

UPPER PAYETTE RESERVOIR

ACTIVE STORAGE

CALCULATION

IDAHO DEPARTMENT OF WATER RESOURCES

J. WESTRA & S. HORNBAKER  
6/2/93

## UPPER PAYETTE RESERVOIR

### PURPOSE

The primary purpose of the project was to determine active storage volumes at any given reservoir level height. Allowances for evaporation, seepage and other sources of shrinkage were not considered in the calculations. The results will be utilized for future water management of the Payette River system.

### BACKGROUND

The upper Payette Reservoir is a mountain reservoir located north of McCall in the Payette National Forest. Originally, the reservoir was part of a natural lake on the North Fork of the Payette River, draining into "Big" Payette Lake. A radial gate dam was constructed on the south end in 1953, raising the lake 8 feet in height. The active storage is utilized for irrigation in the lower Payette River Valley below.

### PROCEDURE

Several sources of information and field data were incorporated into the volume calculations for the reservoir. Due to the natural lake (dead pool) portion of the reservoir, a detailed survey of the reservoir would have involved a great deal of time and resources. It was felt that by incorporating the use of existing contour maps, survey field data, and the computer, a credible calculation of volume could be found. USGS bench marks had been established on the right dam abutment and at the north road bridge, all elevations were referenced to these bench marks. The USGS contour maps of the reservoir also referenced the reservoir at the high water line elevation of 5555 ft., which outlined the reservoir border at full elevation. In late October of 1992 after several drought seasons, the reservoir had reached dead pool level. A field survey was completed at that time, tying the dead pool elevation and slope to the full reservoir elevation, 5555 ft.. Survey data was obtained at key geological features such as shore points, incoming creek tributaries, and bench marks that could be referenced on the USGS map. The data points were then plotted for the dead pool on an expanded version of the contour map. Data points from the reservoir full elevation and dead pool were loaded into the computer utilizing Surfer-Version 4 software, which inturn plotted a new contour map of the reservoir with contour elevations at 1 foot intervals. Surface areas were also calculated at each elevation of the reservoir as part of the software. The volume for each 1 foot of reservoir elevation was then computed by the pyramid frustrum equation:

$$V = h/3(A_1 + A_2 + \sqrt{A_1 A_2})^1$$

where V= Volume (Ac-Ft.)

h= contour height (ft.)

A = upper surface area (Ac-Ft)

A = lower surface area (Ac-Ft)

#### ACCURACY/ERROR

Although, the utmost care was taken in obtaining and collecting data, there is always some error involved in field data, maps, and computer plotting. Close attention was paid to the calmness of the dead pool during the survey to obtain accurate elevations, but some movement is unavoidable. At the reservoir dead pool level, the north end of the reservoir becomes a wetland grass habitat, and the ground surface is very uneven with several creek tributaries coming in. In being practical, some interpolation had to be done in plotting this particular area. By plotting the data manually on an expanded map, using a planometer, the surface areas found were reasonably close to the computer calculated areas. Generally, the accuracy of other types of water measurements are credible within 5 to 10 percent, the volumes determined in this case would safely fall within this percentage.

#### SPECIFICATIONS/FACTS

Reservoir Location: Parts of Sec. 36, 25, T21N, 3E  
 Sec. 31, 30, 19, T21N, 4E  
 Valley County, ID.

Dam: 4 - 8ft.(height) X 10 ft.(wide) radial gates.

Drainage: 42 square miles.

Surface Area: 321 acres

Water Right: #65-2918 (Decreed)

