ATTACHMENT A

Project Description

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DRAFT

Johnson Creek Dam Project,
Coos County, Oregon

Project Description

Bandon Cranberry Water Control District
P.O. Box 570
Bandon, Oregon 97411

May 24, 2006

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1.0 INTRODUCTION

The Bandon area along the Southern Oregon Coast is a popular tourist area and the center of Oregon's cranberry industry. Both the tourist and cranberry industries have grown significantly during the past several years. With the growth of these two industries and the need for additional water for fishery interests, existing water supplies would not meet current or future demands for water for these uses.

The Bandon Cranberry Water Control District (District) was formed to investigate potential water supplies for growth and develop the water resources in this area. The District is a Water Control District formed under ORS 553. It encompasses an area of approximately 18 square miles of the Coos County cranberry production area. The District is located between Cut Creek north of Bandon and the southern Coos County Line. This area represents approximately 50% of the cranberry production area in Coos and Curry Counties.

Sub districts were formed to develop water supplies in specific areas within the District. For example, the Windhurst Road sub district was formed to construct a 405-acre-foot off channel reservoir to provide water to seven (7) cranberry growers. The second sub district was formed for the Prosper Project and the third for the Johnson Creek Project.

2.0 PROJECTED AGRICULTURAL WATER NEEDS

The District has projected its agricultural water demands and estimated a summer requirement of approximately 1,100 acre-feet. Various solutions were considered for the water shortage including storage and acquisition of surface water supplies and groundwater supplies, as well as water conservation. Surface water supplies are either over committed for summer appropriation or not available for other reasons. Groundwater supplies are limited by the geology. A proposed storage project appears to be the only source of water available to meet the needed supplies.

3.0 PROJECT LOCATION

The proposed storage project would be on Johnson Creek at river mile 2.6, approximately 2 miles east of Bandon and south of the Coquille River (Figure 1, all figures are located in the Appendix). The proposed dam (Dam Site #5) is in the northwestern quarter of Section 9, Township 29 south, and Range 4 west, W.M. (Figure 2). There are a limited number of other potential sites for the dam in the vicinity of the northeastern corner of Section 9 that were considered. Storage as a solution is consistent with the Coos County Comprehensive Plan (Coos County, 2004). In addition, storage on Johnson Creek was recommended in the Coos County Water Management Plan immediately upstream of Highway 101 (Coos County, 1986). The proposed site, however, was moved upstream to the present proposed location to minimize impacts on fish resources.

4.0 DAM CONFIGURATION

The proposed dam would be 90 feet high with a drainage basin of approximately 1.26 square miles (Figures 3-7). It would be a zoned earthfill dam with filters and drains. The core would be either a sloping upstream core with a downstream shell, or a central core with upstream and downstream shells. Embankment materials to construct the dam would come from onsite deposits within the reservoir or from surrounding areas.

The Oregon Water Resources Department (OWRD) classifies the dam as a high hazard dam. As a high hazard dam, the spillway would be required to pass the probable maximum flood and the embankment would be designed to withstand an earthquake load.

The outlet would consist of an inlet, a conduit under the dam, and a stilling basin. The inlet would be single-level entrance using a combination of guard gates. In addition, it would have either an upstream or downstream control gate or valve to release water downstream of the dam for prior water rights; releases for instream flows for fish if seepage is less than expected; contracted releases for consumptive use; and to meet the OWRD dam safety regulations. The natural flow of Johnson creek would be maintained during construction of the dam.

The dam site is in a fairly narrow canyon with steep abutments. These topographic features in addition to the lack of good foundation complicate the spillway design. Three spillway design alternatives have been identified and are being considered. Current spillway considerations include:

1) A concrete chute on the left abutment with a side channel inlet and a concrete stilling basin.
2) A baffle chute spillway with a plunge pool type of stilling.
3) A closed conduit spillway down the face of the dam with a concrete roller bucket stilling basin.

The baffle chute and closed conduit spillways are shown on Figure 6.

5.0 PIPELINE AND POINTS OF DIVERSION

The existing and proposed water rights would be satisfied by existing diversions from Johnson Creek as well as two proposed pipelines to supply users. Pipeline A would start at the dam site and continue west to Rosa Road (Figure 1). The water through this pipeline would be used for agricultural purposes for water users on the south side of Johnson Creek.

Pipeline B would start at the dam site and convey water to Geiger Creek (Figure 1). The water supplied through this pipeline would be used by the City of Bandon for municipal purposes. The water would be removed from Geiger Creek at the City of Bandon Wastewater Treatment Plant just downstream of the Bandon Hatchery. The City of Bandon is planning for future growth and

would not initially need to exercise their water right of 1.23 cubic feet per second (cfs) to Geiger Creek. The City of Bandon does not require the water immediately. The water could potentially be used for fish habitat enhancement on Johnson Creek until it is needed.

6.0 STORAGE CAPACITY

The proposed dam site has a potential for storing up to 2,450 acre-feet of water; however, there is not sufficient yield in the watershed to supply that much storage. Hydrologic yield and flow balance studies were completed to determine the optimal dam height and reservoir size (CH2MHill, 2006). The District's reservoir size of approximately 1,565 acre-feet includes the following:

- 1,107 acre-feet water consumption
- 168 acre-feet for evaporation
- 190 acre-feet for seepage
- 100 acre-feet for dead storage

The yield hydrology for the relatively small drainage basin and geological conditions make it cost-ineffective to make the reservoir larger than 1,565 acre-feet.

7.0 PROJECT OPERATION

7.1 Storage Period

The statutory water storage period is from November 15 through March 1. All water beyond a minimum flow release to meet an instream water right (to be determined in consultation with ODFW) would be stored at the dam site until the reservoir is full. After the reservoir is full, flows released would be equivalent to flows that enter the reservoir. During dry years when the reservoir cannot be filled to capacity, rationing amongst the subscribers would occur.

7.2 Non-Storage Period

The non-storage period is from March 2 through November 14. During this period, water would be released to meet instream water rights or the natural flows. This will be determined in consultation with ODFW and agreed to by the District. Flows also would be released to satisfy downstream water rights for lands now served by the pipelines.

