures. The proposed Milner and Star Falls Projects and Star Falls Design Alternative would have significant individual and cumulative adverse impacts, even with the staff-recommended mitigative measures, and for those reasons are not preferred by the staff.

An economic analysis of the array of acceptable projects preferred by the staff shows that only the Milner Design Alternative No. 1 and the Auger Falls Project would be economically feasible. The economic analysis shows that both the Twin Falls Project and Milner Design Alternative No. 2, with the mitigative measures proposed by the staff, would have levelized costs of 2.6 and 6.8 mills/kWh, respectively, which would be greater than the cost of alternative energy.

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The following agencies, organizations, and individuals are being provided copies of the Draft Environmental Impact Statement.

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Department of the Interior
  Bureau of Indian Affairs
  Bureau of Reclamation
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  U.S. Fish and Wildlife Service
  Geological Survey
  National Park Service
  Office of Environmental Project Review
Environmental Protection Agency
Federal Emergency Management Agency
Northwest Power Planning Council

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Idaho State Historic Preservation Officer
State Soil Conservation Commission

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9 APPENDIX A. SPECIAL LICENSE ARTICLES FOR PRIVATE AND MUNICIPAL PROJECTS

Article A. The licensee shall commence construction of project works within 2 years from the issuance date of the license and shall complete construction of the project within 4 years from the issuance date of the license.

Article B. The licensee shall file with the Commission revised exhibit F drawings showing the final design of project structures. The revised exhibit F drawings shall be accompanied by a supporting design report and the licensee shall not commence construction of any project structure until the corresponding revised exhibit F drawing has been approved.

Article C. The licensee shall at least 60 days prior to start of construction, submit one copy to the Commission's Regional Director and two copies to the Director, Division of Inspections, of the final contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouse, and water conveyance structures. The Director, Division of Inspections, may require changes in the plans and specifications to assure a safe and adequate project.

Article D. The licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days prior to start of construction of the cofferdam, the licensee shall submit to the Commission's Regional Director and Director, Division of Inspections, one copy each of the approved cofferdam construction drawings and specifications and the letter(s) of approval.

Article E. The licensee shall within 90 days of completion of construciton file with the Commission revised exhibits A, F, and G to describe and show the project as built.

SCOPING DOCUMENT SUPPLEMENT 2 FOR SNAKE RIVER, IDAHO HYDROELECTRIC PROJECTS

TWIN FALLS	FERC NO. 18-001
MILNER	FERC NO. 2899-003
AUGER FALLS	FERC NO. 4797-001
STAR FALLS	FERC NO. 5797-001

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WASHINGTON, D.C. 20426

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SCOPING DOCUMENT SUPPLEMENT 2

Twin Falls Project	FERC No.	18-001
Milner Project	FERC No.	2899-003
Auger Falls Project	FERC No.	4797-001
Star Falls Project	FERC No.	5797-001

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Washington, D.C.

January 1989

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SCOPING DOCUMENT SUPPLEMENT 2

Twin Falls Project	FERC No. 18-001
Milner Project	FERC No. 2899-003
Auger Falls Project	FERC No. 4797-001
Star Falls Project	FERC No. 5797-001

1.0 INTRODUCTION

The staff of the Federal Energy Regulatory Commission (FERC) determined that issuance of licenses for four proposed projects on the mainstem Snake River, the Twin Falls, Milner, Auger Falls, and Star Falls Projects, would constitute a major Federal action significantly affecting the quality of the human environment. The FERC staff, therefore, issued a draft Environmental Impact Statement (DEIS) in November, 1987.

Due to new circumstances, new information that became available after the DEIS was issued, and new staff alternatives, the FERC issued a Notice of Intent to Prepare a Supplement to the DEIS (Supplement) on July 15, 1988. The Supplement will address only the new circumstances and information made available since the DEIS and will include only sections of the DEIS that require change. Public meetings were held in Twin Falls, Idaho, on August 18, 1988, to discuss the new circumstances, information, and staff alternatives.

