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		see file #43668 Pam file C-62	FEI Date	Amount	DED Check No.
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DEC

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	City hall
Address	930D0
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Name CITY OF THE DALLES

Sector Sec

Date filed			•••••
Priority	May 29.	1967	
Action susp	ended until	OK	art
- (1 - /-			e ve la
Returned t	o applicant .		

Date of approval	November 21.	

CONSTRUCTION

Date for beginning	November 21, 1968
Date for completion	October 1, 1969

.....

Extended to

Date for application of water

Extended to

.....

PROSECUTION OF WORK

....

Form	"A"	filed	Dec	10,	1968	
Form	"B"	filed	Dec	10	1968	
Form	"C"	filed				

FINAL PROOF

Blank mailed	AUG 23 1977
Proof received	007 4 7 1079
Date certificate issued	UCI 1 19/7

SP*12985-119

10-2-67 change opp. to agree with plans Application No. R-Y3 66 7 OF 1.B Form B NOTICE OF COMPLETION OF CONSTRUCTION , John B/himes, Qay Clark. City of the Dallos , the holder of Permit No. R. 1488 Deperpropriate the public waters of the state of Oregon, completed the construction of the works described November. Zherein on the 15 R day of 1968 GIN BEG CRUW CREek DAM Completed - We Will Fell Remarks: 0 ZO This WINTER & Spring. EL 4 Sal EC LU LU 3 0 ----B.a.D STA IN WITNESS WHEREOF, I have hereunto set my hand this 97 day of December, 1968 6-- City Hall 3/3Court St The Dalle Kun 12 (Signature of Applican Fill out, detach and mail to the State Engineer, Salem, Oregon 97310, when construction work is completed. 5 9 97058 or Application No. R-4366 Form A NOTICE OF BEGINNING OF CONSTRUCTION B Mans City Cle ti of 76 Colles, the holder of Permit Nok - 4988 to appropriate the public waters of the state of Oregon, began the actual construction of the works described therein on the 1811 day of 19.6 Bornarks: # 574,352 "Control With AM - Employed 25 To 75 Mon 10 Con 57 ompletes Nov 15, 1968 BM IN WITNESS WHEREOF, I have hereunto set my hand this 977 day of ... LL Gilh- City Hall (Address) 51 of Applicant) Fill out, detach and mail to the State Engineer, Salem, Oregon 97310, when construction work is begun. SP*44000-110 Organ 97058





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R.13E. A In pular SERVICE AREA BERVICE AREA 888.89'= 1 inch 1000' 2000' ~ Application No. R-43667 43668 R-4988 SERVICE AREA MAP

CITY OF THE DALLES MUNICIPAL WATER SUPPLY MAY 1967

MAP TO ACCOMPANY APPLICATION FOR PERMIT TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF OREGON FOR THE CITY OF THE DALLES. SOURCE OF WATER IS CROW CREEK RESERVOIR, SOUTH FORK MILL CREEK.

35479

STATE OF OREGON

COUNTY OF WASCO

CERTIFICATE OF WATER RIGHT

This Is to Certify, That CITY OF THE DALLES

of City Hall, The Dalles

, State of Oregon, 97058 , has made

proof to the satisfaction of the Water Resources Director, of a right to store the waters of South Fork Mill Creek, tributary of Mill Creek, in Crow Creek Reservoir and water diverted for storage from South Fork Mill Creek when available with any deficiency in the available supply from South Fork Mill Creek to be made up by diversion from Dog River appropriated under Application No. 43668, Permit No. 32479

for the purposes of municipal under Reservoir Permit No. R-4988 , and that said right to store said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from May 29, 1967

that the amount of water entitled to be stored each year under such right, for the purposes aforesaid, shall not exceed 955.0 acre feet

ind, onair nor caccea - soore acre r

The reservoir is located in

NW4 Section 20 T. 1 S., R. 11 E., W. M.

WITNESS the signature of the Water Resources Director, affixed this date. October 17, 1977

James E. Sexson

Water Resources Director

Recorded in State Record of Water Right Certificates, Volume 36 , page 44917

VOR

STATE OF OREGON

COUNTY OF WASCO

Proof of Appropriation of Water

CITY OF THE DALLES

of City Hall, The Dalles

, State of Oregon, 97058

, has

SP+12055-690

constructed a reservoir to store the waters of South Fork Mill Creek, tributary of Mill Creek, in Crow Creek Reservoir and water diverted for storage from South Fork Mill Creek when available with any deficiency in the available supply from South Fork Mill Creek to be made up by diversion from Dog River appropriated under Application No. 43668, Permit No. 32479

for the purposes of

municipal

, and that the storage of said waters has been under Reservoir Permit No. R-4988 completed within the terms of said Permit; that the priority of the right dates from

May 29, 1967

that the amount of water entitled to be stored each year under such right, for the purposes afore-

said, shall not exceed 955.0 acre feet

The reservoir is located in

NW Section 20 T. 1 S., R. 11 E., W. M.

RECEIVED SEP - 61977 WATER RESOURCES DEPT SALEM, OREGON

I have read the above and foregoing proof of appropriation of water; I know the contents thereof, and that the facts therein stated are true.

IN WITNESS WHEREOF, I have hereunto set my hand this 26R day of augure

19

Dul Cisar

May 12, 1972

William I. Porfily Watermaster District No. 3 Courthouse Annex, Room 205 The Dalles, Oregon 97058

Dear Bill:

On November 8, 1971, field engineers from this office made the final proof inspection on the water right pertaining to the city of The Dalles under permits numbered 32479 and R-4988. Permit numbered R-4988 allowed for the storage of 955.0 acre feet in Crow Creek Reservoir with water to be diverted from South Fork of Mill Creek when available, with any deficiency in the available supply from South Fork of Mill Creek to be made up by a diversion from Dog River for municipal use. Permit numbered 32479 allows for the use of 955.0 acre feet of stored water only from Crow Creek Reservoir for municipal use.

Mr. Vern Gould, field engineer from this office, made an inspection of the area of use based on the applicant's service area map. During the course of the inspection, it was estimated that approximately 50 families were using water and one cannery using water, scattered along Mill Creek in Township 1 North, Range 12 East, W.M., Sections 13, 14, 21, 22, 23 and 28, and also in Township 1 North, 13 East, W.M., Sections 7, 8 and 18.

It is the practice of this office when issuing certificates of water rights confirming the use of water under a municipal right, to include all areas of use. Since this use of water is not limited to the service area map provided by the city of The Dalles, it is necessary that the location of place of use be more closely defined.

It may be possible that the city of The Dalles has a service area map or maps showing their customer hookup service along Mill Creek.

R-43667 43668 U-135 William I. Porfily May 12, 1972 Page 2

If you could provide us with a copy of that map, or such information, it would be appreciated.

It may be necessary to make an actual field check with the use of quad sheets to determine the place of use.

