

Orr Affidavit

Exhibit 58

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WATER RESOURCES

Excerpted pages of the
Transcript of examination of Lynn Crandall
(Federal Power Commission proceedings
on Idaho Power Company's proposed
Hells Canyon project)
(Jan. 12-13, 14-15, 1954)

Fourth Orr Affidavit
Exhibit 8:

**Excerpted Pages of Transcript of
Examination of Lynn Crandall, Formal
Hearings Before the Federal Power
Commission,
Project No. 1971, P-2132, P-2133**

Part 41 - January 12, 1954 to January 13, 1954

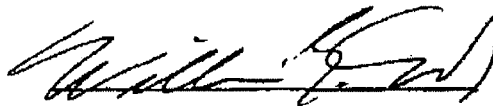
Part 42 - January 14, 1954 to January 15, 1954

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

CERTIFICATION

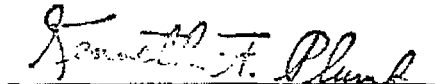
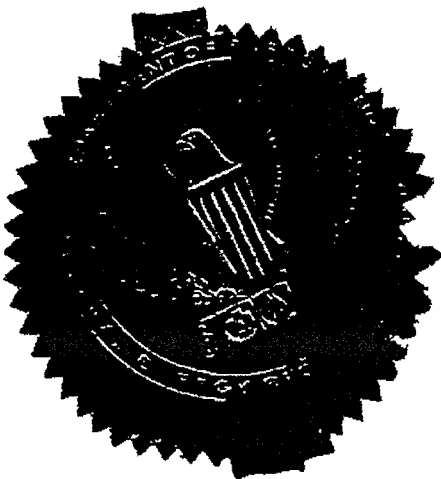
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ACCESSION NO. 36-A-161 BOX 213

F. P. C. Form No. 39

FEDERAL POWER COMMISSION

PROJECT NO. 1971
P-2132 7 P-2133

IDAHO POWER COMPANY
(Hearing 7-14-52 on)

FORMAL
HEARINGS

IMPORTANT

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January 12, 1954

TO

January 13, 1954

Part 41

U. S. GOVERNMENT PRINTING OFFICE 16-6470-1

FILE No. 100-2

PROJECT NO. 1971
(Hearing) Part 41

1 PRESIDING EXAMINER: Come to order, please.

2 Do you have another witness to present, Mr. Mason?

3 MR. MASON: Yes, sir, Mr. Examiner, but before I call
4 that witness, who will be Mr. Lynn Crandall, I should like
5 to take up a matter of procedure. You will recall, Mr.
6 Examiner, and counsel will also, that a document entitled
7 "Future Upstream Depletion Above Hell's Canyon", which bears
8 the date of April 28, 1953, has been identified as Exhibit
9 119. You will also recall, Mr. Examiner, that a ruling on
10 the admissibility of Exhibit 119 was deferred.

11 I have been supplied from the Department of the Interior
12 a report bearing the same title by Mr. Lynn Crandall, bear-
13 ing the date of April 6, 1953, and it also carries a foot-
14 note on the first page which is not carried on the document
15 identified as Exhibit 119.

16 I also direct attention to the fact, Mr. Examiner, that
17 the document dated April 6, 1953 gives much better prints of
18 the two charts attached to the report. And I would move at
19 this time that the present Exhibit 119 be withdrawn and we
20 substitute for that exhibit this same, or substantially the
21 same document bearing the date of April 6, 1953, and with the
22 footnote on the first page which is missing from the present
23 Exhibit 119.

24 MR. PARRY: May I inquire, is the text identical?

25 MR. MASON: I think it is. Mr. Crandall has informed me

1 that the reports are identical except for the footnote which
2 was omitted from page one of the copies you had, and that
3 the difference in date occurs because the first supply of
4 copies was exhausted and additional runs were made, and it
5 carried the date of the new run rather than the date of the
6 original run.

7 MR. PARRY: We have no objection to it, Mr. Examiner.

8 PRESIDING EXAMINER: Mr. Parry, it is your exhibit.

9 MR. PARRY: Yes, we have no objection to it.

10 PRESIDING EXAMINER: You will have to withdraw it if
11 it is to be withdrawn.

12 MR. PARRY: In order to accommodate Mr. Mason, I will
13 ask to withdraw the copies heretofore marked as Exhibit 119
14 and ask that the ones now supplied by Mr. Mason be substituted
15 in lieu thereof with the same number.

16 PRESIDING EXAMINER: Very well, that may be done, and I
17 will ask the reporter to instruct his firm to send over the
18 copies of Exhibit 119 which they are holding over there as
19 identified but not received, and we will make the substitu-
20 tion here with the copies with the copies that Mr. Mason is
21 now furnishing as Exhibit No. 119 for identification. As
22 far as the sponsorship of the exhibit is concerned, I don't
23 think that is going to trouble us very much.

24 MR. PARRY: No.

25 MR. MASON: Then, under those circumstances, I would

1 assume it is appropriate for me to make available to Mr.
2 Parry four copies for the record for substitution purposes,
3 and I would presume, Mr. Examiner, that the identification
4 date of the exhibit would remain the same, namely, August
5 6, 1953, and this is merely a physical substitution of
6 copies. Is that correct?

7 MR. INMAN: April 6..

8 MR. MASON: August 6. I was talking about the date it
9 was identified, August 6.

10 PRESIDING EXAMINER: At page 4315, according to the index
11 that we have.

12 MR. MASON: That is correct.

13 PRESIDING EXAMINER: Especially so since one of the
14 witnesses, or perhaps two of the applicants' witnesses,
15 made reference to it in their testimony at about that time.
16 It would have to relate back to those dates.