The pipeline south of Johnson Creek (Figure 1) would not return water to Johnson Creek or any other stream system. Approximately 285 acre-feet would be reserved for water users for use between the proposed dam site and Rosa Road. The pipeline to Geiger Creek would provide water to Geiger Creek between July 1 and October 31. Approximately 300 acre-feet would be reserved for this pipeline. This would add approximately 1.23 cfs of flow to Geiger Creek during this time period. In the event that the City of Bandon is not prepared to accept the 1.23 cfs, the flow could be released to Johnson Creek rather than stored for irrigation uses.

Johnson Creek currently has several pump stations to service water rights directly from the creek. Four pumps at creek level in the proposed inundation area would be removed and replaced at a higher elevation in the inundation area. Water demand times would be coordinated with release flows to satisfy water rights to protect the ODFW instream water rights. Based on an average year for water demands, approximately 504 acre-feet of would be delivered to Johnson Creek during irrigation season. The amount of flow available would depend on the ability to store water in the reservoir to achieve a full supply for water users.

8.0 ESTIMATED FLOWS IN JOHNSON CREEK

8.1 Estimated Natural Flows at Proposed Dam Site

Based on measured rainfall and flow data collected at the proposed dam site, a rainfall-runoff model was developed and calibrated (CH2MHill, 2006). Long-term historic precipitation records were then used to estimate daily Johnson Creek flows at the proposed dam site (Table 1).

8.2 Estimated Natural Flows at Johnson Creek Mouth at Tidewater

Historic flow records from a gage located near Highway 101 were used to evaluate the addition of flow between the dam site and the mouth of Johnson Creek (CH2MHill, 2006). Based on a comparison of records at the proposed dam site and at the mouth, a majority of the flow in Johnson Creek enters the creek downstream of the dam site (Table 1).

The estimated flows were used as input for a daily water balance model which incorporated a November 15 through March 1 water storage period, an annual dry season (May 1 to November 1) subscriber water demand of 1,107 acre-feet, reservoir evaporation of 168 acre-feet, seepage to Johnson Creek of 190 acre-feet, and dead storage of 100 acre-feet. In addition, either 1.5 cfs or 3.0 cfs flow release from the reservoir during the reservoir filling period (November 15 to March 1) was assumed. Flow releases of either 1.5 or 3.0 cfs at the dam site during storage were arbitrarily selected for evaluation. The model also looked at releasing 2.7 cfs during the month of December to meet the requested ODFW instream water rights, but no release from the dam during the rest of the storage season. The stream flow immediately downstream of the dam in this model would consist of only seepage from the dam (predicted to be 0.4 cfs). The model of releasing 1.5 cfs is preferred due to the fact that it has a high reliability for the water users and meets the ODFW minimum flow requirements except for June in average years (Table 1).

9.0 INSTREAM WATER RIGHTS

The ODFW estimated the minimum and optimum flows to protect fish in 1972 (Table 1). On March 8, 1990, ODFW filed for instream water rights on Johnson Creek (Table 1). The instream water rights requested by ODFW is the same as the optimum flow requested in 1972. The legal description for the instream water rights request is from an unnamed tributary in T29S, R14W, SWNW Section 6 (Figure 1) to the downstream end the head of tidewater in T29S, R15W, SWNW Section 1 (ODWR, Application IS-70228, March 8, 1990). The request by ODFW was

protested on October 3, 1996, and a resolution has not occurred. According to ODFW (Pers. Comm., Jill Zarnowitz, Water Policy Coordinator, May 3, 2006), the instream water right would need to be met at the mouth of Johnson Creek (i.e., near the head of tidewater) rather than the reach described in the flow request application.

10.0 ESTIMATED FLOWS DURING OPERATION OF THE PROPOSED PROJECT

Additional scenarios modeled reservoir storage and flow releases to evaluate project ability to meet District water demands and ODFW instream water rights (Table 1). Figures 8, 9, and 10 illustrate the storage and release for a wet, dry, and average water year assuming a 1.5 cfs flow release from the reservoir during the storage period. Storage would commence in November 1 and extend to February 1. If the reservoir is not filled by February 1, additional storage would occur until March 1. A water storage period of December 1 to March 1 was modeled with a required inflow release of 1.5 cfs immediately downstream from the reservoir during the storage period to meet the ODFW minimum flows.

The water balance model shows that the project would not meet the ODFW instream water rights at the mouth of Johnson Creek and subscriber demands on an average year as they demand more flow than naturally occurs on Johnson Creek. Flow release during the non-storage period of March 2 - November 15 equals the inflow to the reservoir.

11.0 CONCERNS EXPRESSED BY ODFW

11.1 Peak Flow Releases

Peak flows are necessary to maintain channel forming processes, allow cleaning of gravel substrates, and maintain the opening at the mouth of Johnson Creek where sand deposits from tidal activities buildup to block the mouth of the creek. The presence of the proposed dam site in the upper watershed of Johnson Creek (river mile 2.6) is upstream of tributaries that provide a majority of the flow that enters Johnson Creek (Figure 1 and Table 1). Flows that enter Johnson Creek downstream of the dam site would likely continue to provide channel forming processes and gravel cleaning, especially as flows increase toward the mouth of the creek. High peak flows (average year) during winter and spring months would continue to occur at the mouth of Johnson Creek and likely would continue to maintain the opening of the mouth of the creek.

11.2 Instream Water Rights

The project cannot meet the ODFW instream water rights requested in 1990; however the minimum flow estimated by ODFW in 1972 can be met during the storage period. The natural flow can be met during the non-storage period in average years (Table 1).

11.3 Fish Passage

A Waiver for fish passage would be required for the project. Adequate mitigation must be provided to offset loss of stream habitat.

11.4 Diversion of Water to Geiger Creek

ODFW maintains a fish hatchery program on Geiger Creek. Diversion of water from Johnson Creek to Geiger Creek is under evaluation by ODFW to ensure that diseases in the Johnson Creek water (if any) would not be introduced into Geiger Creek water that is used by the fish hatchery.

12.0 REFERENCES

CH2MHill. 2006. Johnson Creek Reservoir Feasibility Study: Hydrologic Assessment. April 25, 2006.

Coos County. 2004. Coos County Comprehensive Plan. Coos County, Coquille, Oregon.

Coos County. 1986. Coos County Water Management Plan. Coos County, Coquille, Oregon.