Your assistance in this matter would be most helpful.

Very truly yours,

Vestal R. Garner Assistant

VRG:ds

STATE OF OREGON

INTEROFFICE MEMO

TO: The Files

DATE: August 27, 1971

FROM: Gary Oberholtzer

SUBJECT: Crow Creek Dam R-43667, 43668

On Wednesday, August 11, 1971, I performed a field inspection of Crow Creek Dam and Reservoir in the company of Mr. Bill Keser, Watershed Manager, and Mr. Joe Hasbrouck, Supt. of Public Works, both representing the City of The Dalles. Also present were Mr. Bill Porfily, Watermaster, and Mr. Clif Everett, Consulting Geologist.

The dam gave an overall appearance of being in good condition and well maintained.

The spillway was operating at an estimated flow of 3 cfs. The control section, consisting of a riprap dike approximately 4 feet in height in the spillway near the center line of the dam, had collected some debris. No erosion was evident in the spillway with the exception of minor undercutting at the toe of the left bank (facing downstream). The toe was undercut approximately $\frac{1}{2}$ foot and will cause no problems unless the amount of undercutting increases with time.

The reservoir level was an estimated 8 feet below the crest of the dam. No new cracking in the structure could be found. Mr. Hasbrouck advised that the latest readings on the reference stakes had been forwarded to our office. The outlet works appeared to be in excellent condition. No erosion was noted. Mr. Hasbrouck advised that the outlet was passing a flow of 6 million gallons per day.

The two "springs" issuing from the downstream toe were inspected. The "spring " nearest the right abutment, based on a reading of 3 3/4 inches head on a 90 degree v-notch weir, plus an estimated 25% leakage under the weirboard, was flowing 0.2 cfs. The other "spring", which is located approximately midway between the Teft abutment and the outlet works, appeared to be flowing at approximately the same rate or 0.2 cfs. Mr. Hasbrouck advised that the majority of the flow originated from springs which were present in the foundation prior to the construction of the dam. The water issuing from the "springs" was quite clear, indicating no transport of fill or foundation material.

G. L. OBERHOLTZER

August 30, 1971

R-43667 43668

Mr. Joe Hasbrouck Supt. of Public Works City of The Dalles 313 Court Street The Dalles, OR 97058

Dear Mr. Hasbrouck:

This letter is in reference to our August 11, 1971, inspection of the Crow Creek Dam, and our subsequent telephone conversation of August 27, 1971.

Deflection readings on the control stakes should be continued on an annual basis, preferably in early summer after the reservoir has stablized at full pool, with copies of the data forwarded to this office.

The minor undercutting in the left toe of the spillway, as seen when facing downstream, apparently has not increased since the first season of operation. As we discussed, if undercutting does increase in the future, thought should be given to possible methods of repair. The minor amount of undercutting now present is certainly no cause for concern.

The structure gave an overall appearance of being in good condition and well maintained. I would like to thank you for your cooperation and assistance.

Very truly yours,

G. L. OBERHOLTZER Engineer

GLO:cd

cc Wm. Porfily, Watermaster

R-43667 43668 - C-62

January 5, 1970

Mr. Del Cesar, City Manager City of The Dalles 313 Court Street The Dalles, Oregon 97058

Dear Mr. Cesar:

In your letter of November 25, 1969, you indicated that Tenneson Engineering Corporation has been observing and checking the slippage at the Crow Creek Dam. Would you please forward a summation of all measurements taken by Tenneson Engineering Corporation since September.

Very truly yours,

A. M. Fetska Engineer

AMP:1sa

cc: Glenn Tracy, Watermaster

November 12, 1969

Mr. Del Cesar, City Manager City Hall The Dalles, Oregon 97058

Dear Mr. Cesar:

During a recent telephone conversation between Roger Lindquist and this office, Mr. Lindquist advised that during the crack clean out and repair of your Crow Creek Dam, several of the control markers on the dam and measuring points were lost. I recommended to Mr. Lindquist that these points be recovered and that periodic measurements be continued, at least until all movement has ceased. On November 7, 1969, Cornell, Howland, Hayes & Merryfield advised that they were not providing this service to the city.

Would you please advised as to what steps the city has taken to recover these lost points and your proposed frequency of observation, both measurement of lateral separation of the crack and settlement.

Very truly yours,

A. M. Petska Engineer

AMP:1sa

cc: Fred E. Harem, Water Projects Manager Cornell, Howland, Hayes & Merryfield

October 30, 1969

Mr. Roger W. Lindquist CH2M Engineers and Planners P. O. Box 428 Corvallis, Oregon 97330

Dear Mr. Lindquist:

Very truly yours,

A. M. Petska Engineer

AMP:1sa

June 5, 1969

R-43667 43668

Mr. Del Cesar City Manager City Hall The Dalles, Oregon 97058

Dear Mr. Cesar:

This is to confirm the comments made by Mr. Petska and me when we inspected your Crow Creek Dam on May 23, 1969. The inspection is part of my safety of dams program and will be followed by periodic inspections.

The longitudinal crack, when reported, did not indicate a probability of immediate failure but did justify an inspection. It requires watching to define its behavior and to determine corrective action which may be necessary. Any crack which develops in a structure of this character should be examined in this light and records obtained of movement of the fill, so that we will have the necessary information upon which to make intelligent decisions. You, as the owner, have the ultimate and full legal responsibility for the structure and should be most interested in its status.

Longitudinal cracks in dams of this size and type of construction are not entirely unexpected. The crack is a reflection of differential movement in the fill, and if it acts as expected would not indicate any significant weakness. The crack does extend throughout most of the length of the dam and generally follows the downstream crest of the core section. The maximum horizontal separation appears to be in the order of 2½ inches with a maximum vertical displacement of approximately 2 inches. Measurements which have been kept indicate that the rate of movement has been slowing down although none of your measurements have identified vertical movement.

The information available at present does not indicate there is any danger of imminent failure. However, in order that you, your engineer, and this office might have the data to adequately evaluate the performance, it was recommended that you run a tangent line across the dam, establish stations at 50 foot intervals in the maximum portion of the fill with a hundred foot or greater intervals on the shallower section. Offset measuring points Mr. Del Cesar

should also be established near the upstream and downstream crests at each station. Measurements should include both vertical and horizontal movement of first order accuracy and at not less than two week intervals.

If the movement continues to slow down or at least does not accelerate throughout this period, it would confirm our feeling that there is no great problem. Prior to the rainy season you should excavate the crack out and backfill it with impermeable material so it would not be an avenue for rain water to be fed into the core section.

We saw no problem in connection with the spillway erosion which could cause any failure of the dam or significantly interfere with its operation. There was some erosion which we would ordinarily consider a maintenance problem to be taken care of by the city as normal maintenance. At this stage I would have no particular concern as to how this would be done, but would assume you might wish to use rock locally available in the borrow area as material for riprapping the eroded sections.