17 MR. MASON: That is what I had in mind, Mr. Examiner.
18 I knew it had been used in the testimony.

19 At this time I will call Mr. Lynn Crandall to the stand.
20 Whereupon,

21 LYNN CRANDALL

22 was called as a witness, and, having been first duly sworn,
23 was examined and testified as follows:

24 DIRECT EXAMINATION

25 BY MR. MASON:

1 Q Will you please state your name and address for the
2 record?

3 A Lynn Crandall, Idaho Falls, Idaho.

4 Q Will you state by whom you are employed and in what
5 position?

6 A I am District Engineer of the United States Geo-
7 logical Survey of the upper Snake River. I am also Water-
8 master of Water District No. 36, which includes the irrigated
9 lands from the Snake River in ~~Idaho~~^{Idaho} which is a State position,
10 being elected annually by the water users. I am also a deputy
11 State reclamation engineer for the State of Idaho, which is
12 an annual appointment, in charge of the delivery of stored
13 water from the Snake River reservoirs.

14 Q For what period of years have you been the Snake
15 River Watermaster?

16 A From 1930 to date.

17 Q Continuously?

18 A Yes, sir.

19 Q Now, would you please give us, Mr. Crandall, a state-
20 ment of your education and experience, if you will, please, sir.

21 A I graduated from the College of Civil Engineering at
22 Cornell University in 1910. From 1910 to 1916 I was employed
23 by the U. S. Geological Survey on stream gauging work in Idaho
24 and Utah. From 1916 to 1920 I was hydraulic engineer with the
25 Twin Falls Northside Land and Water Company, in charge of

1 investigations of use of water and water supply on a 170,000-
2 acre irrigation project in the Snake River Valley in Idaho.
3 From 1920 to 1930 I was Commissioner of the United States
4 District Court of the District of Idaho in charge of the
5 distribution of water on Big Lost River, Idaho, and a study
6 for the court of the use of water on that stream and the
7 effect the storage of water in a reservoir had upon the
8 supply of natural flow rights.. During the last four years
9 of that period, from 1926 to 1930, I was also Commissioner
10 for the same court in charge of the distribution of water
11 on Salmon Falls River, a tributary of the Snake River, which
12 rises in Nevada and flows into Idaho. During the same period
13 I also carried on a general engineering practice at times
14 when I wasn't occupied with work in these other positions,
15 and I made numerous reports and investigations in connection
16 with water problems on the Snake River and its principal
17 tributaries. From 1930 to date, as I said, I have occupied
18 this position as District Engineer of the Geological Survey,
19 and Watermaster on the river.

20 Q Could you , please, sir, just generally, give us
21 some idea of your duties in your present positions?

22 A Well, as District Engineer I have charge of the
23 collection of stream flow and reservoir records in that
24 portion of Idaho on the upper Snake River and its tributaries
25 above Milner Dam, and as Watermaster I have charge of the

1 distribution of the natural flow of the stream, and as
2 Deputy State Reclamation Engineer the distribution of the
3 stored waters, most of those to about one hundred canal
4 companies serving a million and a quarter acres of irrigated
5 land.

6 I am also the author of the annual reports of Water
7 District 36, which is an extensive volume of report, and I
8 am joint author of many water supply papers published by the
9 Geological Survey, including "Geology and Ground Waters of
10 the Snake River Plains", "The Geology and Ground Waters of
11 the Mud Lake Region", "The Wells on the Snake River Plains",
12 and many publications giving the result of stream flow
13 measurements in that area.

14 Q Do you have before you, Mr. Crandall, a copy of a
15 document entitled "Future Upstream Depletion Above Hell's
16 Canyon" by Lynn Crandall, dated April 6, 1953, which has been
17 identified here as Exhibit 119?

18 A Yes.

19 Q Was that document or report, including the two plates
20 attached thereto, prepared by you or under your supervision?

21 A Yes, it was prepared by me.

22 Q Would you please tell us what source material and
23 data and other information you had available and used in the
24 preparation of this report that is not stated in the document
25 itself?

1 A Well, the information is largely of my personal
2 knowledge acquired during these 40-odd years that I have
3 worked in the area, supplemented by the reports of the
4 Geological Survey, reports of the State Reclamation Engineer,
5 and reports by the U. S. Bureau of Reclamation in their
6 files in their Boise office, and personal conferences with
7 many individuals who lived in these tributary areas, and
8 from watermasters on the projects and things of that kind.

9 Q Do you have any further explanation that you would
10 like to make, Mr. Crandall, in connection with your report
11 that you think ought to be brought out or that would make it
12 clearer in any respect?

13 A Well, I don't know. I might make a general state-
14 ment of the basis upon which I prepared this report, if you
15 would like.