Additionally, the FERC staff held scoping meetings in Boise and Twin Falls on November 2, 1988, to: (1) present the environmental issues expected to be covered in the Supplement to the public and experts familiar with the Snake River Projects, (2) receive input from the public and experts on the issues presented, (3) clarify the significance of issues, (4) identify additional issues that merit treatment in the Supplement, and (5) identify issues that do not merit treatment in the Supplement. Oral and written comments were received from the public and Federal and state agencies.

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Principal scoping comments were grouped into the following categories:

- o water quality issues, including target flows, the comprehensive water block, and the water bank;
- o cumulative impacts, primarily cumulative impacts on water quality and fish and wildlife resources from all proposed projects on the mainstem of the Snake River in the vicinity of the four projects;
- o fish and wildlife resources and riparian habitat losses; and
- o Milner licensing.

The FERC staff has considered all scoping comments and has revised the issues list in section 3 to reflect input from the scoping meetings and subsequent letters of comment. Concurrently, due to the high risk of failure of the existing Milner dam, the Commission consulted with the Council on Environmental Quality (CEQ) and requested concurrence with a plan to proceed with the licensing of the Milner Project prior to completion of the FEIS on the four projects on the Snake River. Consistent with the emergency provisions of the CEQ's regulations, the CEQ approved the Commission's plan to license the hydroelectric facility at the Milner dam prior to completion of the FEIS. A Commission licensing order issued on December 15, 1988, resolved project-specific environmental issues. Thus, the Supplement will address the Milner Project only to summarize project-specific issues resolved in the license order and to analyze the cumulative impacts of the Milner Project in association with the other proposed projects.

Any questions concerning the scoping process or preparation of the Supplement should be directed to Mr. Frank Karwoski, Federal Energy Regulatory Commission, Office of Hydropower Licensing, Division of Environmental Analysis, 825 N. Capitol Street, N.E., Washington D.C. 20426 (202/376-9284).

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The following sections provide a description of the proposed action and alternatives, summarize the environmental impact issues, and present a draft outline of the Supplement. The outline is a project-based format with cross-reference to the DEIS.