It was agreed at the site that the measurements requested would be made and this office would be furnished copies of the data at reasonable intervals as collected, and would take further action if it appears justified.

Very truly yours,

CHRIS L. WHEELER State Engineer

CLW:eh

cc - CH2M

2



CORNELL, HOWLAND, HAYES & MERRYFIELD

ENGINEERS AND PLANNERS

1600 S.W. WESTERN BLVD. • P.O. BOX 428 • CORVALLIS, OREGON 97330 TELEPHONE: AREA CODE 503/752-4271 OTHER OFFICES IN: SEATTLE • BOISE • PORTLAND



STATE ENGINEER

SALEM. OREGON

28 May 1969

Project No. C4233.8

Hr. Del Cesar City Hanager City Hall The Dalles, Oregon 97058

Dear Mr. Cesar:

Crow Creek Dam

The purpose of this letter is to summarize discussions and the observations made during inspection of Grow Creek Dam on 23 May 1969. Among those present were:

> Mr. Chris L. Wheeler, State Engineer Mr. A. M. Petska, Assistant State Engineer Mr. S. A. Thorn, Regional Engineering Office, U. S. Forest Service Mr. George Palmer, Mt. Hood National Forest Mr. Robert Chadwick, Dufur Ranger District Mr. A. D. Elmore, Dufur Ranger District Mr. A. D. Elmore, Dufur Ranger District Mr. Bick Ramon, Economic Development Administration Mr. Don Gould, Economic Development Administration Mr. Del Cesar, City Manager, The Dalles Mr. Jack Milne, Councilman, The Dalles Mr. Vern Tenneson, City Engineer, The Dalles Mr. Bill Keyser, Chief Vater Treatment Plant Operator, The Dalles Mr. Joe Hasbrouck, Superintendent of Public Works, The Dalles Mr. Fred Harem, CH₂M Mr. Roger Lindquist, CH₂M

The purpose of this inspection was to:

(1) Review the condition of the dam after two months of operation with a full reservoir, with special attention being given to the longitudinal cracks on the crest of the dam.

(2) Inspect the condition of the spillway.

(3) Inspect and discuss the problems of the spillway erosion, borrow area erosion, access road maintenance, and the effect of the erosion on the quality of water.

Mr. Del Cesar 28 May 1969 Page 2

Our letter written to Mr. Cesar on 10 April 1969 summarizes the condition of the dam as observed on 1 April 1969.

DAM

The longitudinal cracks on the crest of the dam have opened up approximately 1/4 to 1/2 Inch since the reference points were established on 1 April 1969. The rate of movement is slowing down as shown on the enclosed plot of the change in crack separation. The settlement points have not been read since 1 April 1969. At that time the maximum settlement was 0.15 feet at station 7 + 50, which coincides with the location of maximum crack opening, and maximum fill height.

The flow in the outlet of the underdrain system has remained stable during the past two months. Turbidity observations indicate that the water discharging from this underdrain system and the other springs is very clean (under one Jackson Turbidity Unit).

The foundation and abutments appear in good condition. No evidence of movement was observed. One damp spot was observed on the exposed rock in the right abutment at approximately station 7 + 50; the remainder of the abutments were dry.

OUTLET WORKS

The outlet works were not inspected on this inspection trip.

SPILLWAY

The spillway from the concrete control sill at the entrance down to the end of the riprap, approximately 200 feet downstream of the log bridge, shows negligible erosion. This portion of the spillway channel is functioning very well, although some debris has hung up on the riprap at the spillway crest. From the end of the riprap down to the curve where the spillway enters the old intermittent stream channel, bottom and lower side slope erosion has occurred. This is generally 2 feet deep. Exposed in the bottom of this eroded channel is the surface of weathered conglomerate or the weathered andesite which was exposed in the core borrow area. The edge of the earth dike along the south edge of the channel adjacent to the waste disposal area has been undercut and eroded back approximately 4 feet at one location.

Along the intermittent stream channel, the spillway water has generally eroded 2 to 3 feet of soil. In general, the underlying conglomerate is exposed in the bottom of this channel.

Mr. Del Cesar 28 May 1969 Page 3

BORROW AREAS

The 27-acre core borrow area is the only exposed borrow area. The remaining borrow areas were in the reservoir area and are inundated by the full reservoir. The core borrow area was planted with grass and tree seeds last fall. Only the southern edge of this borrow area was inspected, but it appeared that wherever there was sufficient soil, the grass seed has germinated and started to grow; but generally, the stand of grass is poor. Numerous small trees were observed and if they continue to grow, a good stand of pine and fir trees is expected. Some erosion of the borrow area has occurred, but generally the floor of the borrow area is in hard, weathered andesite which contributes to a high runoff of precipitation but generally is too hard to support much erosion. It was observed that some silt and sand has washed across the access road into the forested area between the road and the spillway.

ACCESS ROAD

The access road through the borrow area is rutted and needs to be graded, drained and graveled to provide an all-weather road. Twelve-inch culverts at three locations around the reservoir will reduce maintenance and minor erosion where these smaller water courses enter the reservoir. The 12-inch culvert adjacent to the spillway has been damaged at the upper end and should be repaired or replaced with a 15-inch or 18-inch culvert.

WATER QUALITY

The color of the lake has improved greatly since 1 April 1969, when it appeared to be rather muddy from the recent heavy snow melts. By inspection, it appears that the water at the head of the spillway has about the same turbidity as the water at the lower end of the spillway. The problem with water quality occurs primarily at the time of quick run-off, should this occur when the water demand exceeds the capacity of the plant. Otherwise, it is primarily the additional operating time and chemical use needed to produce a consistently high quality water.

The contributing factors are:

- (1) The erosion and deposition caused by the 1964 storm.
- (2) The ash and erosion resulting indirectly from the 1967 fire.

(3) The erosion caused by the construction of the dam and its appurtenances followed by an unusually heavy snow pack. It will take several seasons for the watershed to return to normal but we feel conditions will improve naturally and with minimal maintenance effort.

Mr. Del Cesar 28 Hay 1969 Page 4

CONCLUSIONS AND RECOMMENDATIONS

(1) Mr. Petska and Mr. Wheeler made several observations that should be understood and made a matter of record. They have:

(a) Indicated that longitudinal cracks frequently occur in a zoned rock-fill dam, and that if they behave normally, the rate of separation would continue to decrease and finally stop. Then the cracks should be excavated out and filled with compacted clay;

(b) suggested that in order to properly monitor the deflection and settlement of the dam, additional survey points should be set on the crest. These would be set at 50-foot intervals across the highest portion of the fill and at 100-foot intervals at the north end where the fill was less high. A second reference line will be established on the bench above the downstream toe;

(c) indicated that they saw no problem in the spillway which would cause concern for the safety of the dam.

We concur in these suggestions and will assist the City's staff in carrying out this program of observation and corrective work.