16 Q If you would, please, sir.

17 A It is a difficult matter in any line of human en-
18 deavor to make estimates of what is going to happen a long
19 distance in the future. That is particularly true in so
20 complex a matter as water supply available during the pay-
21 out period for the Hell's Canyon project. Not only must we
22 base it on the stream flows of the past but it will be
23 modified by additional development. That development will
24 depend on the availability of land and water, it will depend
25 on the future price of farm crops, whether and to what extent

1 those prices may be subsidized or supported by the govern-
2 ment, the extent to which the government might subsidize
3 some of these proposed irrigation projects; all of those
4 things make it extremely difficult to arrive at a figure
5 with a great deal of assurance. I had some acquaintance
6 years ago with a number of irrigation projects in southern
7 Idaho that were either complete or partial failures on ac-
8 count of the water supply turning out not to be as great
9 as had been estimated, and on that account I have a tendency,
10 I think, to be somewhat conservative in estimating future
11 water supplies. It is something like when an engineer de-
12 signs a bridge or a dam; he allows what he calls a factor
13 of safety, and makes the structure a little stronger than
14 would actually be required to stand the computed stresses,
15 and I think that in a project of this kind that involves the
16 expenditure of so much money that some similar procedure
17 ought to be applied in determining the water supply.

18 Accordingly, in determining these acreages and areas
19 that might be irrigated in the future, I have included gener-
20 ally all areas that, according to my feeling, have an adequate
21 water supply and good land, and in which there is a reason-
22 able possibility of their being developed during this period
23 of time. That may result in a somewhat moderately greater
24 figure than might otherwise be arrived at, but I believe
25 that is the basis I would like to set it up on if I was

1 investing my money in building the Hell's Canyon project.
2 And that basis will follow through these various calcula-
3 tions that are given here in these tabulations.

4 Q By the tabulations you mean Exhibit 119?

5 A Yes.

6 MR. MASON: I might inquire whether there are any clari-
7 fying questions on the part of counsel before I offer Exhibit
8 119. That concludes the direct of this witness.

9 MR. PARRY: Our position, Mr. Examiner, is this, that
10 because of our long acquaintance with and confidence in Mr.
11 Crandall and his report, we have heretofore offered it as
12 the applicant's exhibit, so I guess it might be appropriate
13 to either reoffer it or to join in Mr. Mason's offer, which-
14 ever is proper.

15 MR. MASON: Do you have any comments, Mrs. Cooper?

16 MRS. COOPER: Just one question, Mr. Mason.

17 BY MRS. COOPER:

18 Q Mr. Crandall, can you tell us the circumstances
19 under which the preparation of this report was undertaken?

20 A Michael Straus, who was Commissioner of Reclamation
21 late in the summer of 1952, requested the Secretary of the
22 Interior to ask the Director of the Geological Survey to
23 have me make this report. I prepared the preliminary copy
24 of the report in the fall of 1952 and awaited final comple-
25 tion, waiting for the availability of some 1952 stream flow

1 records that had not then been computed. And meanwhile it
2 was circulated around amongst the engineers of the Geological
3 Survey in that area and in Washington, and was reviewed by
4 them, and, based on their review, my original estimate, I
5 think, of the irrigated acreage which was 1,170,000 acres --
6 which is on page 4 of the exhibit -- my original estimate
7 was 1,170,000 acres, and as a result of that review that
8 total was raised to 1,300,000 acres, with suggestions about
9 various little areas that they thought there was more land
10 available there than I had first included. And then the re-
11 port was finally prepared and gotten out here. It just lay
12 quiescent then until these hearings developed, and I finally
13 got it out last April. It is the same form as it was pre-
14 pared in the preceding September except for raising that
15 acreage from 1,170,000 to 1,300,000.

16 Q When Mr. Straus' request for the preparation of
17 this report was relayed to you did you understand that the
18 report was wanted by the Interior Department in connection
19 with its consideration of the Hell's Canyon project?

20 A Yes; particularly I was advised that they wanted it
21 in consideration of the Hell's Canyon project, and I might
22 be asked to come back here and testify before some Congress-
23 ional committees in support of the project.

24 MRS. COOPER: That is all, Mr. Examiner.

25 PRESIDING EXAMINER: Mr. Crandall, there is something I

1 am not clear on. Are you an employee of both the State
2 government of Idaho and the U. S. Geological Survey, or
3 just one of those?

4 THE WITNESS: Yes, both of them, and there is an execut-
5 ive order outstanding authorizing me to hold both federal
6 and state positions as a part of the cooperative work be-
7 tween the Geological Survey and the State of Idaho.

8 PRESIDING EXAMINER: And you receive a salary from both
9 places?

10 THE WITNESS: I may charge my salary to either one. I
11 just have my federal salary, but it may be paid at times
12 out of State funds. If it is paid out of State funds I go
13 off of the federal payroll. I just get the regular salary.
14 But its source may come intermittently from either way,
15 depending on how much particular work I do.

16 PRESIDING EXAMINER: You have to keep track of the time
17 you spend working for the State as against the time you
18 spend working for the U. S. G. S.?

19 THE WITNESS: The way the thing is arranged there, a
20 large part of this work as watermaster is constituted of
21 the collection and study of the stream flow records and
22 the geological survey contributes an amount of money into
23 this operation fund which they would otherwise spend on
24 maintenance of a number of guaging stations which we have
25 there under their regular program.

1 The State of Idaho contributes some money, and the bal-
2 ance of the money is paid by the Snake River water users.
3 So it is somewhat elastic. A bill comes in and it might
4 be charged to one of those funds or the other. The total
5 for the year is all we are particularly concerned with.

6 PRESIDING EXAMINER: You have a regular office at Idaho
7 Falls, Idaho? Is that right?

8 THE WITNESS: Yes, in the Federal Building there.

9 PRESIDING EXAMINER: And a number of engineers work
10 under you, is that it?

11 THE WITNESS: Well, we have three permanent civil service
12 employees, one engineering assistant, one clerk, and during
13 the summertime we hire a half dozen additional hydrographers
14 and a number of people to regulate the head gates, who are
15 just employed during the period of water regulation in the
16 summer months. And we keep the records of the stream flow
17 year round, and we work up all these reports and so forth.