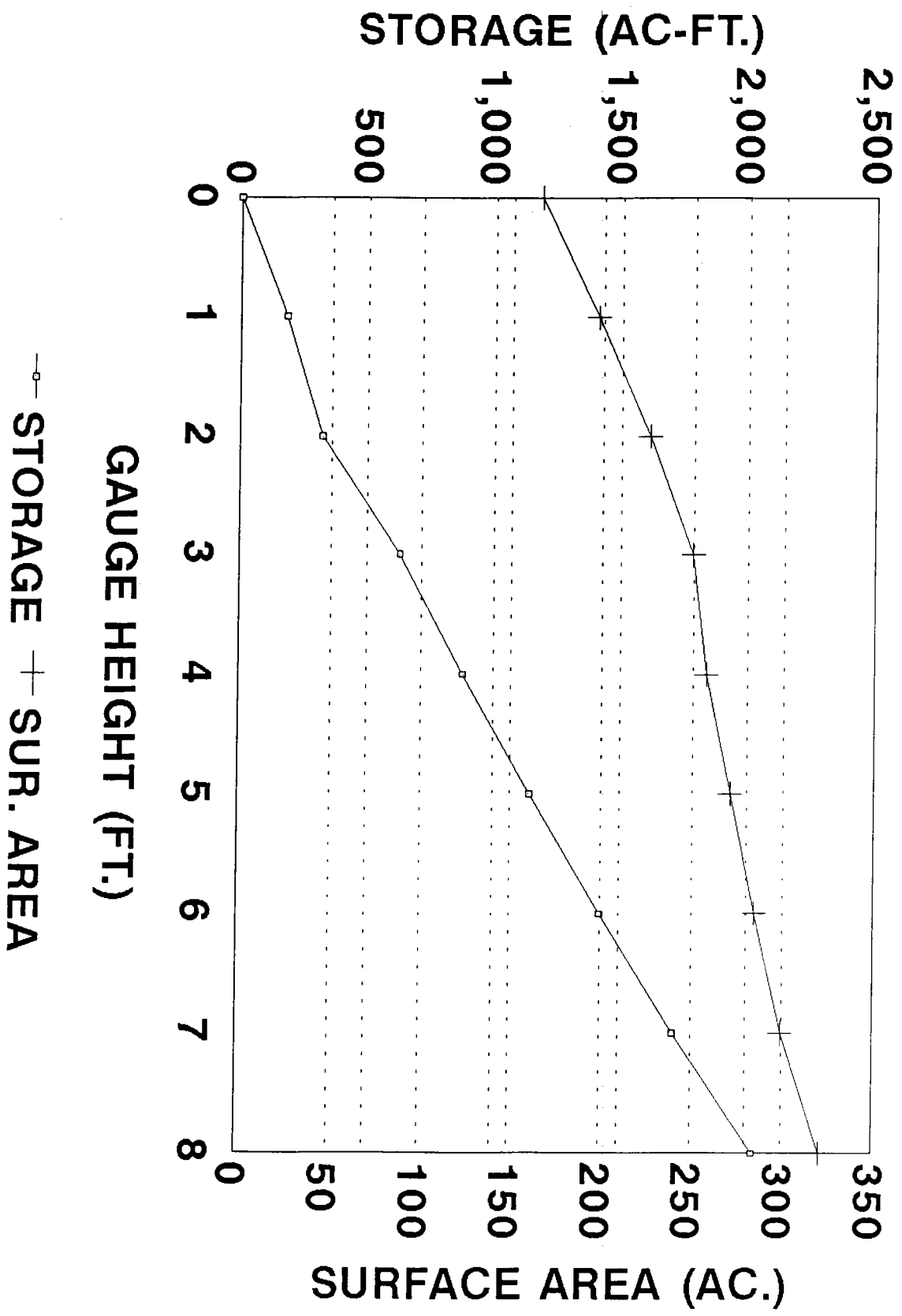
Owner: Lake Reservoir Co., Payette, ID.