Table 1. Comparison of Stream Gages, Instream Water Rights Requested by ODFW, Flow Releases to Meet Instream Water Rights, Release Needed at the Dam Site to Meet Instream Water Rights and Minimum Flows, and Proposed Released at the Dam Site.

Month	Stream Gage #14327123 at proposed damsite on Johnson Creek Average Flow (cfs)	Stream Gage #14327122 near mouth of Johnson Creek Average Flow (cfs)*	Percent (%)of Flow that Enters Johnson Creek below the Proposed Damsite	Instream Water Right Requested by ODFW in 1990 (cfs)	Minimum Flow Requested by ODFW IN 1972*** (cfs)	Flow Releases Needed to Meet ISWR Requested by ODFW near mouth of Johnson Creek (gage #14327122) (cfs)	Flow Releases Needed to Meet Minimum Flow Requested by ODFW near mouth of Johnson Creek (gage #1432712) (cfs)	Proposed Flow Release from Reservoir*** (cfs)
January	8.3	36.5	77	17.0	10	0.0	0.0	1.5
February	9.3	39.2	76	17.0	10	0.0	0.0	1.5
March	5.6	19.6	71	17.0	10	3.0	0.0	5.6
April	4.2	15.6	73	17.0	10	5.6	0.0	4.2
May	3.0	12.5	76	17.0	10	7.5	0.5	3.0
June	1.9	5.9	68	10.0	6	6.0	2.0	1.9
July	1.4	2.8	50	6.0	1	4.6	0.0	1.4
August	0.5	1.7	71	6.0	1	4.8	0.0	0.5
September	0.1	1.7	94	6.0	1	4.4	0.0	0.1
October	0.5	3.7	86	6.0	1	2.8	0.0	0.5
November	4.5	13.5	67	10.0/17.0**	6/10*	1.0/0.8	0.0/1.0**	1.5
December	7.4	21.7	66	17.0	10	2.7	0.0	1.5

*Proposed release of 1.5 cfs from the reservoir plus average seepage flow of 0.4 cfs to Johnson Creek.

**Releases between November 1-15 and November 16-30.

***Flow release during non-storage period of March 2-November 14 equals inflow to reservoir.

Source: CH2MHill, 2006. Johnson Creek Reservoir Feasibility Study: Hydrologic Assessment. April 3, 2006.

Source: Thompson, Ken E., Allan K. Smith, and Jim Lauman (1972).

Oregon Water Resources Department, April 28, 2006.