18 PRESIDING EXAMINER: And this work of drafting and pre-
19 paration of reports of this kind would be all done in Idaho
20 Falls?

21 THE WITNESS: Yes.

22 PRESIDING EXAMINER: That is all I have to ask, Mr. Mason.

23 MR. MASON: I have one further question.

24 PRESIDING EXAMINER: Yes.

25 BY MR. MASON:

1 Q I would like to refer a minute, Mr. Crandall, to
2 your previous answer with respect to the raising of the
3 number of acres that you refer to on page 4 of your report.

4 A Yes, from my original figure in the tentative re-
5 port, you mean.

6 Q That is correct. And I want to ask you whether
7 the figure included in the report now of 1,300,000 acres
8 is your own best judgment, after the review of the others
9 and these matters were brought to your attention?

10 A Yes. There was some small areas with which I
11 wasn't so intimately familiar as I am with the area above.
12 Milner, the area between King Hill and Oxbow, for example,
13 including the Boise River, and the Owyhee and Malheur and
14 various other tributaries; while I have worked on them in a
15 general way, I wasn't so familiar with the immediate future
16 possibilities on those streams, and I had originally used
17 some figures from the Bureau of Reclamation's reports, and
18 Mr. Nace, who is the District Geologist of the Geological
19 Survey at Boise and who has made an intimate study of the
20 ground water possibility of that area, felt that those fig-
21 ures were too low, and, on reviewing the matter with him, I
22 concluded that he was correct, and I raised them accordingly.
23 That is a common practice, as you know, in all these govern-
24 ment departments, that somebody prepares a preliminary report
25 and it is circulated around amongst the engineers and employees

1 and hashed over and finally comes out in the final form,
2 and this is the final form on which we stand.

3 MR. MASON: We have a technicality as to who offered
4 Exhibit 119. Mr. Parry, as far as I am concerned, it is
5 immaterial who offers it. I raised a technical objection
6 to it originally because I thought there was no foundation
7 for it, which has certainly been supplied now.

8 PRESIDING EXAMINER: Since the report is practically all
9 of the direct testimony of the witness, there is a question
10 as to whether Mr. Parry has any right to cross-examine.

11 MR. PARRY: I am not going to argue about that.

12 PRESIDING EXAMINER: Or whether the staff has any right
13 to cross-examine. I don't know, maybe Mrs. Cooper will have
14 to bear the principal burden here, since this witness comes
15 from, primarily, two sources. This report, which is his
16 direct testimony, was offered by the applicant, and now the
17 staff has adopted it for its presentation.

18 MR. MASON: I think Mr. Parry's difficulty is he anti-
19 cipated too soon. I do not raise any technical objection
20 to his right to ask the witness any questions. That is what
21 the staff brought him here for, to develop the record on this
22 subject. But I am not raising any technical objection against
23 Mr. Parry's right to ask questions, and I have asked the wit-
24 ness all the questions I have, and I understand he has given
25 the testimony here he desired to give in connection with his

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F. P. C. Form No. 32

FEDERAL POWER COMMISSION

PROJECT NO. 1971
P-2132 & P-2133

IDAHO POWER COMPANY
(Hearing 7-14-52 on)

FORMAL
HEARINGS

FILE No. 100-2

IMPORTANT

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January 14, 1954

TO

January 15, 1954

Part 42

PROJECT NO. 1971
(Hearing) Part 42

1 with this morning?

2 MR. MASON: Yes. Mr. Crandall is present, and he has
3 obtained the tabulation with respect to diversions which was
4 requested yesterday by Mr. Parry. I had just received copies
5 of his tabulation; that is, Mr. Crandall's, and have not shown
6 it to Mrs. Cooper. It might save a little time to go off the
7 record and examine these before we put the witness on because
8 I am not familiar with it.

9 PRESIDING EXAMINER: All right. I will excuse you now,
10 Mr. Koessner, temporarily.

11 (Witness temporarily excused.)

12 PRESIDING EXAMINER: We will take a five-minute recess.

13 ~~XXXXXXXXXX~~ (Whereupon, at 11:30 a.m., a recess was taken until
14 11:35 a.m.)

15 PRESIDING EXAMINER: Come to order, please.

16 Mr. Mason, you wish to have Mr. Crandall come back, is
17 that correct?

18 MR. MASON: That is correct.

19 Whereupon,

20 LYNN CRANDALL

21 was recalled to the stand, and having been previously duly
22 sworn, was examined and testified further as follows:

23 DIRECT EXAMINATION

24 BY MR. MASON:

25 Q You will recall yesterday Mr. Parry asked for certain

1 data with respect to diversions above Milner on the Snake
2 River and storage diversions. I understand now that in response
3 to that request, Mr. Crandall, you have prepared a computation,
4 copies of which have been made available to counsel. Do you
5 have before you a single sheet, being a tabulation bearing the
6 title at the top, "Snake River, Idaho," with a column "Diver-
7 sions Above Milner," and a column "Storage Diversions"?

8 A Yes.

9 Q That was prepared by you in response to a request
10 by Mr. Parry?

11 A Yes.

12 MR. MASON: I would like to ask a question or two about
13 this tabulation if I may.

14 PRESIDING EXAMINER: You may, indeed.

15 BY MR. MASON:

16 Q Could you give us for the record, Mr. Crandall, the
17 source of the data shown on the statement I have just referred
18 to, the one you have before you?