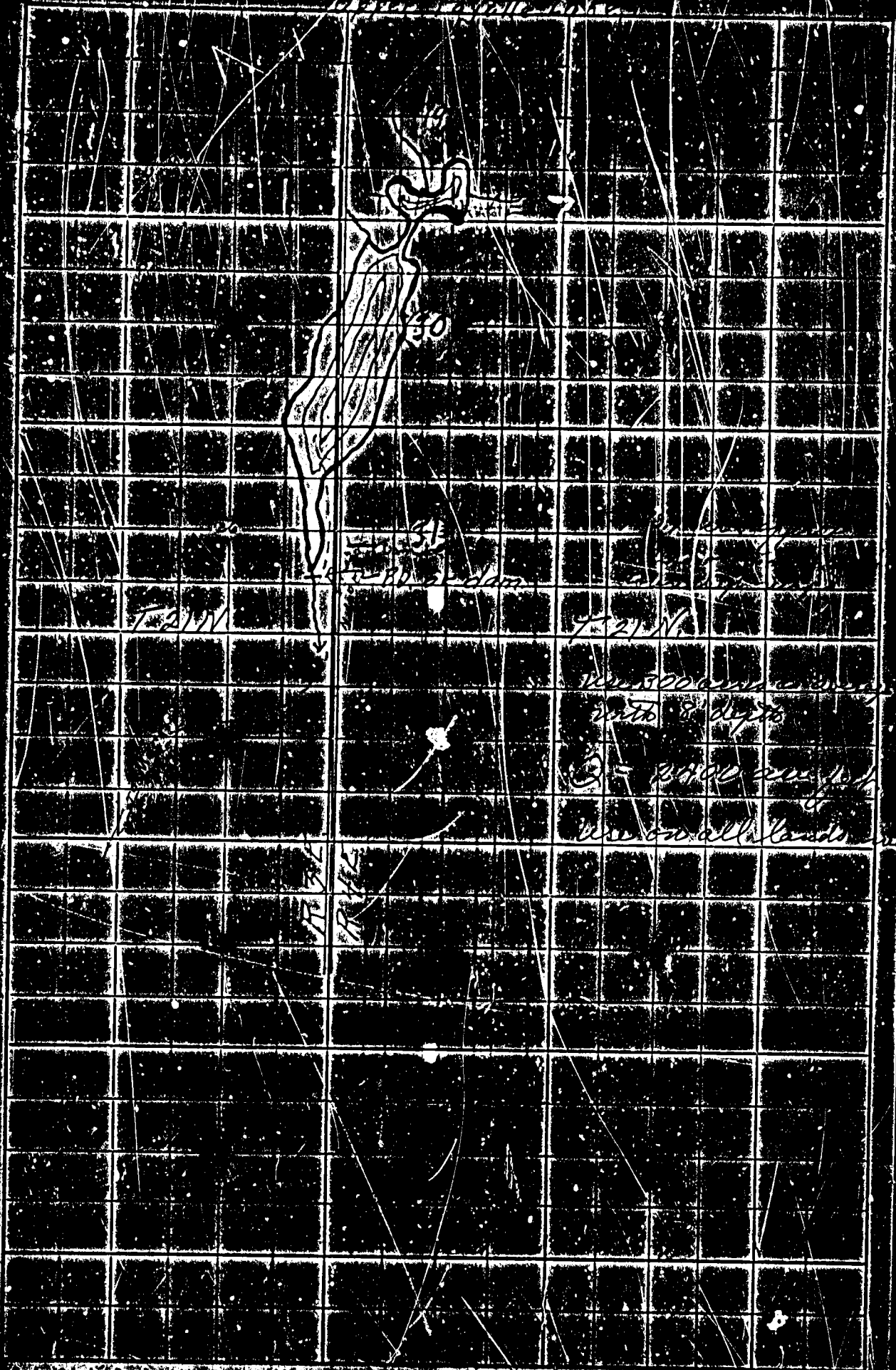
UPPER PAYETTE RESERVOIR LAKE STORAGE CHART

Gauge Height (Ft.)	Remaining Active Storage (Ac-Ft.)	Surface Area (Acres)
0.0	0.0	165.5
1.0	181.0	197.0
2.0	320.0	225.6
3.0	629.0	249.6
4.0	882.0	257.2
5.0	1146.0	270.8
6.0	1423.0	284.6
7.0	1715.0	299.4
8.0	2026.0	321.2

# UPPER PAYETTE RESERVOIR

## ACTIVE STORAGE





30

T-21 N

T-21 N

2000 m  
2000 m

2000 m  
2000 m  
on all lands

STATE OF IDAHO  
DEPARTMENT OF RECLAMATION  
BOISE, IDAHO  
REPORT OF ENGINEER

Permit No. B-113

This proof is for Completion of Works & Beneficial Use in Water District No. \_\_\_\_\_

1. Name of applicant: G. O. Ficken, Pres. Lake Reservoir Company

2. Source of water supply: No. 10 Payetta River

3. Location of point of diversion: Is in the NW 1/4 of Section 31

T. 21 N. R. 4 E. B. M. County of Valley

4. Describe works as they exist, giving dimensions and capacities of same: a concrete structure

has been placed across the channel some distance below the lake pool. It has an overflow spillway as indicated on the plan. Structure is 4.5 feet bank to bank with earth embankments extending to high ground on each side. It has a depth of 8' high water. Lake area 1152 acres reported by Forest Service in 1911 Idaho

5. Water is used for: irrigation, domestic and power purposes

6. State whether or not water has been turned into works of diversion: Yes

7. List legal subdivisions of lands to be irrigated. If proof is for beneficial use, give exact number of acres under cultivation in each forty-acre tract. (Describe manner and place of use if other than irrigation.)

All lands lying under and being irrigated by Burgett Irrigation District, Lake Irrigation Co., Enterprise Ditch Co., Farmers Cooperative Irrigation Co., Lower Payetta Ditch Co., and Payetta Heights Irrigation District, embracing approximately 68,500 acres.

Site location made on lands irrigated 8-7-11

(Submit map on attached plat, showing location and details of above description.)

8. What large stream would the water here appropriated finally reach?

Remarks: Structure in good shape. Sluice gates open. No water being placed on this date.

This is an inspection report made Sept 7-11  
Date inspection

This examination was made on the

26 day of Oct 1911  
(Signed) G. O. Ficken

STATE OF IDAHO  
DEPARTMENT OF RECLAMATION  
BOISE, IDAHO  
REPORT OF ENGINEER

Permit No. 2414

This report is for completion of the work authorized in Water District No. 1

1. Name of applicant: Lake Reservoir Company

2. Source of water supply: Payette River

3. Location of point of diversion: Is in the NEASW 1/4 of Section 31

County of Valley

4. Describe works as they exist, giving dimensions and capacities of same.

*Structure is a concrete dam with a spillway on the right side. The dam is 100 feet high and 100 feet wide at the top. The spillway is 100 feet wide and 100 feet high. The dam is located on the Payette River. The dam is owned by the Lake Reservoir Company.*

5. Water is used for: IRRIGATION, DOMESTIC AND POWER PURPOSES

6. State whether or not water has been turned into works of diversion: Yes

7. List legal subdivisions of lands to be irrigated. If proof is for beneficial use, give exact number of acres under cultivation in each forty-acre tract. (Describe manner and place of use if other than irrigation.)

*All lands in this area are being irrigated by the Lake Reservoir Company. The lands are located in the Lake Reservoir Company's irrigation district. The lands are approximately 68,500 acres.*