(2) The earth dike along the south edge of the spillway channel near the curve where the spillway joins the intermittent creekbed should be lined with rock to prevent additional erosion. Abundant rock is available from the rock piles in the adjacent core borrow area.

(3) The access road through the borrow area should be graded, drained and graveled to provide an all-weather access road. The drainage should be controlled so that any muddy water will be discharged into the forest area where it will not cause further erosion, or discharged through a rock-lined ditch directly to Mill Creek to minimize erosion.

(4) The Soil Conservation Service, U. S. Department of Agriculture should be contacted and requested to visit the site and make recommendations for methods of improving the grass stand in this core borrow area. It was also suggested that small trees may be hand-planted in the borrow area. This might be a worthwhile project for a scout troop or similar youth groups.

(5) Bi-monthly turbidity checks should be made at the point where Crow Creek enters the reservoir, at the head of the spillway, at the lower end of the spillway, and from water released from the outlet works which is coming down Mill Creek. These measurements would give qualitative information on the amount of any turbidity increase which is occurring in the reservoir and spillway. These measurements can be compared with raw water turbidities observed at the plant, and will provide a good base for evaluating the relative importance of this problem, and the results from corrective measures.

Mr. Del Cesar 28 May 1969 Page 5

SUMMARY

it was the general feeling of those present that the dam appeared stable and was not in any danger. It was also felt by the majority of people present that the erosion in the spillway was less than what was anticipated, and that the evidence of the conglomerate and weathered rock in the bottom of the spillway was an indication that the erosion in the future would be relatively alnor.

All reasonable steps should be taken to insure a high quality water for the City of The Dalles with a minimum amount of treatment. By this we mean steps that are consistent and economic when viewing the situation as a whole. Granted, we would all have liked to have been able to accomplish this worthwhile and much-needed project with no objectionable side effects or scars in the watershed, even though these will be healed with a relatively small expenditure, some patience, and a little time. We are frankly encouraged by the performance of the spillway and, while the City may wish to go ahead with construction of the pipe spillway as once proposed, we see no urgency for this construction. The remaining project funds might be better spent in further replacement of another section of the transmission pipeline.

If you have any questions pertaining to this letter, please call so that we may arrange to discuss it further with you.

Very truly yours,

CORNELL, HOWLAND, HAYES & MERRYFIELD

Tild E. Harem Roger W. Levilquit

Fred E. Harem Project Manager

Roger W. Lindquist Project Engineer

RWL:cas

cc: Mr. R. Ramon Mr. A. H. Petska Mr. S. A. Thorn Mr. R. Chadwick





CORNELL, HOWLAND, HAYES & MERRYFIELD

ENGINEERS AND PLANNERS

1600 S.W. WESTERN BLVD. • P.O. BOX 428 • CORVALLIS, OREGON 97330 TELEPHONE: AREA CODE 503/752-4271 OTHER OFFICES IN: SEATTLE • BOISE • PORTLAND

10 April 1969

Record No. C4233.8

Mr. Del Cesar City Manager City Hall The Dalles, Oregon 97058

Dear Mr. Cesar:

Crow Creek Dam

The purpose of this letter is to summarize observations made during our inspection trip of the dam on 1 April 1969. This inspection was made at the request of Mr. Joe Hasbrouck, Superintendent of Public Works. Mr. Hasbrouck and Mr. Harry Cretin, who was Resident Engineer for CH₂M during the construction, assisted in the inspection.

STATE ENGINEER

SALLM. OREGON

Background Information

The dam was completed in September 1968. Very small longitudinal cracks were first noticed in the late fall by City personnel. These cracks were considered unimportant and were not reported to Mr. Hasbrouck until larger cracks were observed this spring. The reservoir was slowly filled during the winter after the gate was partially closed in late November. In March the gate was completely closed to fill the reservoir for the summer operation. The reservoir filled rapidly and the spillway started to operate on 26 March 1968. As the snow melted off the dam crest, the cracks were again observed on 29 March 1969. The purpose of our inspection was to establish basic measurements and control for further observation of these cracks, and to make a post-construction inspection of the facilities to evaluate any remedial construction or maintenance work following the winter.

Longitudinal Cracks

Cracks in the embankment material, which parallel the centerline, are almost continuous from one end of the dam to the other. During our inspection, the centerline of the dam was resurveyed and the cracks were located, measured and mapped. The crack pattern is shown on the enclosed drawing, C-4233-8 sheet 1 of 1. These cracks vary in width from hairline indications at the north end of the dam to cracks which are up to 2-1/2 inches wide (plus raveling of the edges to a 4-inch width) at the area of the highest fill. The cracks vary from 1/2 foot to 9 feet downstream from the centerline.

Mr. Del Cesar 11 April 1969 Page 2

• Elevations were taken on the settlement points which were previously set on the upstream edge of the crest in September 1968, after the completion of the dam. The maximum settlement observed was 0.15 feet at station 7 + 50. This maximum settlement coincided with the largest cracks, and the most differential settlement observed between sides of the cracks.

In order to monitor future separation of the cracks, iron pins were driven into the crest on each side of the major crack at three locations. The distance between the pins will be measured periodically in order to check movement.

These cracks appear to be caused by a combination of differential settlement between the various materials used in the dam and consolidation of the foundation soil. It is our opinion that the majority of the settlement is occurring in the random fill No. 2. This material was placed between the core and the downstream rock shell. It was a silty soil with varying sizes and amounts of rock fragments and was not compacted to as high a density as the core. Also, a portion of the foundation soil near the downstream toe beneath the random No. 2 fill was in the old marsh and was softer than adjacent soils.

The following paragraph from the book, Earth and Earth-Rock Dams by Sheard, Woodward, Gizienski & Clevenger, summarizes the conclusions of research on longitudinal cracks, "Although they are not normally dangerous, longitudinal cracks occur frequently and have developed in some of the largest dams built in recent years. Although some have opened to a depth of more than 20 feet, they usually are only a few feet in depth."

By contrast, transverse cracks which cut across the core and form a seepage path for water are, of course, a more dangerous type of crack. No evidence of transverse cracks was observed during this inspection.

The results of this inspection were discussed with Mr. Petska of the State Engineer's office. Mr. Petska stated that these cracks were common in zoned earth-rock dams and that he has observed many such cracks in dams constructed in Oregon. Once they have stopped moving, they are normally filled to prevent water from seeping into them.

Downstream Face and Abutments

No evidence of foundation movement on the abutment or valley floor was observed. The abutments appear to be firm and undisturbed. There were small rivulets of water from patches of melting snow making it impossible to make a meaningful inspection for springs or seepage from the abutments. The foundation drains appear to be functioning properly and are flowing only slightly more than they were last fall.