Appendix

Figures

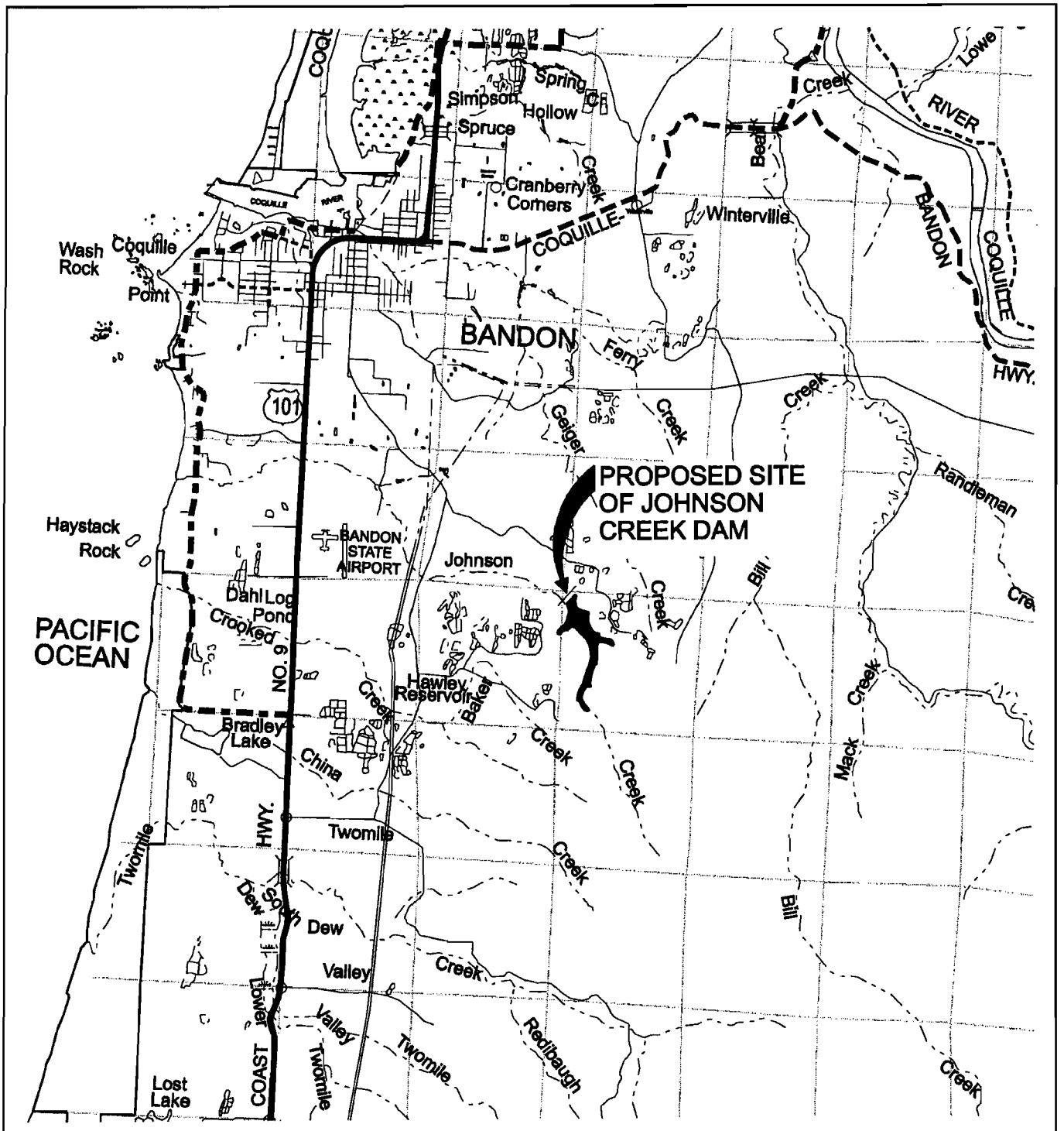

FIGURE 1
JOHNSON CREEK DAM
SITE LOCATION MAP
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

CH2MHILL

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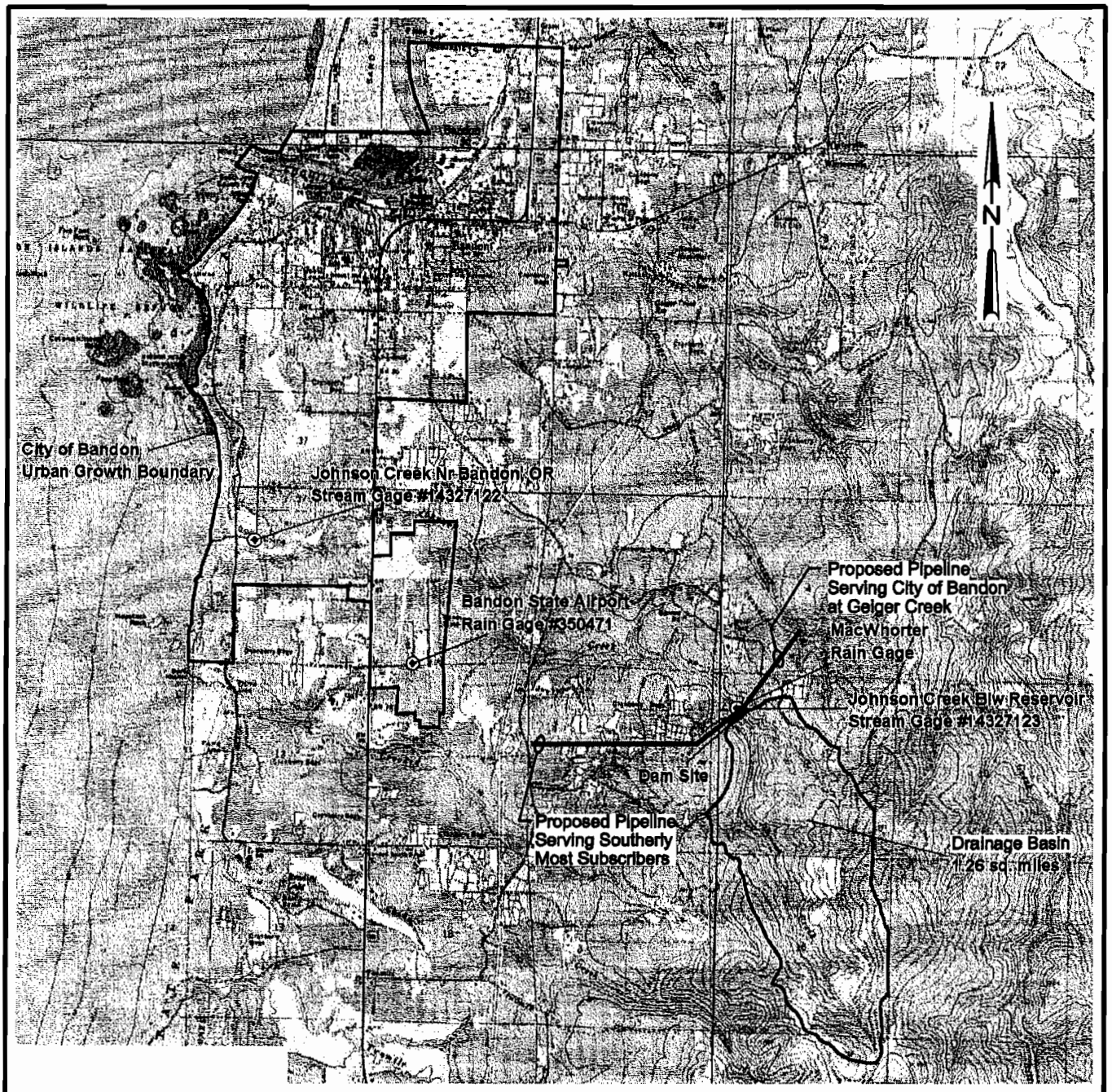

APPROXIMATE DRAINAGE AREA: 810 ACRES
RESERVOIR SURFACE AREA: 144 ACRES

FIGURE 2
JOHNSON CREEK DAM
DRAINAGE AREA
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

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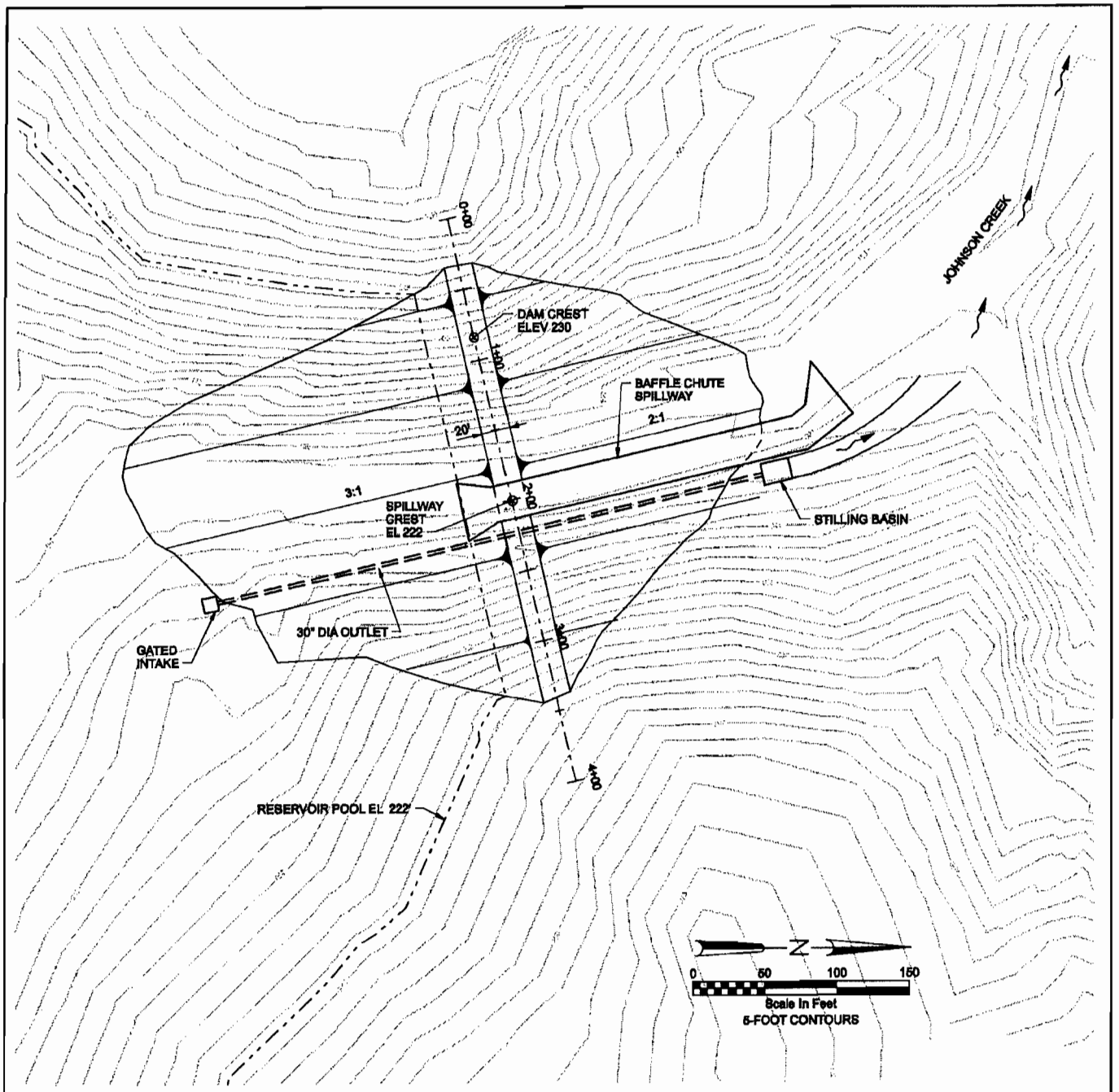