*Map on attached page showing location and details of above description.*

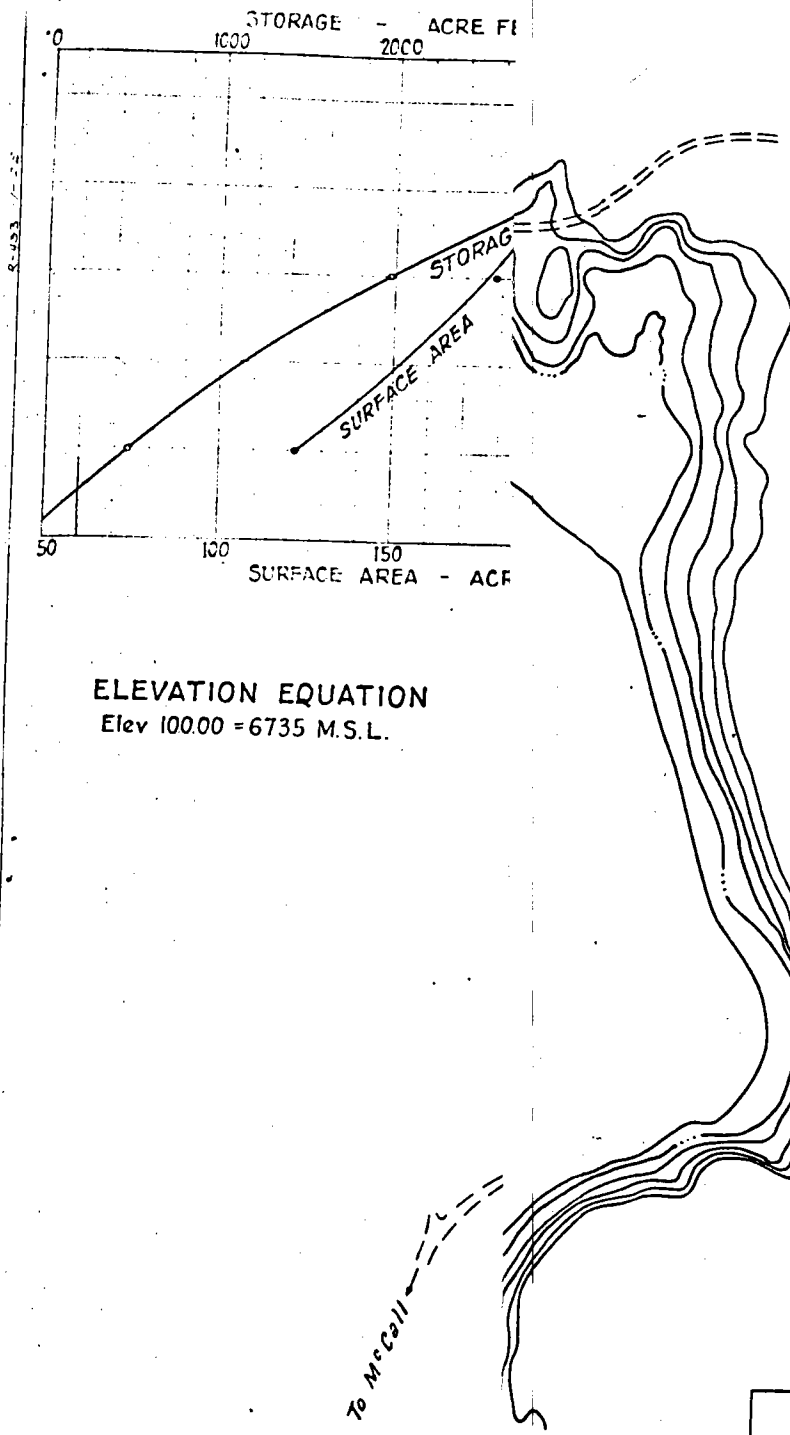
8. What large stream would the water here appropriated finally reach?

*Payette River*

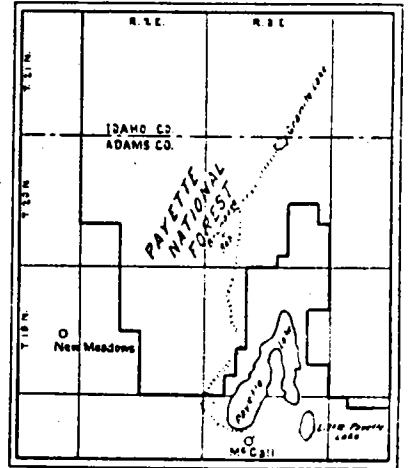
This examination was made on...  
(Signed) [Signature]



Granite  
Lake.



ELEVATION EQUATION  
Elev 100.00 = 6735 M.S.L.



VICINITY MAP  
SCALE 1" = 4 MILES

<b>LAKES RESERVOIR CO. RECONSTRUCTION GRANITE LAKE DAM</b>	
<b>TOOTHMAN-CHRONIC &amp; ASSOCIATES CONSULTING ENGINEERS</b> 1802 N. 33rd ST. BOISE, IDAHO	
APPROVED	
LAKES RESERVOIR CO. President <i>[Signature]</i>	Date 8/15/60
IDAHO DEPARTMENT OF RECLAMATION	
Engineer U.S. FOREST SERVICE	Date
DESIGNED BY <i>N.W.</i> DRAWN BY <i>[Signature]</i>	
CHECKED BY <i>D.C.T.</i> DATE 10/3/60	REVISED 11/30/60 12/30/60
SHEET 1 OF 4	