2.0 PROPOSED ACTIONS AND ALTERNATIVES

2.1 DESCRIPTION OF PROPOSED ACTIONS

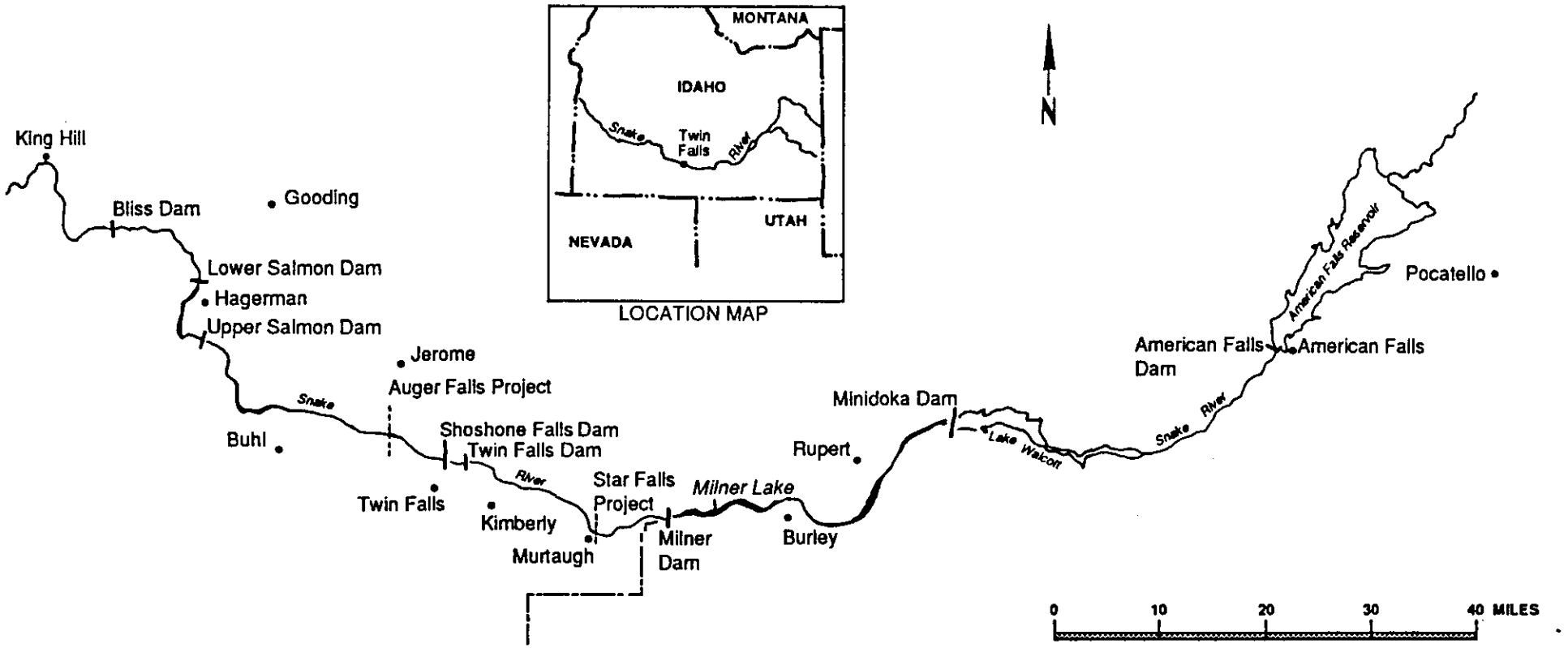
The locations of the four proposed projects are shown on Figure 1. No major changes are proposed by the applicants for either the Twin Falls or Auger Falls Projects. However, alternative project configurations have been proposed by the staff for the Auger Falls Project (see Section 2.4.2). The Star Falls Project has been reconfigured and an amended license application was filed on December 1, 1988. A summary of the amended Star Falls Project is provided below.

- Changes in project configuration include a larger and higher dam located upstream of the original diversion site dam that will be 50 feet above the current water surface (versus 20-foot-high weir), a powerhouse (1 MW unit) located at the dam, a buried penstock on the north side of the river instead of a canal on the south side of the river, and a powerhouse (35.8 MW unit) located on the north side of the river instead of the south side and upstream of the original powerhouse site. Two rapids previously within the bypassed reach are now below the powerhouse site.

- The size of the reservoir would increase, with 5.2 miles of free-flowing river inundated instead of 3.5 miles with the original proposal. The reservoir would extend nearly to the site of the Milner powerhouse.

- Access to the project would be provided by upgrading the existing road that leads to Star Falls from the north canyon rim, instead of constructing a new access road from the south canyon rim as originally proposed.

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Figure 1. A portion of the Upper Snake River between King Hill and Pocatello, Idaho, showing existing dams and proposed hydroelectric projects. (Dashed lines indicate proposed dam)

- Project operation would be run-of-river rather than the previously proposed store and release. No whitewater boating releases will be provided from water in the reservoir.

2.2 SUPPLEMENTAL MITIGATIVE MEASURES PROPOSED BY APPLICANTS

Supplemental mitigative measures were proposed for the Milner and Twin Falls Projects in filings dated March 31, 1988. Mitigation for the Milner Project is updated in the FERC order issuing the license, dated December 15, 1988. Mitigative measures for the amended Star Falls Project were proposed in the amended application for license filed on December 1, 1988.

2.2.1 Amended Star Falls Project

- Target flows for fisheries in the bypassed reach are proposed to be 160 cfs during the irrigation season and 250 cfs during the nonirrigation season.

- During construction, cofferdams, berms, check dams, and sediment ponds would be used to control erosion and sedimentation and protect water quality.

- An off-site mitigation area for aquatic, terrestrial, and recreational resources would be located on a 3/4-mile-long reach of Rock Creek located about 12 to 15 miles from the project area.