19 A It is annual reports of Water District No. 36 of
20 the State of Idaho and the Water Supply Papers of the U. S.
21 Geological Survey.

22 Q Now would you refer to the vertical column headed
23 "Storage Diversions" and tell me whether or not the amounts
24 shown for each year under that column heading are included
25 in the amounts shown for each respective year under the vertical

1 column headed "Diversions Above Milner"?

2 A Yes, they are so included.

3 Q Now referring again to the vertical column headed
4 "Storage Diversions," will you tell me whether the figures
5 shown for each year in that column includes any allowance for
6 evaporation?

7 A No, they do not. It has been our experience on Snake
8 River after many years of observation that the reservoirs
9 generally under ordinary conditions have enough return flow
10 from what we call bank storage; that is, water that is stored
11 in the adjacent soils and gravels, so that as that drains out
12 it just about equals the evaporation losses.

13 Q Referring again to the figures for each year under
14 the vertical column "Storage Diversions," is each figure for
15 each year intended to show the volume of water, stored water,
16 leaving the storage reservoirs?

17 A And diverted by the canals.

18 Q But that figure for each year in that vertical column
19 does not necessarily represent the exact amount of water that
20 actually reached the irrigated areas, does it?

21 A Well, it is approximately the amount at the heads
22 of the canals, but not the amount that reached the lands.
23 There are some transmission losses in the stored water charged
5 24 to stored water going down the river channels. We also have
25 an item of storage water gain to the river from the Minidoka

1 project, which in the aggregate just about offsets the losses
2 charged to the stored water charged to transmission down to
3 the channels. So that for the purposes of this tabulation I
4 have taken drop in the reservoirs and allowed the river loss
5 to balance the storage gain from the Minidoka project and used
6 the same figures to represent diversion by the canals in this
7 tabulation. That is approximately correct. There might be
8 small differences in some of the years that would not be sig-
9 nificant for the purposes that Mr. Parry might have in mind
10 using this information.

11 MR. MASON: I might at this point ask Mr. Parry if this
12 tabulation supplies the data he requested?

13 MR. PARRY: It does.

14 PRESIDING EXAMINER: Could I ask a question here to be
15 sure I understand what this is?

16 MR. MASON: Yes, sir.

17 PRESIDING EXAMINER: Take the year 1952 on your tabulation
18 there, for example. If I understand this correctly there was
19 used --

20 THE WITNESS: Was diverted.

21 PRESIDING EXAMINER: Was diverted and therefore used, I
22 presume?

23 THE WITNESS: I mean, some of it wastes back to the river,
24 but it was diverted from the stream.

25 PRESIDING EXAMINER: Taken from the stream?

1 THE WITNESS: Yes.

2 PRESIDING EXAMINER: Above Milner Dam in thousand acre-
3 feet, 7941 thousand acre-feet?

4 THE WITNESS: That would be 7,941,000 acre-feet. You
5 just add three ciphers. It was merely tabulated this way to
6 save the stenographer putting on all those extra zeroes.

7 PRESIDING EXAMINER: I understand. And of that amount
8 that was diverted there was 1,723,000 acre-feet which came
9 from storage which had been accumulated at some prior time?

10 THE WITNESS: That is correct.

11 PRESIDING EXAMINER: So you get the impression from this
12 tabulation in the early years from 1919 on through 1927 or
13 1926, thereabouts, there was less storage used than there was
14 in subsequent years?

15 THE WITNESS: There was less storage available. The
16 American Falls Reservoir ^{which} was not built until 1927, was the
17 first year that was in use. So it is a combination of two
18 things, increasing acreage going into cultivation and addi-
19 tional stored water being available. Other reservoirs were
20 made available about 1939, ~~and other reservoirs.~~

21 PRESIDING EXAMINER: Now the wide difference between the
22 storage diversion shown for 1951 and 1952 --

23 THE WITNESS: That depends on the character of the year.
24 Some years the water supplied from the melting snow holds up
25 well into the year. In other years it drops off and that just

1 reflects runoff conditions.

2 PRESIDING EXAMINER: 1951 was one of those good water
3 years so that less storage was needed to supply the needs of
4 the owners of the canal?

5 THE WITNESS: That is right. There wasn't much differ-
6 ence in the total diversions, but, the natural flow water held
7 up a long time, and they didn't need to draw on their storage.

8 PRESIDING EXAMINER: I think I understand it now.

9 MR. MASON: I have one or two further questions.

10 PRESIDING EXAMINER: All right.

11 BY MR. MASON:

12 Q Will you refer to your note on the bottom which
13 starts out "Column 3." Do you find that?

14 A Yes.

15 Q In that note you use the term at the end "During
16 regulation period." Would you define that for us?

17 A In the early part of the season when the flood
18 waters are on there is plenty of water for everybody, and we
19 are usually spilling water to waste past Milner which goes
20 down to the Pacific Ocean. We don't attempt to regulate any-
21 body's diversion at this time according to their rights. The
22 water is in ample supply; it is being wasted, and we don't put
23 our regulation river riders to work until the stream flow
24 drops to a point where we no longer have any water to waste
25 and have to ^{begin} ~~begin~~ the use of stored water.

1 From then until the end of September or early October is
2 what we call the regulation period when the canals are under
3 regulation and the water being delivered according to their
4 priority rights and stored water being delivered from the
5 reservoirs.