Mr. Del Cesar 11 April 1969 Page 3

Outlet Works

The stilling basin and the outlet pipe were inspected and are in good condition. Approximately five transverse hairline cracks and one 1/16- to 1/8-inch crack were observed in the outlet pipe. The open crack was estimated to be 25 to 50 feet downstream from the centerline of the dam. The outlet gate operates easily. The discharge channel downstream from the outlet works appears well formed and stable.

Spillway

The spillway on the left abutment is operating very satisfactorily. The major, initial erosion of the fine-grained soil from the rock fragments took place in a very short time. During the inspection very little erosion was observed. The sides of the spillway from the concrete sill to a point below the bridge (which were lined with rock) looked very good. From below the bridge down to the intermittent stream channel, there has been erosion, but it appears that this area has stabilized with rock particles forming the channel bottom. After the spillway joins the intermittent stream, flow meanders through the channel which was cleared last summer.

Recommended Inspection

In order to determine if separation or movement is continuing in the cracks, the distance between the separation pins should be made frequently(at least three times a week) until it is established that movement is not presently occurring, or that it is slowing down. The crest should be inspected for changes in the crack pattern and for evidence of random cracks.

Inspect the abutments and valley floors frequently for springs and seeps. Any seeps should be located and enough information obtained so an estimate of an increase or decrease in the flow can be made. The existing weirs on the known springs or underdrains should be read and recorded frequently. The source of any muddy water seeping from the abutments should be determined if possible, and the State Engineer and CH₂M should be notified if muddy seeps are observed.

Maintenance

Shallow drainage ditches should be excavated to divert water from the melting snow away from the dam abutments. At the present time this water is running underneath the rock shell. This can be prevented by shallow drainage ditches excavated by hand.

After the spillway overflow stops this summer, an inspection may show areas of erosion in the spillway channel which should be repaired

Mr. Del Cesar 11 April 1969 Page 4

with heavy riprap. Large rock is readily available from the boulder piles in the core borrow area, adjacent to the spillway channel. These rocks could be rolled into the channel and placed with a dozer.

After the movement of the cracks has stopped they should be filled with clayey sand up to within approximately two feet of the surface, and then filled with tamped clay. It may be necessary to excavate along this crack with a narrow backhoe and backfill with clay in order to properly seal the surface. This sealing is necessary to prevent water from rain or snow from entering the cracks and softening or weakening the core of the dam.

I have asked that Mr. Hasbrouck keep us informed of the observations that he makes. Again, we should stress the importance of making these observations frequently until the nature of the movement of these cracks is established.

The assistance given by Mr. Hasbrouck during the inspection was greatly appreciated by the writer.

If you have any questions pertaining to this letter or would like to discuss it further, please call.

Very truly yours,

CORNELL, HOWLAND, HAYES & MERRYFIELD

R. W. Lindquist

RWL:cas

Enclosures

cc: Mr. Al Petska State Engineer's Office 518 Public Service Building Salem, Oregon 97310

> Mr. Dick Ramon Economic Development Administration 415 First Avenue N. Seattle, Washington 98109

Mr. Dick Lincoln Excavators, Inc. P. 0. Box 555 Kenmore, Washington 98028

STATE OF OREGON STATE ENGINEER WATER RESOURCES DEPARTMENT 516 PUBLIC SERVICE BUILDING SALEM 10

December 17, 1968

City of the Dalles City Hall The Dalles, Oregon 97058

Gentlemen:

This will acknowledge notice of beginning and completion of construction under the terms of permit No.s R-4988 and 32479.

Under the provisions of the permit, the time limit for completion of the appropriation by accomplishing the authorized beneficial use of water to the full extent intended will expire October 1, 1970, (In the case of irrigation completion of the appropriation means at least one beneficial irrigation of all the lands to be irrigated under the subject permit.)

Very truly yours.

o Halor

R-43667 43668

REFER TO

FILK NO.

CHRIS L. WHEELER State Engineer

Form 127 ks

September 4, 1968

Cornell, Howland, Hayes & Merryfield 1600 Western Avenue Corvallis, Oregon 97330

Attention: Roger W. Lindquist

Dear Mr. Lindquist:

÷.

The revised spillway plan for the Crow Creek Dam has been approved by the State Engineer. Please find enclosed two copies of the approved revision.

As discussed at the time of my field inspection on August 20, 1968, this office is very much concerned with the performance of this spillway and we will want to observe closely its performance during and after run-off periods in the first year or two of operation of the dam.

Very truly yours,

CHRIS L. WHEELER State Engineer

By Gary A. Gasaway Engineer

GAG: pju enclosure



December 11, 1967

City of The Dalles City Hall The Dalles, Oregon 97058

Gentlemen:

R-43667, permit No. R-4988, application No. 43668, permit No. 32479 with a blueprint.

December 11, 1967

Cornell, Howland, Hayes & Merryfield 1600 Western Avenue Corvallis, Oregon 97330

ATTENTION: Roger W. Lindquist

Gentlemen:

This letter is to advise you that permits have been issued for the Crow Creek Dam, plans and specifications for which were submitted by your organization as supporting data. Since this project is over the statutory limits, it will be necessary that construction be supervised by a registered professional engineer to insure that the dam is built in accordance with the approved plans and specifications.

Your attention is drawn to the specifications, General Conditions, Page 9, Item 24 "Plans and specifications shall not be altered in any particular without the written approval of the State Engineer". Engineers from this office will be available to consult with you to obtain immediate approval of these proposed changes.

> Very truly yours, CHRIS L. WHEELER State Engineer

By A. M. Petska Engineer

AMP: sh

cc: City of The Dalles

Mr. Glenn E. Tracy Watermaster District #3

November 15, 1967

Cornell, Howland, Hayes and Merryfield 1600 Western Avenue Corvallis, Cregon 97330

Attention: Roger W. Lindquist

Gentlemen:

This will acknowledge receipt of your letter authorizing the amendment of the reservoir application No. R-43667 to agree with the plans submitted. This has been done.

Both applications No. R-43667 and 43668 are now in satisfactory form for approval by issuance of permits.

Very truly yours,

CHRIS L. WHEFLER State Engineer

By

Larry W. Jebousek Assistant

LWJ:dlw cc: City of The Dalles City Hall The Dalles, Oregon 97058

Cetober 11, 1967

City of The Dalles City Hall The Dalles, Oregon 97058

Gentlemen:

In checking the final plans and specifications submitted with the application, several discrepancies were found.

The application shows the height of dam as being 108 feet. The plans show this to be 100 feet. The application shows the surface area of the reservoir as being 31 acres, the plans show this to be 29 acres. The application shows the capacity of the reservoir as being 965 acre feet. The plans show this to be 840 acre feet. The application shows the mean or average depth of the reservoir as being 32 feet. The plans show this to be 29 feet.

Assuming the plans submitted are correct, would you give us written authorization to amend the reservoir application to agree. Upon receipt of this letter of authorization, both applications No. R-43667 and 43668 will be in satisfactory form.