- An on-site developed recreation area would include parking, toilets, picnic facilities, fire pits, campsites, handicap-accessibility, and put-in facilities for whitewater boating.

- Project facilities would be designed to accommodate recreational releases if the whitewater enthusiasts desire the releases in the future and other environmental concerns can be adequately addressed.

- Interpretive signs would explain the historical significance of Star Falls and Caldron Linn.

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- Several viewpoints would be provided along the inner canyon wall.

2.2.2 Twin Falls Project

- Release of flows over Twin Falls to enhance visual quality would be provided to coincide with periods of greatest recreational use of the project area.

- Two alternative plans have been proposed for flows to be released over Twin Falls: Plan A would provide 140 cfs during daylight hours on weekends and holidays all year, and Plan B would provide 140 cfs during daylight hours on weekends and holidays for September to March and provide 140 cfs daily during daylight hours from April to August.

- A small weir would be constructed at the top of the falls to direct the water over both sides of the falls, to create a similar visual impression from a flow of 140 cfs as is seen with flows of 300 and 500 cfs; the weir would not be visible to people viewing the falls.

2.3 ALTERNATIVE MITIGATIVE MEASURES PROPOSED BY THE STAFF

2.3.1 Target Flows

- Target flows may be set for a variety of resources, including fisheries, water quality, visual quality, and recreation.

- The State Water Plan specifies zero flow below Milner dam. To be consistent with this comprehensive plan, target flows in the bypassed reach of the Milner Project can only be provided when there is water available in excess of irrigation needs.

- A target flow at the other projects would be equivalent to the minimum flow that would otherwise be recommended for the bypassed reach for each project. All inflow must be released up to the target flows, which must be met or exceeded before a powerhouse at the bottom of a bypassed reach could be operated.

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2.3.2 Comprehensive Water Block (CWB)

- The objective of the CWB is to provide water for target flows at the projects when it is available in excess of irrigation needs.

- The CWB is the combined amount of water needed to provide target flows for mitigation of project-specific and cumulative impacts for all of the projects. The size of the CWB would vary with the number of projects that are licensed and constructed.

- Each project that is licensed and constructed would provide a subblock to the CWB. The size of individual subblocks would be different for each project since target flows would be based on what is needed to mitigate impacts at each specific project.

- The size of the CWB would vary from year to year depending on the amount of flow in the river and the availability of water in excess of irrigation needs.

- Licensees could potentially lease water for the CWB from the Water Supply Bank, described in Policy 4B of the State Water Plan, which also states that use of the Water Supply Bank created by Idaho Code 42-1762 shall be encouraged. Water has been available for rental in all years since the bank began operation in 1979, and is expected to be available in sufficient quantities to meet the needs of the CWB in most if not all years in the future, based on current staff estimates. Long-term leases may be established and would have priority over nonirrigation uses.

- Target flows to be set for the projects will recognize the physical limitations of the system so that they will not interfere with irrigation operations or flood low-lying areas.

- Flows to be released for project-specific target flows could be accounted for when the water is released from American Falls reservoir, and measured below Milner dam.

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- The CWB could be an accounting mechanism, for licensees to equitably share the responsibility for providing mitigative flows, since water that is released from American Falls reservoir would flow through all the proposed projects.

2.4 ALTERNATIVES TO THE PROPOSED ACTIONS

2.4.1 Milner Project Staff Alternative

One or more small turbines would be installed at the dam in addition to the large turbine proposed for the powerhouse to be located 1.6 miles downstream of Milner dam. The specific location and configuration of this additional generation were not addressed in the license order. The license order requires the licensees to conduct a study of the feasibility of constructing a power plant at Milner dam. If this study shows that it would be economically beneficial, the licensees shall submit a schedule and plans for developing a power plant at the dam.