APPROVED  
JUL 1 1961  
*[Signature]*

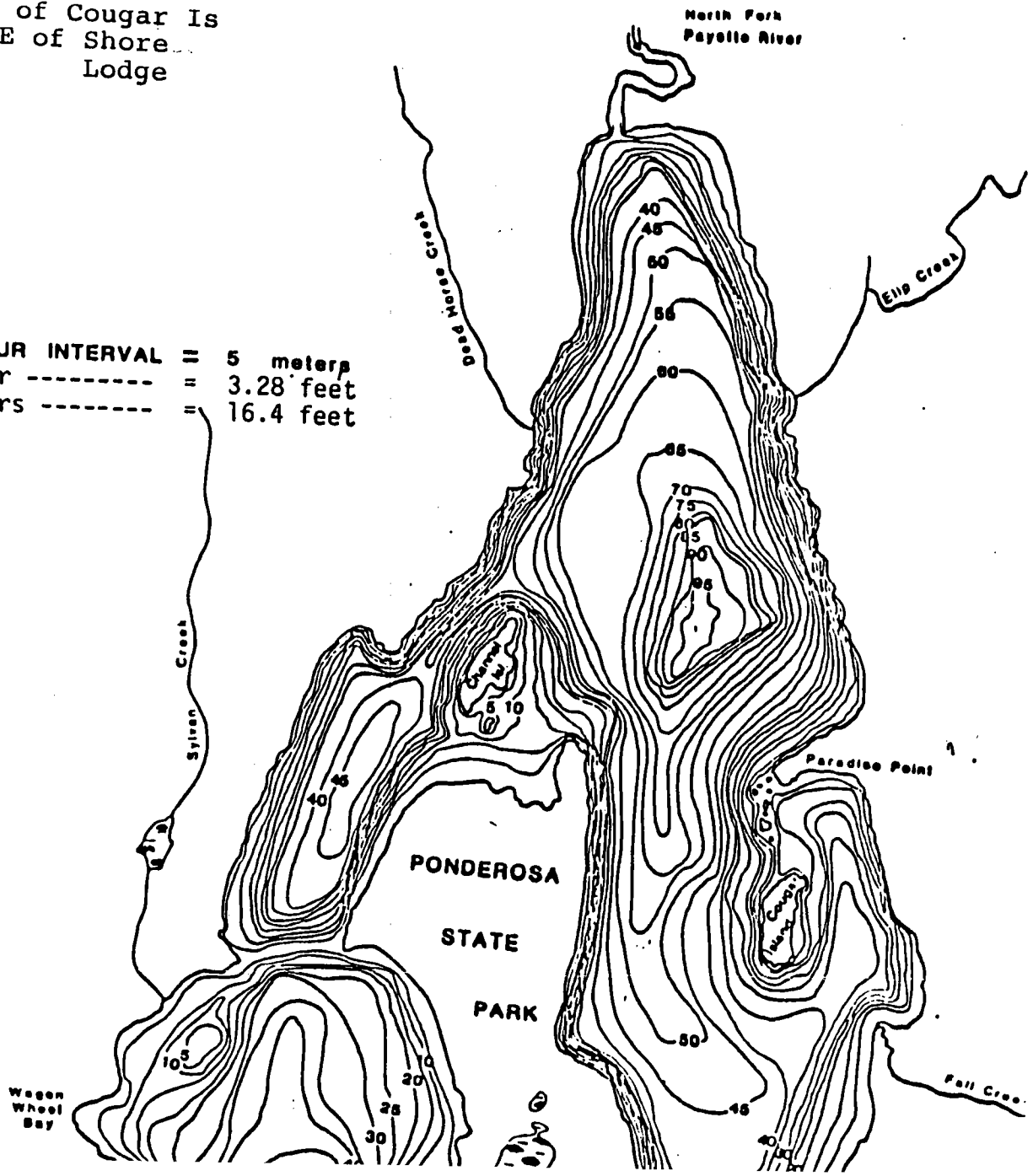
*[Signature]*  
10/17/60

Big

PAYETTE LAKE DEPTH

327' deep - E. of Cougar Is  
229' deep - (NE of Shore Lodge

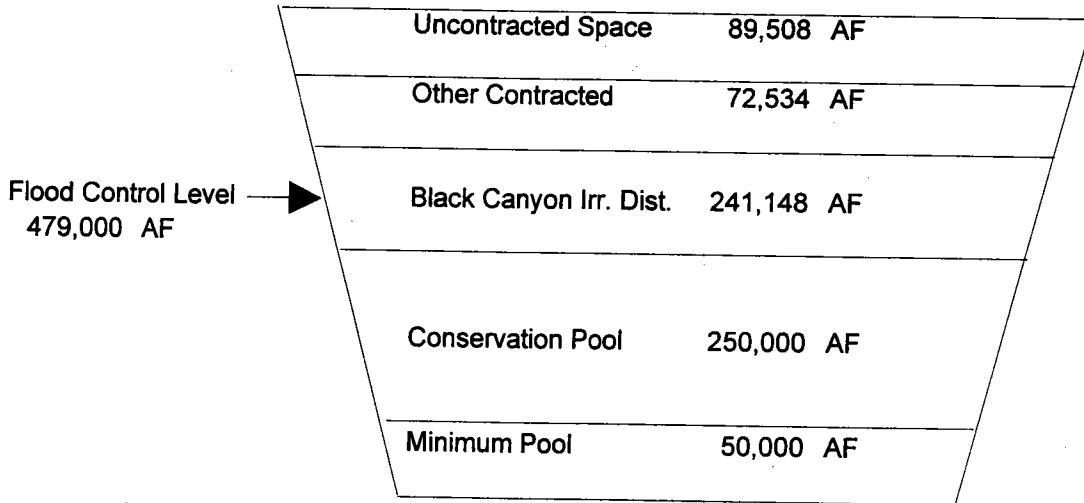
CONTOUR INTERVAL = 5 meters  
1 Meter ----- = 3.28 feet  
5 Meters ----- = 16.4 feet



Cascade Reservoir  
Storage Space and Possible 1995 Scenario

Possible 1995 Scenario:

	Acre Feet		Acre Feet
Minimum Pool	50,000	Full Reservoir Space	703,190
Conservation Pool	250,000	Irrigation Needs	(88,000)
Black Canyon Preferred	125,000	Fish Flush	(96,726)
Black Canyon Regular	116,148	Evaporation	<u>(29,394)</u>
Other Contractors	72,534		
Uncontracted Space	<u>89,508</u>	Possible Reservoir Level - 10/95	<u><u>489,070</u></u>
<b>Total Space</b>	<b><u><u>703,190</u></u></b>		



Cascade Reservoir																		
Possible Refill Scenarios																		
Given Certain Assumptions																		
	Totals	1995	1995	1995	1995	1995	1995	1996	1977	1977	1996*							
		In Basin	Out Basin	Evap. Chg	Carryover	Space	1st Fill	Last Fill	Fill									
Dead Pool	50,000				50,000						50,000							
Conservation Pool	250,000				250,000						250,000							
Black Canyon Preferred	125,000				125,000			0			125,000							
Uncontracted	89,508		74,230	15,278	0	89,508	15,278				15,278							15,278
Black Canyon	116,148	88,000		10,852	17,296	98,852	14,559				31,855							31,855
Farmer's	38,893		13,012	1,750	24,131	14,762	1,750				25,881							25,881
Noble	10,050		4,417	452	5,181	4,869	452				5,633							5,633
Lower Payette	10,050		5,067	452	4,531	5,519	452				4,983							4,983
Emmett	10,050			452	9,598	452	452				10,050							10,050
Other	3,491			157	3,334	157	157				3,491							3,491
Total Space	703,190	88,000	96,726	29,394	489,070	214,120	33,100	0			522,170							522,170
Active Capacity	653,190				439,070						472,170							472,170

Note: Evaporation charges are proportionately distributed according to total space.

\* Assuming a 1977 snow pack during the winter of 1995-96, this would be the 1996 storage accounts as of 6-1-96

Cascade Reservoir	Possible Refill Scenarios	Given Certain Assumptions	Totals	1995 In Basin	1995 Out Basin	1995 Evap. Chg	1995 Carryover	1996 Space	1994 Refill	1994 Last Refill	1996* Fill
Dead Pool			50,000				50,000				
Conservation Pool			250,000				250,000				250,000
Black Canyon Preferred			125,000				125,000	0			125,000
Uncontracted			89,508		74,230	15,278	0	89,508	15,278	28,093	43,371
Black Canyon			116,148	88,000		10,852	17,296	98,852	98,852		116,148
Farmer's			38,893		13,012	1,750	24,131	14,762	1,750	4,925	30,805
Noble			10,050		4,417	452	5,181	4,869	452	1,672	7,304
Lower Payette			10,050		5,067	452	4,531	5,519	452	1,918	6,900
Emmett			10,050			452	9,598	452	452		10,050
Other			3,491			157	3,334	157	157		3,491
Total Space			703,190	88,000	96,726	29,394	489,070	214,120	117,393	36,607	643,070
Active Capacity			653,190				439,070				593,070

Note: Evaporation charges are proportionately distributed according to total space.

\* Assuming a 1994 snow pack during the winter of 1995-96, this would be the 1996 storage accounts as of 6-1-96

Cascade Reservoir																				
Possible Refill Scenarios																				
Given Certain Assumptions																				
	Totals	1995	1995	1995	1995	1995	1996	1992	1992	1996*										
	In Basin	Out Basin	Evap. Chg	Carryover	Space	1st Fill	Last Fill	Fill												
Dead Pool	50,000																			
Conservation Pool	250,000																			
Black Canyon Preferred	125,000																			
Uncontracted	89,508		74,230	15,278	0	89,508	15,278	54,723	70,001											
Black Canyon	116,148	88,000		10,852	17,296	98,852	98,852		116,148											
Farmer's	38,893		13,012	1,750	24,131	14,762	1,750	9,593	35,473											
Noble	10,050		4,417	452	5,181	4,869	452	3,256	8,889											
Lower Payette	10,050		5,067	452	4,531	5,519	452	3,735	8,718											
Emmett	10,050			452	9,598	452	452		10,050											
Other	3,491			157	3,334	157	157		3,491											
Total Space	703,190	88,000	96,726	29,394	489,070	214,120	117,393	71,307	677,770											
Active Capacity	653,190				439,070				627,770											

Note: Evaporation charges are proportionately distributed according to total space.

\* Assuming a 1992 snow pack during the winter of 1995-96, this would be the 1996 storage accounts as of 6-1-96

Cascade Reservoir	Possible Refill Scenarios	Given Certain Assumptions	Totals	1995 In Basin	1995 Out Basin	1995 Evap. Chg	1995 Carryover	1996 Space	1988 Refill	1988 Last Fill	1996* Fill
Dead Pool			50,000				50,000				
Conservation Pool			250,000				250,000				250,000
Black Canyon Preferred			125,000				125,000	0			125,000
Uncontracted			89,508		74,230	15,278	0	89,508	15,278	56,795	72,073
Black Canyon			116,148	88,000		10,852	17,296	98,852	98,852		116,148
Farmer's			38,893		13,012	1,750	24,131	14,762	1,750	9,956	35,837
Noble			10,050		4,417	452	5,181	4,869	452	3,380	9,012
Lower Payette			10,050		5,067	452	4,531	5,519	452	3,877	8,860
Emmett			10,050			452	9,598	452	452		10,050
Other			3,491			157	3,334	157	157		3,491
Total Space			703,190	88,000	96,726	29,394	489,070	214,120	117,393	74,007	680,470
Active Capacity			653,190				439,070				630,470