Very truly yours,

CHRIS L. WHEELER State Engineer

· By

Larry W. Jebousek Assistant

LWJ:dlw

cc: Cornell, Howland, Hayes and Merryfield 1600 Western Avenue Corvallis, Oregon 97330

August 15, 1967

Cornell, Howland, Hayes & Merryfield 1600 Western Avenue Corvallis, Oregon

ATTENTION: Roger W. Lindquist

Dear Mr. Lindquist:

This is with reference to the preliminary plans for the City of The Dalles Crow Creek Dam. I have examined these preliminary plans and can see no points of disagreement with the exception of the area and capacity curve in the upper right hand corner of sheet 1 of 5. You indicate the surface area is 33 acres. Your chart computes it at 31. You further indicate the storage is 965 acre feet and your chart shows 950 acre feet.

Upon the submission of final plans and specifications, we shall again consider this project for our approval by issuance of State Angineer's permit. The plans submitted should consist of one set of reproducibles and one print thereof together with two copies of specifications.

Very truly yours,

CHRIS L. WHEELER State Engineer

By

A. M. Petska Engineer

AMP:sh



CORNELL, HOWLAND, HAYES & MERRYFIELD

ENGINEERS AND PLANNERS

1600 WESTERN AVENUE • CORVALLIS, OREGON 97330 TELEPHONE: AREA CODE 503/752-4271 OTHER OFFICES IN: SEATTLE • BOISE • PORTLAND

DUL 21 1967

20 July 1967

Record No. C4233.1

State Engineer State Office Building Salem, Oregon

Attention: Mr. A. M. Petska

Gentlemen:

Crow Creek Dam The Dalles, Oregon

Enclosed herewith is a copy of the plans and specifications for the construction of Crow Creek Dam. Copies of these contract documents are also being sent to the U. S. Forest Service and the Economic Development Administration for their review. When comments from the reviewing agencies are received, required changes, if any, will be made and the job advertised. Our present schedule calls for advertising on 14 August 1967.

GENERAL DESCRIPTION

The dam will be owned and operated by the City of The Dalles, Oregon. The purpose of this dam is to supply domestic water for the City of The Dalles. The water will be stored from November to April each year for release during the summer and fall. Water will be released to the South Fork of Mill Creek. Released water will flow down Mill Creek approximately 11 miles to the existing City water intake. From the intake it will be treated at the existing Wicks Treatment Plant and then be piped into the City of The Dalles.

The dam is located on the South Fork of Mill Creek in the Sections 17 and 20, Township 1 South, Range 11 East, Wasco County, Oregon. The dam is located just downstream from the confluence of the South Fork of Mill Creek and Crow Creek.

HYDROLOGY

The drainage of the basin covers 12.5 square miles of Wasco and Hood River Counties. The basin is oval shaped approximately 5.5 miles long. This drainage area is partially protected from heavy storms by Mount Hood. The headwaters of the tributaries form on Surveyor Ridge at an elevation of 4,000 to 5,000 feet. The drainage area is steep and generally covered with thin, rocky soil. The vegetation varies with elevation and the water available. Along the creeks there is dense second growth timber with heavy underbrush. On the rocky hills there are scattered brush and trees with numerous open areas.

The rainfall in the upper part of the basin is approximately equal to that at Parkdale, Oregon. The average annual rainfall in the basin is approximately 40 inches. (Reference Hood Basin Report, State Water Resources Board, 1965, Plate 2.)

- -

A gauging station is located on the south fork of Mill Creek approximately 0.2 miles upstream of the Wicks treatment plant. The drainage area above this gauging station is 28 square miles. The maximum recorded flood at this station is 1,220 cubic feet per second (cfs) during December, 1964. On an area basis, this flood is prorated to be 525 cfs at the dam site.

The length of record at this gauging station is 7 years. Records on adjacent rivers have been kept for large periods.

River	Drainage Area Sq. Mi.	Years of Record	Maximum Q	Flood Year	cfs per Sq. Mi.
S.F. Mill Cr.	28	7	1,220 cfs	1964	43.5
White River (Tygh Valley, Oregon)	368	50	13,300 cfs	1923	36.2
Klickitat River (nr. Glenwood, Wash.)	360	58	9,870 cfs	1933	27.4
West Fork Hood River (nr. Dee, Oregon)	96	38	15,000 cfs	1964	156

TABLE I

The runoff per square mile is low, except for the West Fork Hood River, which is located in a different geographic area.

The rainfall during December 1964 flood was 1.58, 4.34, 4.87, 2.24, 1.07, and 0.87 from the period of 20 December to 26 December at Parkdale, Oregon. This rain combined with the melting of 27 inches of snow to cause the flood. The percentage of runoff of this storm was approximately 14 percent, as compared with the annual average runoff of approximately 25 percent (reference Hood River Basin Report). The estimated 100-year, 24-hour rainfall is 4.75 inches. (Reference rainfall intensities for local drainage to the western United States, U.S. Weather Bureau Technical Paper No. 28.) Therefore the 1964 storm produced two 100-year, 24-hour storms on consecutive days at Parkdale.

Based on the rational formula and a runoff coefficient of 0.14, an intensity of 0.5 inches per hour, and a concentration time of one hour, the runoff at the dam site would be 560 cfs. With a runoff coefficient of 0.25, the runoff would be 1,000 cfs.

The design storm was picked to be equal to the measured runoff from the 1964 storm of 525 cfs.

SPILLWAY

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A 50-foot wide excavated spillway is cut into underlying rock in the right abuttment. The velocity will be less than 15 feet per second until the water is downstream of the crest of the dam. The volocity will then increase to approximately 35 feet per second in the steepest portion of the spillway. The spillway is terminated at Mill Creek approximately 400 feet downstream of the toe of the dam. No energy-dissipating structure is planned at the end of the spillway. The spillway will pass the design flood of 525 cfs at a depth of 2 feet. (Water surface in the reservoir 2572.0+.) A flood of 2500 cfs will pass with a water surface elevation of 2576.3 in the reservoir.

OUTLET WORKS

The outlet works for draining of the reservoir and the release of water to the South Fork of Mill Creek will consist of a 30-inch diameter reinforced concrete pipe, with rubber-ring joints. The pipe will be cradled or encased in concrete for its entire length. The pipe will flow under open channel conditions except when the gate is completely open and the reservoir is full. Under these conditions the maximum pressure will be approximately 30 feet at the upper end of the pipe. This pressure will decrease to zero at the stilling basin. The outlet box at the upstream toe of the dam is equipped with a 24-inch square slide gate for releasing water from the reservoir and flushing during the wintertime.