2.4.2 Auger Falls Staff Alternative

- Penstocks leading from the proposed canal to the powerhouse would be shifted towards the south side of the river and placed in a natural "niche" in the face of the cliffs to minimize blasting that would be needed to excavate the trenches for the penstocks. Placing the penstocks along the existing road to the Rock Creek powerhouse and constructing the Auger Falls powerhouse next to the existing powerhouse will also be evaluated. This alternative would eliminate blasting of the cliffs.

- Access to the powerhouse would be from the end of the road leading to the existing Rock Creek powerhouse located on the Snake River near the south end of the cliffs, instead of constructing a new access road along the river and leading to the north end of the cliffs as originally proposed.

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- o The transmission line could be relocated to follow the existing Rock Creek transmission line and eliminate a river crossing for the Auger Falls transmission line.

3.0 ENVIRONMENTAL IMPACT ISSUES

A preliminary list of the environmental impact issues identified by the FERC staff for consideration during the scoping process was presented in the Scoping Document Supplement No. 1. Project-specific environmental issues for Milner have been resolved in the License Order and in the License Articles. Consequently, resolution of the project-specific environmental issues identified for Milner in the Scoping Document Supplement No. 1 will be summarized in the Supplement, and they have accordingly been deleted from this scoping document.

Input from the scoping process did not result in any major changes to the preliminary list of issues for the other three projects or cumulative impacts at the four projects.

3.1 PROJECT-SPECIFIC ISSUES

3.1.1 Amended Star Falls Project

3.1.1.1 Erosion, Sedimentation, and Slope Stability

Temporary and permanent measures may be necessary to control erosion, sedimentation, and slope stability.

3.1.1.2 Water Resources

- o The proposed Star Falls impoundment may not meet state water quality standards for temperature and dissolved oxygen. Sampling at the existing pool behind Star Falls indicates dissolved oxygen presently falls below the state standard of 5 mg/l (Star Fall License Application Table E2-5). The proposed reservoir may

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further increase surface water temperature and lower dissolved oxygen, since the existing pool stratifies in the summer (Table E2-5).

- Water temperature and flow conditions could improve with the project in the river below the reservoir, because target flows will be potentially higher than existing low midsummer flows, and because bottom releases from the proposed reservoir may be cooler than existing water flowing over the falls.

3.1.1.3 Fisheries Resources

- Existing cold water fish habitat in the project reach will be replaced with warm water fish habitat in the proposed larger, deeper reservoir. A combination warm/cold water fishery may be possible in the stratified reservoir; however, oxygen depletion in deeper water may limit cold water fish habitat.

- The cold water fishery in the Murtaugh reach below the project could be affected by altered water temperatures with the proposed project. If surface waters from the reservoir are released downstream during midsummer, water temperature below the dam may exceed existing conditions. If reservoir bottom waters are released, water temperature below the dam may be lower than existing conditions, which may benefit the trout population.

- Fish in the reservoir may be diverted into the power intake. No fish screens are presently proposed, thus fish residing in the reservoir may be lost downstream or may be damaged or killed by the turbines.

- Specific ramping rates may be necessary to protect fish habitat during power generation in the bypass reach and below the powerhouse.

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3.1.1.4 Vegetation and Wildlife Resources

- Elimination of most waterfowl nesting habitat within the project reach of the Snake River.

- Loss of winter habitat for pheasants and gray partridge.

- Loss of 27 acres of wetlands (palustrine scrub/shrub, palustrine forested-scrub/shrub, palustrine emergent) and 84 acres of mixed sagebrush and grassland.

- Potential indirect effects on wetlands (5.7 acres) immediately downstream of the proposed damsite.

3.1.1.5 Recreation

- Access to the river for whitewater boaters that portage around or put-in immediately downstream of Star Falls.

- Effects of sudden increases in flow from operations on safety of downstream recreationists.

- Potential increase in private and commercial summer whitewater boating in the Murtaugh Reach.

3.1.1.6 Visual Resources

- Visual effects of reduced flow over Star Falls.

- Visual effects of project facilities in contrast to the natural appearance of the area on recreationists.