FIGURE 3
JOHNSON CREEK DAM
CONCEPTUAL PLAN
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

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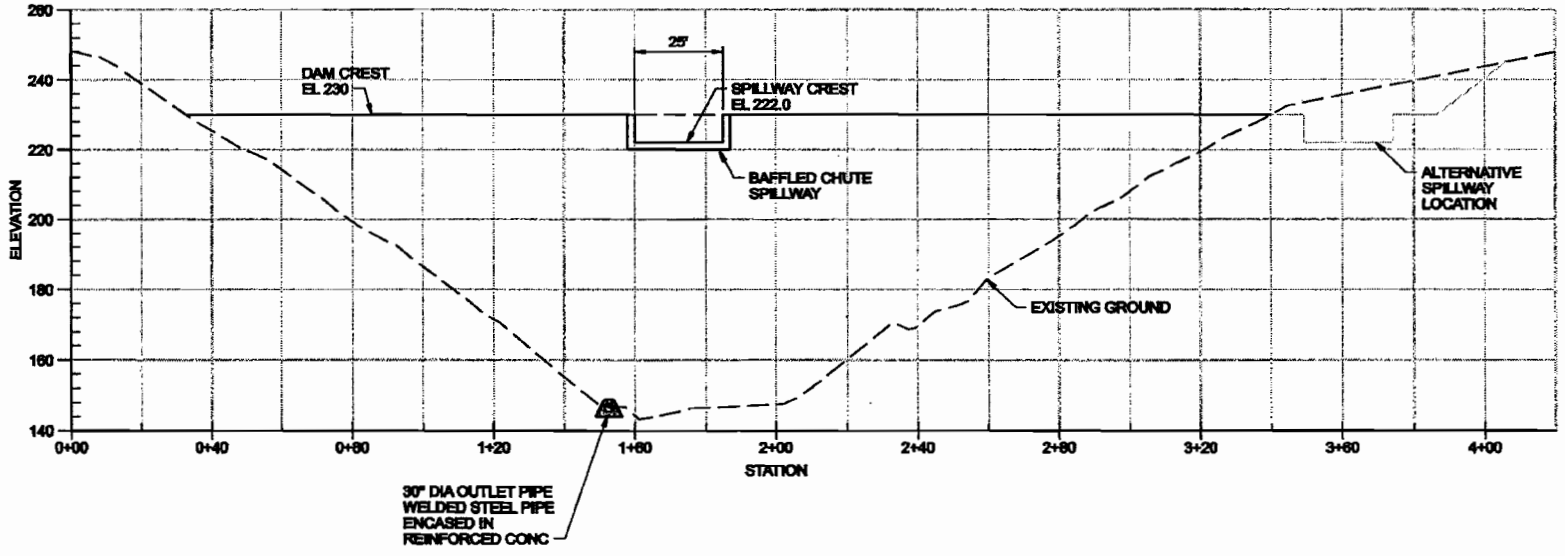

CENTERLINE PROFILE (LOOKING DOWNSTREAM)

1"=50'

FIGURE 4
JOHNSON CREEK DAM
CONCEPTUAL PROFILE
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

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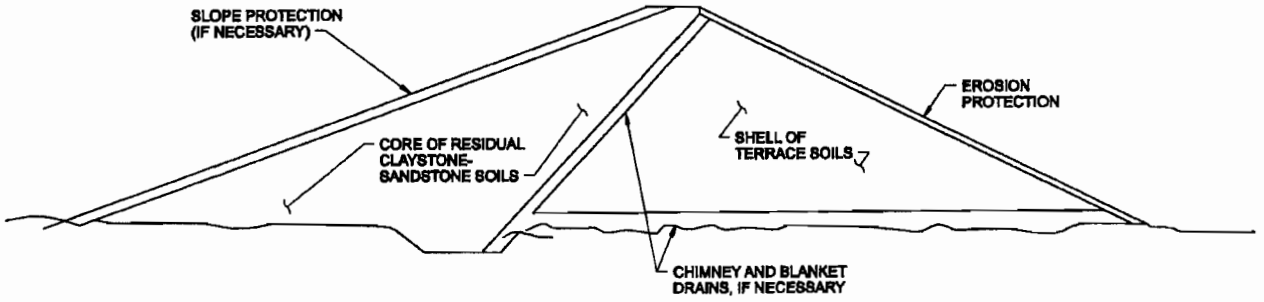
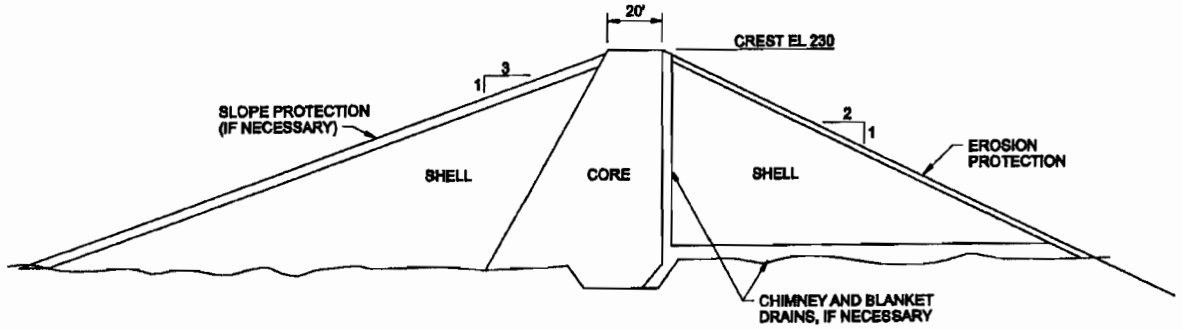