DAM SECTION

The physical properties for the soils of the dam section are shown on Drawing No. C4233-3, Sheet 2 of 5, and further described in the preliminary report dated August, 1966. (A copy of this preliminary report was sent to you in April 1967.) The section of the dam is shown on Drawing No. C4233-3, Sheet 3 of 5. The core width was sized to utilize a large quantity of the easily accessible core material which is located approximately 1/2 mile downstream of the site. This core material is a silt or clayey silt with a coefficient of permeability range from 2.6 to 0.28 feet per year. This material will be compacted to 98 percent of maximum as determined by AASHO T 99.

The random fill section upstream of the core will utilize the readily obtainable fill material from the west side of the reservoir area. This material is a silt with a high percentage of rock fragments.

The material for the rock shell will come from the south and east sides of the reservoir and from the spillway excavation.

The filter rock will be a crushed rock which meets the gradation shown in the specifications. Because of the rocky nature of the random fill, an upstream filter was not included.

* . * '

The dam was analyzed for slope stability using the slip circle method and the sliding wedge method as described in U. S. Corps of Engineers Civil Works Manual EM1110-2-1902. A computer program for this method was used. The results were spot-checked by hand to confirm the computer results.

The results of the stability analysis is shown on Table II.

TABLE II

SUMMARY OF STABILITY ANALYSIS

Condition	Factor of Safety
Sudden Drawdown (Upstream Face)	1.36
Steady Seepage (Downstream Face)	1.45

The soil parameters for materials to be used in construction of the dam are shown in Table III.

TABLE III

SOIL PARAMETERS

Location	Cohesion lbs./sq. ft.	Angle of Internal Friction	(Moist) lbs./sq. ft.
Core	400 psf	17°	120 psf
Random Fill Rock Shell &	0	30°	125 pcf
Filter Foundation (Boulder-grave)	0	35°	120 pcf
Silt Alluvium)	0	35°	120

The normal water surface is 2570, and the maximum water surface under a flood of 550 cfs is 2572. The upstream face of the dam will be protected from wave action by the rock shell. Normal freeboard is 8 feet. The reservoir area is small with a maximum fetch length of 0.5 miles. The estimated wave height is 2.7 feet. The computed wave runup on the rock shell is approximately 4 feet.

Below the dam the South Fork of Mill Creek runs through several miles of uninhabited canyon and then discharges into the Columbia River at The Dalles. If complete, rapid failure of the dam should occur, there would be considerable property damage and possibly some loss of life in the area where the creek flows through The Dalles.

After you review these plans, I would like to discuss them with you. I will be on vacation until 7 August 1967. If any questions should arise prior to that time, Vaughn Sterling of our office is familiar with the project and would be able to discuss the project with you.

Very truly yours,

CORNELL, HOWLAND, HAYES & MERRYFIELD

W Roger N. Lindquist

RWL/kc

Enclosure

cc: Mr. C. Dean Smith Mr. Harvey Hall Mr. Ricardo Ramon Mr. Vince Killeen

July 17, 1967

Cornell, Howland, Hayes & Merryfield Engineers and Planners 1600 Western Venue Corvallis, Oregon 97330

Gentlemen:

This will acknowledge receipt of the \$1.18 recording fee for application No. 43668 for which our receipt No. 4274 is enclosed.

We will withhold further action on these applications No. N-43667 and 43668 pending receipt of the final plans and specifications.

Very truly yours,

CHRIS L. WHEELER State Engineer

By Larry W. Jebcusek Assistant

LWJ:dly Inclosure cc: City of the Dalles City Hall The Dalles, Oregon 97058 43668 R-43667

ATE OF OREGON

INTEROFFICE MEMO

.-43667, 43668

DATE: July 6, 1967

ROM: A. M. Petska Engineer

SUBJECTInspection of Proposed Crow Creek Dam

On June 20, 1967, accompanied by R. Lindquist and members of the City of the Dalles Water Department, I inspected their proposed Crow Creek Dam in Wasco County. A considerable foundation investigation has been performed as well as location of borrow area. The project will be an earth rock fill dam located in a v-shaped canyon with spillway through the right abutment. The foundation appeared to be adequate for the magnitude of the structure to be constructed; however, I have some suspicions regarding the depth of overburden on the left side. Mr. Lindquist was advised of my suspicions and when the foundation is completely opened up, he will advise and another inspection will be made.

The preliminary drawings have been reviewed and the hydraulic capacity of the conduit and the spillway appears adequate and the material to be used in construction is satisfactory for the type of structure proposed. Upon submission of satisfactory plans and specifications, recommendation will be made for issuance of permits.

Engineer

AMP: sh

June 7, 1967

43668 R-43667

Cornell, Howland, Hayes & Merryfield Engineers and Flanners 1600 Western Avenue Corvallis, Oregon 97330

Gentlemen:

This will acknowledge receipt of an application for a permit to construct Grow Greek Reservoir and store 965 acre feet of water therein from the South Fork of Mill Greek and make up any deficiency from Dog River for municipal water supply, preliminary design report, and the fee of \$28.65 for which our receipt No. 3967 is enclosed. This application has been filed and numbered R-43667.

We will withhold further action on this application, as indicated in Mr. Petska's letter of June 1, 1967.

Also acknowledged is receipt of an application for a permit to appropriate 965 acre feet of water from Crow Creek Reservoir for municipal water supply, a map, and the fee of \$33.82 for which our receipt No. 3968 is enclosed. This application has been filed and numbered 43668.

This application requires a recording fee of \$10 for the first cubic foot per second and \$2 for each additional cubic foot per second or fraction thereof. Therefore, an additional \$1.18 is required.

Very truly yours,

CHRIS L. WHEFLER State Engineer

By Larry W. Jebousek, Assistant

LWJ:dly Enclosure cc: City of The Dalles City Hall The Dalles, Oregon 97058

June 1, 1967

Cornell, Howland, Hayes & Merryfield Engineers and Planners 1600 Western Avenue Corvallis, Oregon 97330

ATTENTION: Roger V. Lindquist

Dear Mr. Lindquist:

I have reviewed the Preliminary Design Report on Subsurface Exploration for the Construction of Crow Creek Dam and from the preliminary information supplied, the design appears to be adequate.

I will be available some time in the coming month to perform an inspection of this project with you. Please advise.

Very truly yours,

CHRIS L. WHEELER State Engineer

By A. M. Petska Engineer

AFIP:sh



CORNELL, HOWLAND, HAYES & MERRYFIELD

ENGINEERS AND PLANNERS

1600 WESTERN AVENUE • CORVALLIS, OREGON 97330 TELEPHONE: AREA CODE 503/752-4271 OTHER OFFICES IN: SEATTLE • BOISE • PORTLAND

STATE ENGINEER

ALEM OREGON

7 April 1967

Record No. C4233.1

State Engineer State Office Building Salem, Oregon

Attention: Mr. A. M. Petska

Gentlemen:

Crow Creek Dam Wasco County, Oregon

Enclosed is a copy of our report Subsurface Exploration and Preliminary Design Analysis for the Construction of Crow Creek Dam. This work was done for the City of The Dalles. The dam is located about 20 miles southwest of The Dalles on South Fork Mill Creek. Water will be stored during the winter for release for municipal use during the summer and fall.