Note: Evaporation charges are proportionately distributed according to total space.  
 \* Assuming a 1988 snow pack during the winter of 1995-96, this would be the 1996 storage accounts as of 6-1-96

Cascade Reservoir	Possible Refill Scenarios	Given Certain Assumptions	Totals	1995 In Basin	1995 Out Basin	1995 Evap. Chg	1995 Carryover	1996 Space	1987 Refill 1st Fill	1987 Refill Last Fill	1996* Fill
Dead Pool			50,000				50,000				50,000
Conservation Pool			250,000				250,000				250,000
Black Canyon Preferred			125,000				125,000	0			125,000
Uncontracted			89,508		74,230	15,278	0	89,508	15,278	59,558	74,836
Black Canyon			116,148	88,000		10,852	17,296	98,852	98,852		116,148
Farmer's			38,893		13,012	1,750	24,131	14,762	1,750	10,440	36,321
Noble			10,050		4,417	452	5,181	4,869	452	3,544	9,177
Lower Payette			10,050		5,067	452	4,531	5,519	452	4,065	9,048
Emmett			10,050			452	9,598	452	452		10,050
Other			3,491			157	3,334	157	157		3,491
Total Space			703,190	88,000	96,726	29,394	489,070	214,120	117,393	77,607	684,070
Active Capacity			653,190				439,070				634,070

Note: Evaporation charges are proportionately distributed according to total space.

\* Assuming a 1987 snow pack during the winter of 1995-96, this would be the 1996 storage accounts as of 6-1-96



WATER DISTRICT 65 - PAYETTE RIVER DIVERSION DATA - AUG 27, 1995

28-AUG-95

DIVERSION	CFS	CFS	AF	AF	DIVERSION	CFS	CFS	AF	AF	DIVERSION	CFS	CFS	AF	AF
	DIVN	STOR	USED	RMNG		DIVN	STOR	USED	RMNG		DIVN	STOR	USED	RMNG
1 S DOBSON	1	0	78	-78	31 CURTIS-MCCONNELL	1	1	39	-39	61 PATTON-RIGGS	2	0	0	0
2 E K ALLEN	0	0	11	-11	32 D HEFFNER	0	0	35	-35	62 NOBLE	175	0	0	0
3 DBL DIAMOND #1	1	1	62	-62	33 R HUNTER	0	0	15	-15	63 ROSEBURY	10	0	0	0
4 HEFFNER	1	1	54	-54	34 MACGREGOR #4	0	0	0	0	64 STEWART	18	0	0	0
5 DOBSON-OLIVER	2	2	107	-107	35 MACGREGOR #3	0	0	0	0	65 MICHOLES	14	6	364	-364
6 J HASBROUCK	0	0	11	-11	36 MACGREGOR #2	0	0	0	0	66 PULLEY	4	0	0	0
7 D & L REAY	0	0	6	-6	37 MACGREGOR #1	0	0	0	0	67 PULLEY PUMP	1	0	2	-2
8 DRAKE #1	1	1	27	-27	38 ENNETT IRR DIST	366	0	99	-99	68 RASMUSSEN	32	1	105	-105
9 DRAKE #2	0	0	16	-16	39 SS ENNETT IRR (1)	72	0	0	0	69 COOPER	4	0	0	0
10 DBL DIAMOND #2	2	2	104	-104	40 BLACK CANYON IRR	1151	827	38303	-38303	70 UPPER ACCORD	4	0	0	0
11 FRY & SOMS	2	2	93	-93	41 LAST CHANCE	96	0	0	0	71 ACCORD PUMP	2	0	82	-82
12 BOISE CASCADE P	2	2	70	-70	42 FOWLER	0	0	0	0	72 LOWER ACCORD	9	0	0	0
13 CITY OF HS BEND	2	2	89	-89	43 HODGINS	0	0	19	-19	73 NESSITT-MCFARLAND	14	0	0	0
14 DBL DIAMOND #3	2	2	85	-85	44 BROWN #1	1	0	0	0	74 BARKER	17	6	353	-353
15 J FRY	0	0	1	-1	45 BROWN #2	0	0	0	0	75 MOKEY-BURT	3	0	0	0
16 C COOPER	0	0	6	-6	46 FARMERS COOP	379	0	0	0	76 PENCE	2	0	0	0
17 D SHOEMAKER	0	0	7	-7	47 NEBEKER-STOKELY	0	0	0	0	77 LOWER PAYETTE	4	0	0	0
18 G BROWN	0	0	1	-1	48 GILL SLOUGH	10	0	0	0	78 EAGLE ISL FARMS	267	0	0	0
19 MONTOUR FARMERS	20	20	0	0	49 BOISE CASCADE	5	0	0	0	79 JOHNSON-BIGBY	30	0	16	-16
20 B JENKINS SOUTH	0	0	24	-24	50 SMITH	8	6	342	-342	80 SIMPLOT	25	0	0	0
21 E GATFIELD	0	0	33	-33	51 ENTERPRISE	45	0	0	0	81 FISH AND GAME	50	0	0	0
22 L MCCONNELL	0	0	27	-27	52 BILBREY	17	0	0	0	82 SHELTON	0	0	0	0
23 B JENKINS NORTH	0	0	10	-10	53 ROGERS	0	0	0	0	83 B MAY	0	0	0	0
24 W SHOEBL	0	0	9	-9	54 REED	44	0	0	0	84 FOLLES	3	0	0	0
25 MCDONOUGH-NEWELL	0	0	15	-15	55 KESGARD-TSCHUDY	14	2	182	-182	85 MOGENSEN	0	0	0	0
26 N CANADAY	1	1	39	-39	56 O'TURLEY	4	0	0	0	86 JACKSON	1	0	0	0
27 J SAAD	0	0	6	-6	57 SELTZ	17	0	0	0	87 DAVIS	1	0	0	0
28 H GATFIELD	0	0	33	-33	58 WOODS	4	0	1	-1	88 SHANSON	1	0	0	0
29 M FROST	0	0	0	0	59 PAYETTE R RANCH	2	0	0	0	89 WASHOE	0	0	0	0
30 F CHARTERS	0	0	1	-1	60 399 PUMPS (2)	44	44	0	0		28	0	0	0