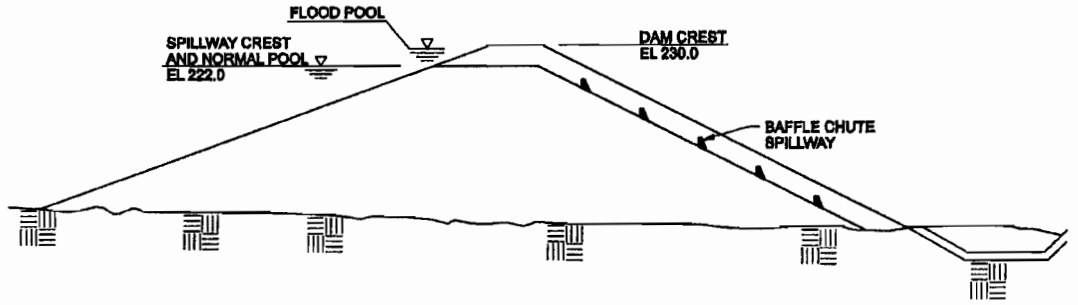
SLOPING UPSTREAM CORE



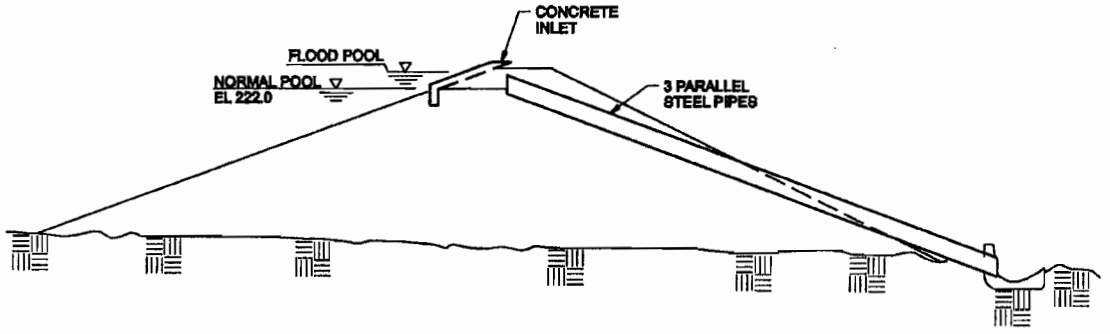
CENTRAL CORE

FIGURE 5
JOHNSON CREEK DAM
CROSS SECTION CONCEPTS
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

CH2MHILL



BAFFLE CHUTE SPILLWAY
WITH PLUNGE POOL



CLOSED CONDUIT SPILLWAY WITH
HOOD INLET AND ROLLER BUCKET

FIGURE 6
JOHNSON CREEK DAM
ALTERNATIVE FOR CONCRETE
CHUTE ON THE ABUTMENT
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

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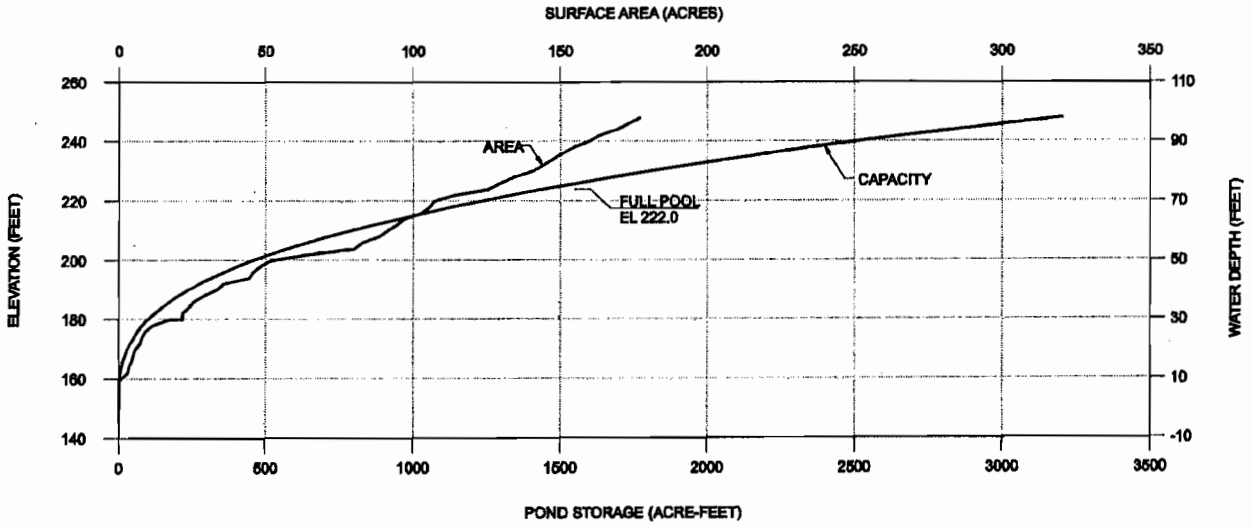