6 Q Now is that waste that you speak of past Wilner,
7 does that occur only during the flood period or might it occur
8 at other periods during the year?

9 A Well, if the amount of water held in storage in the
10 reservoirs at the end of the season is of considerable magni-
11 tude so that we feel sure that some of them at least will fill
12 then instead of filling them during the winter first we figure
13 how much could be spared for power production, and we spill
14 that water gradually during the winter and get a use out of
15 it for power production at the downstream plants rather than
16 to wait and fill the reservoirs and then spill it in large
17 flood flows.

18 We also sometimes spill water to reserve space in the
19 reservoirs for flood control. So that under those conditions
20 there may be substantial spills during the winter months and
21 extending on through the spring months, usually into about early
22 July.

23 Q In deriving your figures as shown in the vertical
24 column, the third column --

25 MR. PARRY: Mr. Mason, could I make this suggestion? I

1 have been mentally wondering what the record would look like.
2 Since the recess we have been talking about a tabulation that
3 has not been identified or put in the record.

4 MR. MASON: I have identified it, and I intend to put
5 it in the record when we have these qualifying questions in.

6 MR. PARRY: I simply asked this to keep the record straight.

7 MR. MASON: If you would feel better about it, I would
8 offer it at this time. I have no feeling one way or the other.

9 MR. PARRY: That is agreeable with us, to incorporate it
10 in the record.

11 MR. MASON: I thought it would be well to have these
12 explanations of the tabulation before incorporating it in the
13 record; that was my plan of procedure.

14 PRESIDING EXAMINER: I would think so, too.

15 Mrs. Cooper, are you going to have any questions about
16 this before it goes into the record? That is the time to ask
17 the questions, it would seem to me.

18 MR. PARRY: I withdraw.

19 PRESIDING EXAMINER: Do you have any further questions,
20 Mr. Mason?

21 MR. MASON: I have one more.

22 PRESIDING EXAMINER: Let's finish up with your questions,
23 Mr. Mason.

24 BY MR. MASON:

25 Q Mr. Crandall, in deriving the figures shown for each

1 year under Column 3 headed "Storage Diversions," did you
2 assume that all flow past the Milner Dam in the regulation
3 period to be diversion storage?

4 A That is true usually except in some instances where
5 due to perhaps a canal shutting some water off unexpectedly
6 or something of that nature there was some water spilled for
7 short times. Ordinarily we charge the water spilled past
8 Milner during the regulation period as storage. The Idaho
9 Power Company has certain storage rights which it draws past
10 there and in the operation of the river, many reservoirs and
11 canals, there is occasionally a little stored water spilled
12 which has to be charged up to the various canals as operation
13 waste. It doesn't amount to much.

14 MR. MASON: I have no further questions, Mr. Examiner.

15 PRESIDING EXAMINER: Did I understand that you had some
16 questions, Mrs. Cooper?

17 MRS. COOPER: Are you assuming that Mr. Parry has none?

18 PRESIDING EXAMINER: I am.

19 MR. PARRY: I have no more on this. I have two more that
20 I am going to ask Mr. Crandall independent of the tabulation.

21 MRS. COOPER: Mr. Examiner, we have no questions on this
22 tabulation.

23 MR. MASON: Then, Mr. Examiner, if there are no further
24 questions and if there are no objections I move that this
25 tabulation about which we have had testimony of the Witness

1 Crandall be incorporated in the transcript of the record.

2 PRESIDING EXAMINER: Without objection then, that may be
3 done by the reporter at this point.

4 (The information referred to above is as follows:)

5 Snake River, Idaho

6 Year	7 Diversions above Milner (1,000 acre-feet)	8 Storage Diversions (1,000 acre-feet)
9 1919	4,839	705
10 1920	6,296	590
11 1921	5,957	590
12 1922	6,051	644
13 1923	6,352	741
14 1924	5,298	664
15 1925	6,582	487
16 1926	6,049	1,003
17 1927	6,822	608
18 1928	7,130	1,017
19 1929	6,628	1,279
20 1930	6,851	1,381
21 1931	5,960	2,152
22 1932	7,052	1,562
23 1933	7,234	1,906
24 1934	5,039	1,641
25 1935	6,423	1,652

1	1936	7,164	1,616
2	1937	6,890	1,979
3	1938	7,220	1,498
4	1939	7,659	2,091
5	1940	7,059	2,420
6	1941	7,036	2,091
7	1942	7,265	1,906
8	1943	7,565	1,080
9	1944	6,759	1,837
10	1945	7,043	1,231
11	1946	7,501	1,544
12	1947	7,609	1,490
13	1948	7,364	1,804
14	1949	7,649	1,828
15	1950	7,619	1,091
16	1951	7,697	907
17	1952	7,941	1,723

Note: Diversions between American Falls and Milner are for entire year ending Sept. 30. Diversions above American Falls are for irrigation season, May to September, inclusive. The totals of these two items are combined to get the figures in column 2 of the above tabulation.

Column 3 is the combined drop in the reservoirs during period of storage draft less stored water spilled past Milner during regulation period.

1 MR. PARRY: Might I ask Mr. Crandall then one or two
2 other questions?

3 PRESIDING EXAMINER: Yes. This is not cross examination?

4 MR. PARRY: No.

5 PRESIDING EXAMINER: It is clarifying material?

6 MR. PARRY: That is what it is intended to be.

7 PRESIDING EXAMINER: All right.

8 BY MR. PARRY:

9 Q What, Mr. Crandall, is the total usable reservoir
10 capacity above Milner Dam in your district at this time ex-
11 clusive of Palisades, which, as I understand, is still under
12 construction?