(1) STORAGE USE COMBINED WITH NS ENNETT

(2) STORAGE USE COMBINED WITH SS BLACK CANYON

WATER DISTRICT 65 - PAYETTE RIVER FLOW ACCOUNTING - AUG 27, 1995 28-AUG-95

REACH FLOWS IN CFS	ACTUAL DATE	NATURAL FLOW	ACTUAL NAT FLOW	POWER FLOW	STORED FLOW	RESRVOIR EVAP FLOW	NATURAL FLOW DIV	TOTAL RCH DIV	REACH GAIN	LAST RIGHT
1 SOUTH FORK AT LOWMAN	AUG 25	512.	512.	0.	0.	0.	0.	0.	512.	19380919
2 DEADWOOD BLW DEADWOOD	AUG 25	117.	556.	0.	439.	20.	0.	0.	117.	19380919
3 PAYETTE NR BANKS	* AUG 26	969.	1408.	0.	439.	0.	0.	0.	360.	19380919
11 UPPER NORTH FORK	* AUG 24	20.	20.	0.	0.	0.	0.	0.	20.	19380919
4 NORTH FORK AT MCCALL	AUG 24	100.	157.	0.	57.	0.	0.	0.	80.	19380919
5 AT MCCALL TO CASCADE	AUG 25	324.	782.	200.	458.	174.	0.	0.	224.	19380919
6 N FORK CASCADE TO BANKS	* AUG 26	456.	914.	0.	458.	0.	0.	0.	132.	19380919
7 BANKS TO HORSESHOE BEND	AUG 26	1460.	2352.	0.	892.	0.	0.	6.	36.	19380919
8 HORSESHOE BEND TO EMMETT	AUG 26	1529.	796.	0.	50.	0.	783.	1622.	68.	19380919
9 EMMETT TO MID SLOUGH	* AUG 26	1729.	350.	0.	41.	0.	638.	647.	201.	19380919
13 COMBINED WASTE	AUG 26	75.	31.	0.	-44.	0.	0.	44.	75.	19380919
12 BELOW 7 MILE SLOUGH	* AUG 26	1804.	169.	135.	34.	0.	249.	256.	0.	19380919
10 LETHA TO PAYETTE	AUG 27	2607.	468.	0.	-17.	0.	453.	461.	803.	19990102
* - INDICATES FLOW ESTIMATED, NOT MEASURED										
TOTALS 2122. 3034. 2607.										

RESERVOIR	PREV CONT (AF)	CURR CONT (AF)	CHNG CONT (CFS)	ACCR STOR (CFS)	TOTL STOR (AF)	TOTL EV (AF)	PRIORITY	RESERVOIR	RIGHT (AF)	STORED (AF)
1 DEADWOOD	133251.0	132292.0	-483.5	0.0	161900.0	960.4	1	PAYETTE	27750.0	26470.0
2 UPPER LAKES	6500.0	6500.0	0.0	0.0	6500.0	0.0	2	DEADWOOD	116800.0	116800.0
3 PAYETTE	35300.0	35000.0	-151.2	0.0	26470.0	0.0	3	UPPER LAKES	2400.0	2400.0
4 CASCADE	628054.0	626200.0	-934.7	0.0	653190.0	10596.3	4	UPPER LAKES	2600.0	2600.0
5 BLACK CANYON	30456.0	30445.0	-5.5	0.0	0.0	0.0	5	UPPER LAKES	1300.0	1300.0
TOTAL	833561.0	830437.0	-1575.0	0.0	648060.0	11556.8	6	CASCADE	570439.0	570439.0
							7	UPPER LAKES	200.0	200.0
							8	DEADWOOD	45100.0	45100.0
							9	CASCADE	82751.0	82751.0
							TOTAL	849340.0	849340.0	848060.0

CHANGE IN ABY LETHA STORAGE USED 40792.9 4970.5 159714.7 37956.0  
 PASSING LETHA ABY LETHA UNACCT 7 MILE SLOUGH AT HEAD CFS - 343. AT END CFS - 47.  
 STORED DIVERTED STORED  
 YEAR-TO-DATE AF 458652.0 40792.9 4970.5 159714.7 37956.0  
 COMBINED WASTE TO 7 MILE SLOUGH CFS - 31.  
 COMBINED WASTE BLW 7 MILE SLOUGH CFS - 11.  
 UPPER 7 MILE COEF - 1.02 LOWER 7 MI COEF - 1.02