FIGURE 7
JOHNSON CREEK DAM
STORAGE AREA CURVE
BANDON CRANBERRY WATER CONTROL DISTRICT
BANDON, OREGON

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Figure 8. Johnson Creek Natural Stream Flow and 1.5 cfs Proposed Reservoir Release Required to Meet Minimum ODFW Johnson Creek Flows During Storage Period
Water Year 2002 - Average Precipitation Year (Precipitation = 56.2 Inches)

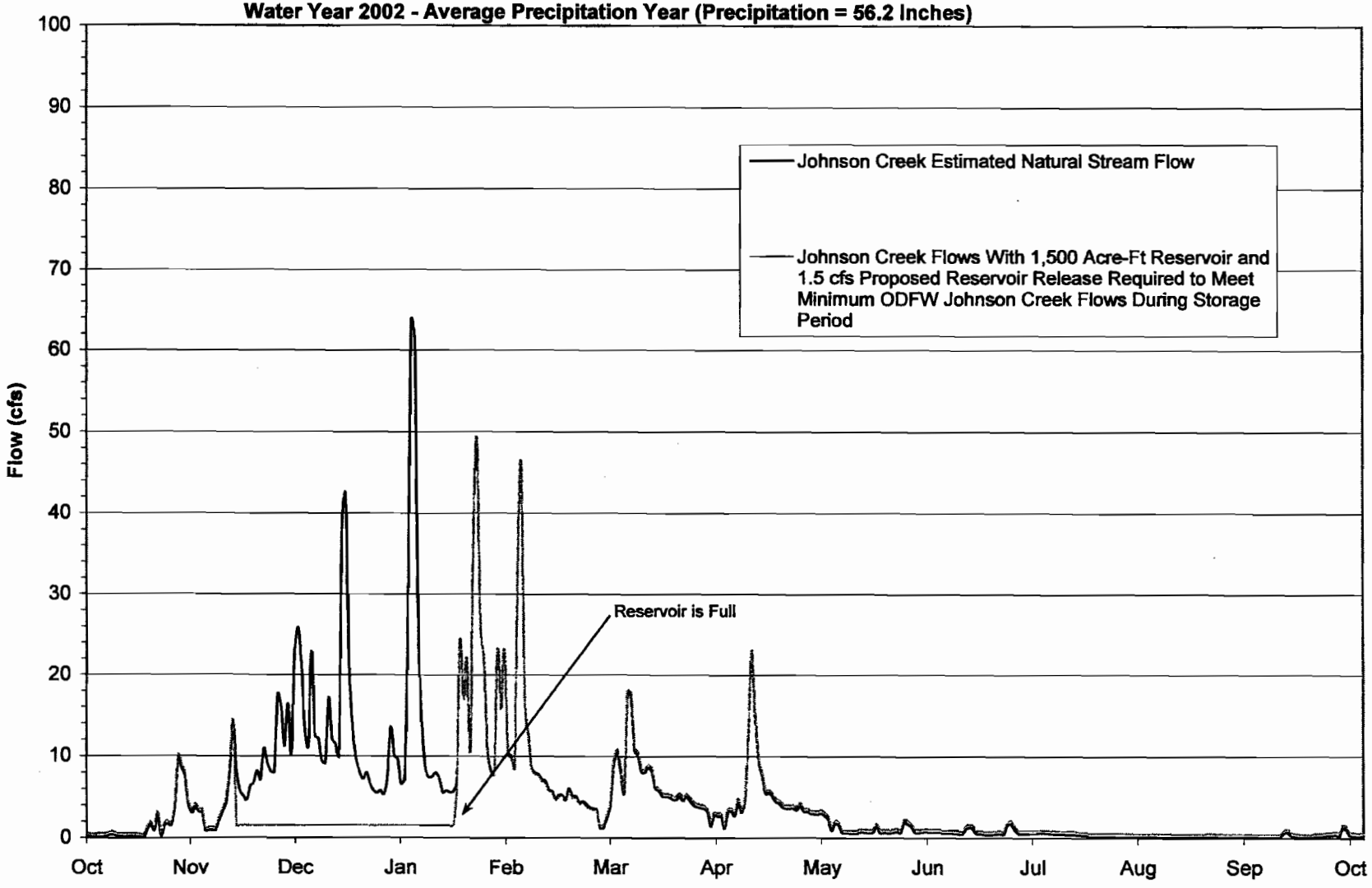

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Figure 9. Johnson Creek Natural Stream Flow and 1.5 cfs Proposed Reservoir Release Required to Meet Minimum ODFW Johnson Creek Flows During Storage Period
Water Year 2001 - Dry Year (Precipitation = 29.8 Inches)