13 A 2,872,000 acre-feet.

14 Q Do I understand your testimony that that is filled
15 annually in the spring where necessary and to the extent of
16 the available water at each reservoir?

17 A That is correct. If the water is there we can store
18 that much.

19 Q Is that your custom, to fill each of those reservoirs
20 each year?

21 A If the water is available.

22 MR. PARRY: That is all I have of Mr. Crandall.

23 PRESIDING EXAMINER: All right. What arrangements did
24 you make with Mr. Hilmer for cross examination of Mr. Crandall?

25 MRS. COOPER: I checked with Mr. Hilmer during the morning

1 Q Does the 80,000 figure represent the maximum
2 possible with such a dam, or is that a --

3 A It is a question of water supply available at
4 the point of diversion. As I state, the river now has a
5 flow there sufficient to irrigate about 110,000 acres.
6 There is a much greater acreage available, and I cut that
7 down to 80,000 acres to allow for a possible diminution
8 in the flow at that point due to pumping from ground waters
9 on the Snake River plains.

10 Q Would you put any of the 80,000 acres in the
11 period up to the mid point of 1985?

12 A Well, I would say it would be quite doubtful if
13 it would be developed by the mid point.

14 Q I notice your statement in connection with this
15 80,000 acre Bruneau project, that the flow below Milner
16 that you referred to "may be appreciably lessened by future
17 pumping developments on the Snake River plains."

18 Could you explain that statement a little further?

19 A That is the same thing that we were discussing
20 yesterday relating to the irrigation of this 400,000 acres
21 which I estimated on the Snake River plains. And in my
22 opinion, that will eventually reduce the present ground
23 water in-flow into the river below Milner.

24 Q That involves some assumptions with respect to
25 time lag, does it not?

1 A Yes.

2 Q Does that also involve the assumption that the
3 cycle of use will be established before the 50-year pay-out
4 period is concluded?

5 A Yes; essentially, or at least in major part.

6 Q What difference, if any, would exist in this
7 situation in dry years, as opposed to wet?

8 A In extremely dry years, when the canal systems
9 are seriously short of water, or, rather, in the year follow-
10 ing such years, the in-flow drops down considerably.

11 Q I notice your statement in connection with this
12 possible project, that[^] it would doubtless be quite costly
13 per acre of land irrigated^{//}. Could you give us some idea
14 of the cost you had in mind?

15 A I don't know exactly, and I couldn't give a def-
16 inite figure except that I am certain in my own mind that
17 it would be greatly in excess of the cost that could be
18 repaid by the irrigators, and that additional cost would
19 have to be subsidized in some way, either by payment from
20 sale of power or a direct government subsidy.

21 Q Do you know whether there has been any land clas-
22 sification or soil analysis in this area of your contem-
23 plated Bruneau project?

24 A I don't think there has been any.

25 Q Does the 80,000 acre estimate include any use of

1 would be somewhat more precipitation falling on the plain it-
2 self, and these minor streams from the north, which run down
3 and during the flood water periods flood out over the margins
4 of the plain, would contribute a little more.

5 But this water table beneath this whole area is a
6 considerable depth below the land, considerable depth below
7 the river face even, and I don't see how the lowering of
8 the water table a few feet will in any way induce a greater
9 inflow in it.

10 The possibility exists of an artificial recharge.

11 Q I was about to ask you about that because I noticed --

12 MR. HILMER: It is getting a little after our usual
13 recess time. Perhaps we could save this artificial recharge
14 subject until we reconvene.

15 PRESIDING EXAMINER: If you would like to have a
16 little rest, we will take our ten-minute break at this
17 time.

a.m.
recess

18 (Whereupon, at 11:15 o'clock a.m. a recess was taken
19 until 11:25 o'clock a.m.)

20 PRESIDING EXAMINER: Come to order, please.

21 BY MR. HILMER:

22 Q Just before the recess, Mr. Crandall, we were
23 about to get into the subject of artificial recharging of
24 the ground water basin, which is discussed on page 6 of
25 your report.

1 Will you describe what you had in mind there and expand
2 on it a little for us?

3 A There are a number of possibilities where water
4 could be diverted from the Snake River or its tributaries in
5 the vicinity of Idaho Falls and carried out onto the plain
6 and allowed to spread over the surface of depressions and
7 porous lava flows and things of that kind, and contribute
8 it to the water table to provide greater storage and offset
9 to some extent depletions arising out of ground water pumping.

10 One of these possibilities is in the diversion of
11 water from Henry's Fork, in the vicinity of St. Anthony,
12 and carrying it over into the Mud Lake basin over a low
13 divide that exists between those two areas, and dissipate it
14 into the ground by flooding.

15 The ditch would be constructed so that as it crosses
16 swells and depressions, only the lower bank would be built,
17 and water allowed to flood as far up the depressions and
18 over as large an area as possible to induce a greater rate
19 of recharge into the underlying ground waters.

20 There are also possibilities of diversions of water
21 from the main Snake River between the mouth of Henry's Fork
22 and the vicinity of Roberts. And the water could be car-
23 ried by gravity through canals out over the plains and
24 similarly be spread over as large areas as are available to
25 dissipate the flow of the stream.