3.1.1.7 Cultural Resources

- Impacts on archeological and historic sites within the new project area. Principal new impact areas include the proposed transmission line, which is now in a different location than the original

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project configuration, and the additional area along the project reservoir that will be affected by the proposed increase in pool elevation.

- Impacts to Star Falls, a historic natural feature listed in the National Register of Historic Places, need to be reassessed given the relocation of the project dam.

- Comments by the state historical preservation officer (SHPO) on the new Star Falls damsite location and associated facilities, including a statement of effect (no effect, no adverse effect, or adverse effect).

3.1.2 Twin Falls Project

3.1.2.1 Water Resources

- Dissolved oxygen levels in the river below the powerhouse during the summer may be reduced by bypassing water around the falls.

3.1.2.2 Fisheries Resources

- Fish in the reservoir may be diverted into the power intake. No fish screens are presently proposed, thus fish may be lost downstream or may be damaged or killed by the turbine.

- Specific ramping rates may be necessary to protect fish habitat during power generation in the river below the falls.

- Appropriateness of the fish habitat enhancement plan proposed at Vinyard Creek to help mitigate possible loss of fish to the intake.

3.1.2.3 Recreation

- Accommodation of any increased recreational use that occurs as a result of increased viewing opportunities of the falls.

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3.1.2.4 Visual Resources

- o Visual effects of reduced flow over Twin Falls.
- o Visual effects of project facilities.

3.1.3 Auger Falls Project

3.1.3.1 Erosion, Sedimentation, and Slope Stability

- o Temporary and permanent measures may be necessary to control erosion, sedimentation, and slope stability.

3.1.3.2 Water Resources

- o Dissolved oxygen levels in the river below Auger Falls in relation to state standards.

3.1.3.3 Fisheries Resources

- o Fish in the reservoir may be diverted into the power intake. No fish screens are presently proposed, thus fish may be lost downstream or may be damaged or killed by the turbine.
- o Specific ramping rates may be necessary to protect fish habitat during power generation in the river below the falls.
- o The effectiveness of a fish ladder at the Auger Falls diversion dam.

3.1.3.4 Vegetation and Wildlife Resources

- o Loss of riparian habitat.

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3.1.3.5 Recreation

- The ability of the proposed lengthy pedestrian access to enhance recreational opportunities at the project site.

3.1.3.6 Visual Resources

- Effects on the views of the canyon from important viewing locations along the canyon rim, especially in consideration of the 0.5 mile setback requirements for a greenbelt.

- Visual effects of reduced flows over Auger Falls.

- Visual effects of project facilities on river recreationists.

3.2 CUMULATIVE IMPACT ISSUES

- Cumulative impacts of projects on all resource areas for projects as proposed and staff alternatives, including new mitigative measures proposed by the applicants and the staff.

- Cumulative effects of projects on water quality of the Upper Snake River, particularly the effects on reaeration from the diversion of water around the falls and rapids.

4.0 COMPREHENSIVE PLANNING

4.1 IDAHO STATE WATER RESOURCES PLAN

4.1.1 Interim Protected Rivers

- Designates a portion of the Snake River as an interim protected river, pursuant to section 42-173H of the Idaho Code, which includes the Star Falls and Auger Falls project sites.

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- The Milner Project is upstream of the designated reach; the Twin Falls Project is not affected because any designation of waterways as interim protected rivers or protected rivers does not affect the continued operation or relicensing of existing hydropower projects.

4.2 NORTHWEST POWER PLANNING COUNCIL

4.2.1 Protected Areas

- A protected area within the reach of the Snake River includes two of the proposed projects. It begins at Vinyard Creek, which discharges into Twin Falls reservoir, and extends downstream through the Auger Falls reach to the mouth of the Snake River.

- Designated protection is for wild resident fish habitat, wintering waterfowl, and bald eagles.

- The proposed Star Falls and Milner Projects are upstream of Vinyard Creek, and would not affect the protected area.

- The proposed Auger Falls Project is within the protected area.

- The proposed Twin Falls Project is exempt from the protected areas designation because it is located at an existing dam.

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