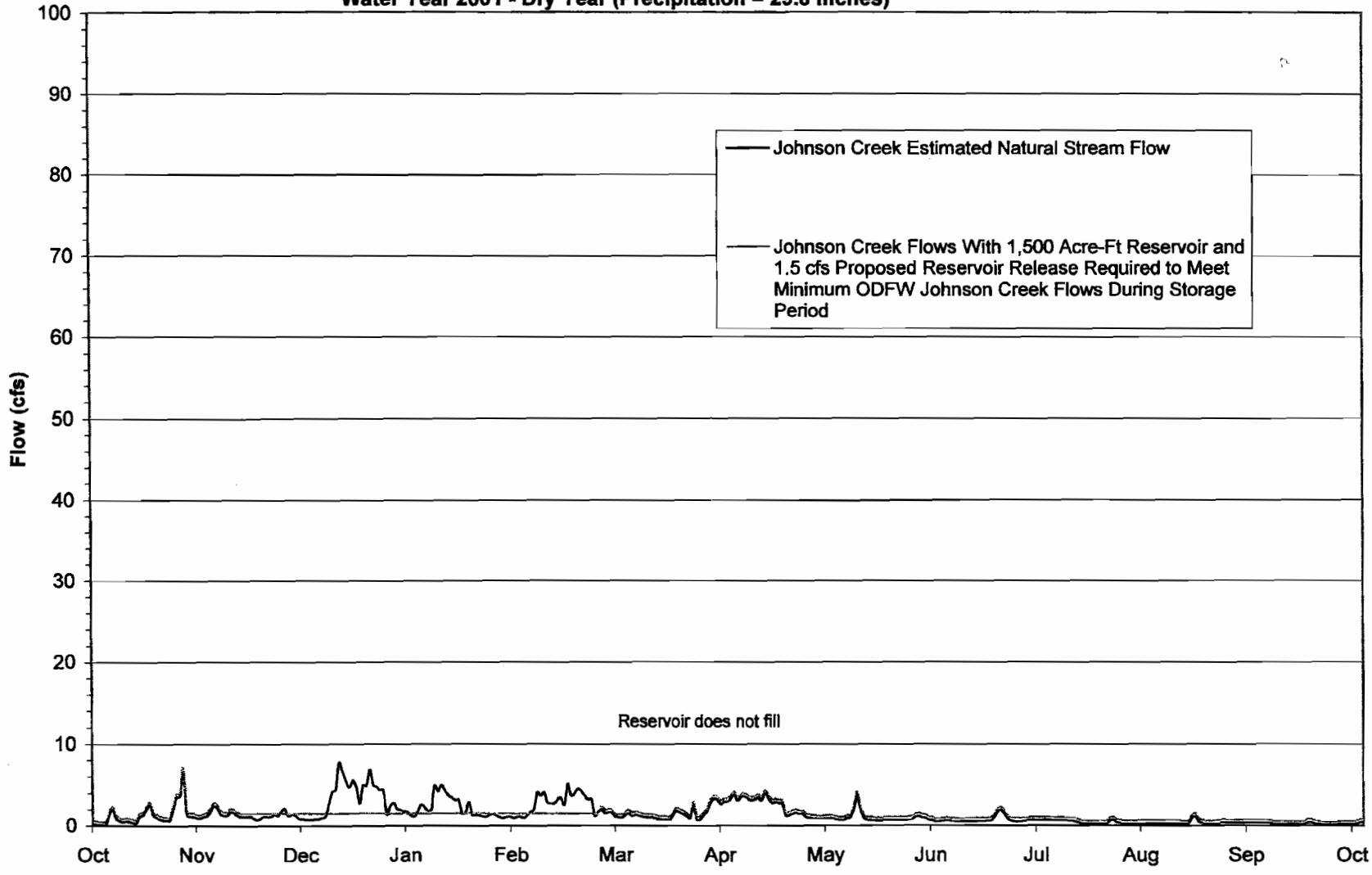

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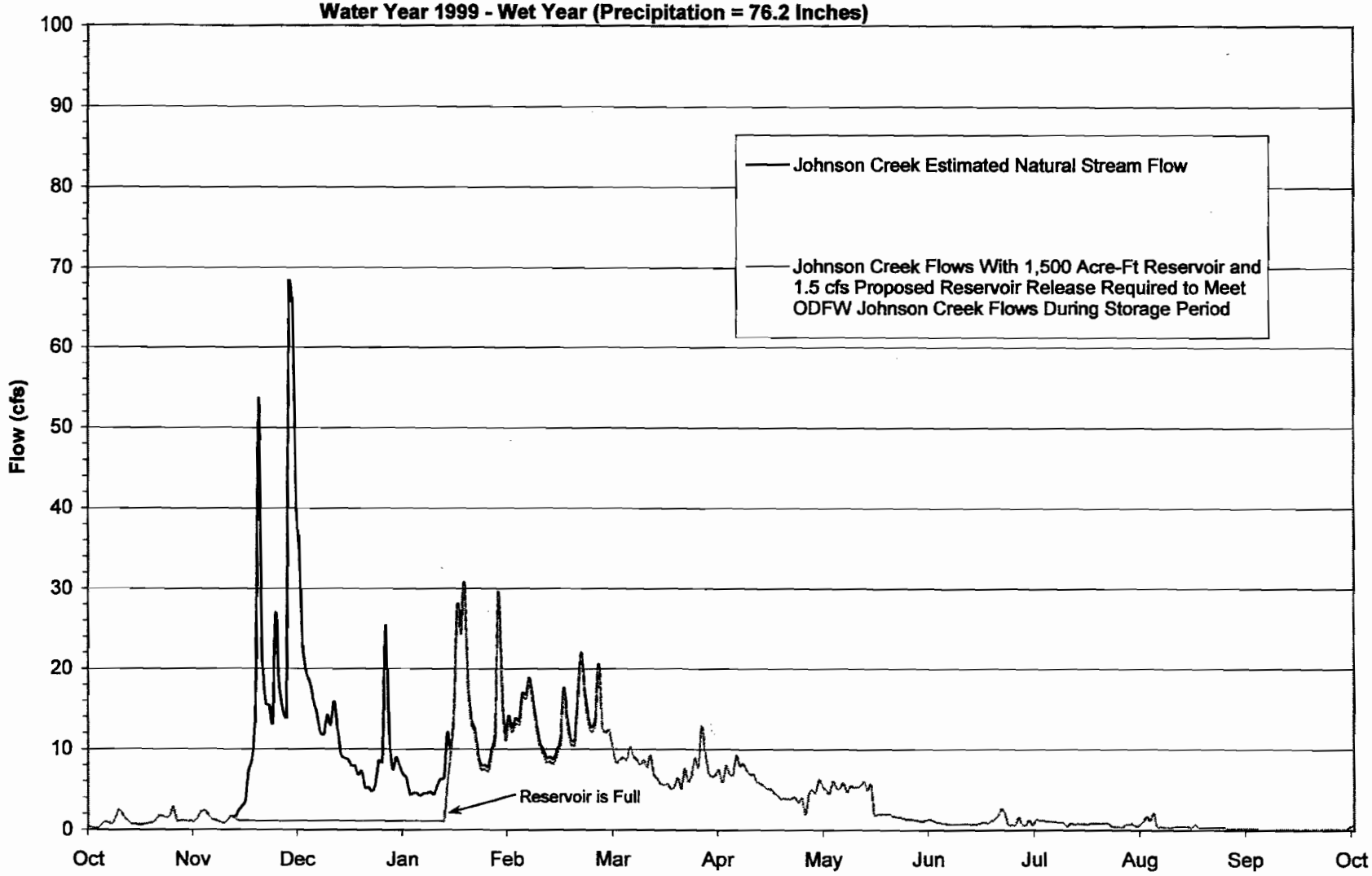
Figure 10. Johnson Creek Natural Stream Flow and 1.5 cfs Proposed Reservoir Release Required to Meet Minimum ODFW Johnson Creek Flows During Storage Period Water Year 1999 - Wet Year (Precipitation = 76.2 Inches)



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