This dam will be constructed partly from Economic Development Administration Funds and from a bond issue. All financing has been completed. Present plans call for the design to be completed in early July, 1967, and to advertise for bids in early August, 1967. We will send to you for review a copy of the Plans and Specifications as soon as they are ready (approximately 1 July 1967).

We would be pleased to visit the site with you at your convenience.

The application for permits for the construction of the reservoir and the appropriation of stored water will be submitted as soon as the maps are prepared.

Very truly yours,

CORNELL, HOWLAND, HAYES & MERRYFIELD

Roger W. Lindan't

Roger W. Lindquist

RWL/kc

Enclosure



Water Resources Department MILL CREEK OFFICE PARK 555 13th STREET N.E., SALEM, OREGON 97310

PHONE 378-2907

May 25, 1979

William R. Keyser Route 2, Box 78 The Dalles, Oregon 97058

Deer Sir:

In reference to your letter of April 20, I have reviewed the files concerning the deflection and settlement readings for Crow Creek Dam.

This program of measurements was established when longitudinal cracking was noticed in the crest of the dam soon after completion of construction. This cracking was a result of differential settlement between the central core material and the outer rockfill shells. A review of the data plots (copy enclosed) shows that the majority of the settlement and deflection which can be expected has already taken place, and recent changes have been minimal. It is quite unlikely that any additional significant movement will occur.

If you wish to continue periodic readings as a precautionary measure, I suggest a three-year interval. As you note, the measurements should be made when the reservoir is at or near full pool.

Your visual inspections and the collection of seepage measurements should by all means be continued. It is unlikely that any problem will develop, but any cracking of the embankment crest or slopes, any significant change in seepage not related to changes in pool elevation, or the discharge of any muddy or turbid seepage, should be reported immediately.

Sincerely,

GARY OBÉRHOLTZER Engineer

5-31-73 Seconote on app. may - use outside of that shown on map must be located by photo, survey, or other releable means ic. city map- guade sheet etc. Ves

NO

Name

Use

Address

Source of water supply

Point of diversion

Number of acres

Abstract of Permit No. R-4988

Application No.

R-43667 Certificate No.

City of The Dalles -

City Hall -The Dalles, Cregon 970-0

Crow Creek, Trib Mill Creek,

trib. E. IX. S. Fk. Mill Creek, trib. Mill Creek & Dog River, Hood hiver

in Crow Creek Reservoir & water to be diverted for storage from S. Fk. Will Creek when available and any deficiency in the * DAN LOCATED: NOR MAL, Sec. 20; 500 - 17, 1. 1 5., H. H. L. M., County of Hasco

DESCRIPTION OF LAND TO BE IRRIGATED OR PLACE OF USE

Twp. Range Sec.	NE ¹ /4			NW1/4			SW1/4				SE¼							
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Priority date

May 29, 1967 -

Amount of water

955.0 a.f. 1

November 21, 1968

Time limit to complete construction

10 extended to

extended to

Time limit to completely apply water

Time limit to begin construction

extended to

extended to

Remarks: The dam shall be constructed under the supervision of a registered professional -engineer.

narks: The dam shall be could a 955 A.F. 1/4/77- O.K. Jan 955 A.F. Q.M. Petoka Eng



Basin 4, Vol.

Info: Joe Hasbrouck (Superintendent Puplic Div. Pts: Both S. Fork Mill Cr. & Crow Cr. empty Works Crow Cr. Ros into Crow Cr. Res. from Dog River is carried To S. Fk. Mill Cr. Through 20" Wood staye fipe 72 miles long. Elevations: Elevations: ¥ H.S.M. -192' A The elevation of crest P. W. L. _ # 174' of Spillway is actually * Spillway - 192' 190', however there was Conduit - 98' dustr. invert. at time of F.P. inspections a 2' dam of stones across spillway crest, Dam: Le Length Crest - 800' Width Crest - 20' Average Min. 24' Max. Slope of sides - 311 Up str. " " " - 2:1 Dn. sTr. Condition - Good Spillway! Location - Leftend of Dam Shaped - Sides slope 1:1 Slope 1st 50' 1 Conduit: Rises l' Nert. +00' fall 12' last 500 drops Location - Approx, 215' approx, 100' Kindisize - 30" Concreto. Gate tatre located - At upstream end. Control: Stainless Steel sliding gate. Incline screw Type control Manuelly operated. Note: Dog River source is used from May to November only, Nov. 8, 1971, L. E. Sould Mr. Hasbroack said that the Dog River Div. PT. is The same as Field Engineer For old Water Right. A.E. S.N. Sec. SAID of APPLICANTS MAP- CERT. 14954 T. 2 S. R. IDE (8627.07' 5) \$ 1399.63' E. from S.E. Cor. Sec. 34 J 15. R. 10 E



WATER RESOURCES DEPARTMENT

1178 CHEMEKETA STREET N.E. • SALEM, OREGON • 97310 • Phone 378-3739

December 14, 1976

ROBERT W. STRAUB

R-43667 43668

City of The Dalles 313 Court Street The Dalles, Oregon 97058

ATTENTION: Mr. Joe Hasbrouck

Dear Sir:

On November 4, 1976, Mr. Don Rohde, Tenneson Engineering Corp., and I visited the Crow Creek Dam. A careful visual inspection was made of the dam and spillway. No adverse changes were noted. The structure is performing in a normal and satisfactory manner. The deflection readings of August 5, 1976, show no change from the previous readings, accordingly, these annual readings can be discontinued.

We did note that several fastening points for timbers in the log boom had worked loose, and should be repaired.

Thank you for your attention.

Sincerely,

G. L. Oberholtzer Engineer

GLO:cjw

cc: Mr. Don Rohde Tenneson Engineering Corp. 409 Lincoln Street The Dalles, OR 97058



WATER RESOURCES DEPARTMENT

1178 CHEMEKETA STREET N.E. • SALEM, OREGON • 97310 • Phone 378-3739

August 19, 1976

ROBERT W. STRAUB

R-43667 43668

City of The Dalles 313 Court Street The Dalles, Oregon 97058

ATTENTION: Mr. Joe Hasbrouck, Director of Public Works

Dear Sir:

I have reviewed the deflection readings, including those of August 5, 1976, for the Crow Creek Dam. These readings show the structure to be performing in a normal and satisfactory manner.

I intend to schedule a site inspection for the structure this fall, hopefully in the latter part of September or early October. I will make arrangements to meet with you for a joint inspection. I have talked recently with Mr. Don Rohde, Tenneson Engineering Corporation, who also wishes to accompany us during the inspection.

Very truly yours,

G. L. Oberholtzer Engineer

GLO:cjw

cc: Mr. Don Rohde