1 There are some sections along the river channel where
2 the river itself is flowing as a perched channel at con-
3 siderable distance above the water table. And at such points
4 it might be possible to recharge the ground water by wells
5 drilled along the shoreline of the river.

6 Any of these projects would be quite costly. They
7 would have to be financed by the government, perhaps as a
8 work relief project or something of that nature, in times
9 of depression, or on account of the general widespread ben-
10 efits. But I believe it is quite possible that they might
11 be able to put in an additional perhaps half million acre
12 feet of water a year in years when it was available over
13 and above filling the present reservoirs, put this addi-
14 tional amount into the ground in the valley by artificial
15 recharge, provided the government would finance the cost.

16 Q First, as to the physical aspects, under what
17 conditions could this type of diversion for ground water
18 recharging occur?

19 A It would occur at times when all prior water
20 rights on the river were being filled, the canals were draw-
21 ing what they wanted, and the reservoirs were either filled
22 or assured of filling; so that this would be the diversion
23 of waters that would otherwise spill down the river past
24 Milner into the Columbia.

25 Q Would that condition be uncommon, in your judgment?

1 A No. Outside of the 1928 to '35 period it would
2 occur in the majority of years.

3 Q Can you not conceive of financial arrangements
4 other than through federal subsidy that might aid this kind
5 of project or make it possible?

6 A I am a little dubious about it because the Snake
7 River plain rises considerably in elevation as you go west
8 from Idaho Falls, and the construction of the canals for
9 long enough distances to flood areas sufficient to allow
10 this water to sink into the soil would represent a consider-
11 able investment, I think, running into some millions of
12 dollars.

13 I don't know exactly how much. It might run to \$15
14 or \$20 million.

15 Q Do you know of any similar projects outside of the
16 Snake basin where the financing has not depended on govern-
17 ment subsidy?

18 A Yes. There are considerable areas in California
19 where the waters are spread and allowed to sink. And they
20 have all been financed by local interests.

21 However, I don't think in those areas that any canals
22 as long as those that would be required in the Snake River
23 or that would be necessary to dispose of as large volumes
24 of water have been built elsewhere.

25 Q Do you know of any other similar projects outside

1 of those you mentioned in California?

2 A I read in the Engineering Press from time to time
3 in some of the eastern areas around Long Island and some
4 places, water is spread that way for municipal or industrial
5 water supplies. If the costs were paid privately, they
6 would have to be paid by the downstream water users who
7 would benefit from their greater return flow, I take it.

8 Q Applying the same standards of likelihood and
9 feasibility that you have applied to the various projects
10 listed on page 4 of your report, would you say that the
11 artificial recharging, which is discussed on page 6 of
12 your report, is a likely development?

13 A I think that depends on circumstances. If this
14 irrigation development takes place and the stream flow
15 down below is greatly depleted so that in the dry years it
16 is markedly less than has been estimated, I think there would
17 be quite a favorable chance of relief being forthcoming
18 from this artificial recharge. That is a kind of a matter
19 that you might think of as being held in reserve to meet
20 some unfortunate contingency that wasn't anticipated.

21 Q If the artificial recharging development should
22 occur, what effect would it have on your depletion estimates
23 in dry years?

24 A If it was of a magnitude that would put a half
25 million acre feet into storage during the years when it

1 was available, I would think that you could safely say
2 that, not being available in some years, you could say that
3 it would increase the river flow down below by an average
4 annual amount of probably half of that.

5 Q Half of what?

6 A Half of the 500,000 ^{acre-feet} that you would put in in
7 years when it was available would produce an average annual
8 outflow of half of that amount, of 250,000 ^{acre-feet}.

9 Q So that, on the average, under the circumstances
10 you have described, such recharging would practically offset
11 the depletion that you have estimated would occur from the
12 development of some 678,000 acres of irrigation east of
13 King Hill, would it not?

14 A No, I don't think that is true. I estimated the
15 average annual depletion during the pay-out period was
16 1,650,000 acre feet. And if this water recharge was put
17 into existence and that produced an average annual inflow
18 of 250,000 acre feet, that would result in reducing my
19 average annual depletion from 1,650,000 to 1,400,000 acre
20 feet.

21 Q I was trying to relate it to the areas east of
22 King Hill, Mr. Crandall.

23 A I haven't made any distinction in those ultimate
24 figures between east and west of King Hill. I think it
25 is just a question of so much depletion in the basin.

1 There are substantial depletions above ^{King}~~King~~ Hill
2 besides those that are included in this area beneath the
3 plains.

4 Q Could you give us your judgment, Mr. Crandall,
5 on the storage and regulating aspects of the ground water
6 basin in the Snake Valley?

7 A It in effect is sort of an equalizing reservoir
8 by which the waters are poured into it from these various
9 sources, principally from irrigation uses. And the outflow
10 is at a relatively uniform rate, with minor variations. So
11 that you might think of it as a big equalizing reservoir.

12 Q Turning now to the subject of surface water irri-
13 gation rather than ground water, in your ^{judgment}~~judgment~~ is there
14 likely to be any appreciable amount of new surface water
15 irrigation in the Snake basin without additional storage
16 development?

17 A In that list of projects that appears on page 4,
18 the items that are not starred are principally almost entirely
19 surface water irrigation, and some of the starred items,
20 such as the Mountain Home project, 192,000 acres of that
21 would be surface irrigation.

22 So that more than half of the area would be irrigated
23 from pumping, but there still would be substantial surface
24 irrigation projects.

25 Q The question is, though, whether that is all