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UNITED STATES DEPARTMENT OF THE INTERIOR

This Report, by Camp Dresser & McKee Inc. (CDM Report or Report) was provided to the Department in July of 2008. Though the CDM Report was originally intended for the Department's internal use, we release it now to insure that the parties negotiating a final settlement/dam removal agreement have access to this information, along with other information already available.

During the development of the Agreement in Principle (AIP), substantial attention was devoted to the lack of a settled understanding about the risks and potential liabilities arising from removal of the four PacifiCorp-owned facilities on the Klamath River. These unquantified risks have a direct correlation to the costs and timing of the proposed removal of the facilities. Consequently, last Spring the Office of the Secretary asked CDM to provide an assessment of the status of the known and available scientific, regulatory and economic information known as of that time.

The attached Report is a snapshot of the published science as it existed slightly less than a year ago; it is one piece of the larger scientific, regulatory, and economic framework that will come into full view during the scientific due diligence contemplated by the AIP, leading up to the Secretary's determination in 2012. The Report describes the potential risks and liabilities of dam removal absent an effective strategy to prevent or manage them: it does not compare the risks and liabilities of dam removal and a new license, nor does it evaluate or quantify the potential benefits and values of dam removal. The Report's utility lies in the assistance it offers the parties in specifying the further efforts needed to quantify potential risks and liabilities, develop an effective strategy to prevent or manage them, and compare such risks and liabilities under alternative futures for this project. Because the science is, and will continue to be evolving until 2012, the Report does not reflect the final or interim position of the United States regarding any aspect of the AIP, Final Agreement, or Klamath Basin Restoration Agreement.

We understand the potential for those who oppose dam removal to identify isolated portions of the analysis and postulations of the CDM Report regarding quantification of risk. But because the Secretary will undertake his own analysis, informed by all the parties to the Final Agreement for Dam removal, these postulations are of limited applicability in the final analysis. We encourage the parties to focus on the Report's true value: its identification of factors and data gaps in the science that must be addressed in order for the Secretarial determination of 2012 to be fully informed and sound.

THIS COVER SHEET  
WAS ADDED AFTER THIS  
REPORT WAS LEAKED TO  
THE PUBLIC 1 DAY AFTER  
PASSAGE OF OREGON  
SENATE BILL 76

CDM

# Evaluation and Determination of Potential Liability Associated with the Decommissioning and Removal of four Hydroelectric Dams on the Klamath River By Any Agent

THIS REPORT WAS LEAKED TO THE PUBLIC 1 DAY AFTER THE PASSAGE OF ORESENATE BILL 76 WHICH AUTHORIZED PACIFICORP TO CHARGE RATE PAYERS FOR DAM REMOVAL



REPORT

*Prepared By:*  
Camp Dresser & McKee Inc.  
*For:*  
U.S. Department of the Interior  
*Through:*  
U.S. Bureau of Reclamation

July 18, 2008

# Executive Summary

This report presents the results of a liabilities assessment for the removal of four hydroelectric dams (J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate Dams) on the Klamath River (See Figure ES-1). This assessment was conducted following the development of the Klamath Basin Restoration Agreement in early 2008 between the U.S. Department of the Interior, PacifiCorp, and the current stakeholder group, which identified the decommissioning and removal of the four dams as a key component of the agreement. Several groups representing resource and regulatory agencies and non-governmental organizations (NGOs) have commissioned studies in an attempt to identify a process and quantify the potential liabilities associated with decommissioning and removal of the four dams. The process for decommissioning studied to date has emphasized the rapid removal of the dams and passage of trapped sediment down the Klamath River.

This report identifies and attempts to quantify specific potential liabilities and the associated costs related to the decommissioning and removal of the four dams based upon the existing information developed to date. The report also identifies additional study needs that would help to reduce the uncertainties associated with facilities removal. Potential liabilities and associated costs were developed using existing reports and studies to present decision makers with a relative scale of the potential costs that could be generated by a dam removal action.



Figure ES-1. Klamath River System

Evaluation of Potential Liability Associated with the Removal of  
Four Hydroelectric Dams on the Klamath River

## Liability Identification and Costing

Liabilities were identified and placed in four categories: (1) physical, (2) biological, (3) socioeconomic, and (4) legal and regulatory. Within each category the liabilities were further divided by their relative resource area and the dam or reach of river they would affect. The liabilities were numbered sequentially by resource area and assigned a corresponding "uncertainty" ranking to indicate confidence in the available data for quantifying the liabilities' total effect on decommissioning. A defined process was followed by the team to cost the liabilities using existing information, research, and engineering and construction judgment. Liability costs fell into two categories: direct costs and indirect costs. Direct costs arise from an identified decommissioning action where indirect costs are those costs that are a result of a decommissioning action in the form of mitigation, compensation, or the recognition of potential litigation of the liabilities described in Chapter 2 of this report. Many of the indirect costs remain unquantified. Presented in Table ES-1 is a summary of quantified liabilities and costs identified in this study.

Costs in Table ES-1 are presented for the quantifiable liabilities only. The unquantified liabilities that remain are presented in Chapter 3 of this report and have the potential to change the partial totals presented in Table ES-1.

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Executive Summary

**Table ES-1. Klamath Dam Decommissioning Liability Investigation Liability Cost Estimate (Quantifiable Costs)**

<i>Physical Structure Removal Costs<sup>1</sup></i>		<i>Cost Estimate</i>			
J.C. Boyle		\$16,914,700			\$16,914,700
Copco No. 1		\$25,380,100			\$25,380,100
Copco No. 2		\$6,112,400			\$6,112,400
Iron Gate		\$46,023,100			\$46,023,100
<b>Physical Structure Removal Subtotal</b>		<b>\$94,430,300</b>			<b>\$94,430,300</b>
<i>Quantifiable Liability Cost Estimates</i>					
<i>Liability #</i>	<i>Liability Description</i>	<i>Dam Affected</i>	<i>Low Estimate</i>	<i>Risk Factor</i>	<i>High Estimate</i>
HW-1 to HW-4	Hazardous Waste Mitigation and Cleanup	J.C. Boyle	\$100,000	1.5	\$150,000
HW-5 to HW-9	Hazardous Waste Mitigation and Cleanup	Copco No. 1	\$100,000	1.5	\$150,000
HW-10 to HW-13	Hazardous Waste Mitigation and Cleanup	Copco No. 2	\$100,000	1.5	\$150,000
HW-14 to HW-18	Hazardous Waste Mitigation and Cleanup	Iron Gate	\$100,000	1.5	\$150,000
HH-4	Operations of Keno Dam	All Dams	\$40,326,000	1.5	\$60,489,000
HH-5	Highway 66 Bridge foundation	J.C. Boyle	\$500,000		\$1,500,000
SE-1	Presence of sediment	J.C. Boyle	\$5,464,000	2.0	\$10,928,000
SE-5	Presence of sediment	Copco No. 1	\$93,560,000	2.0	\$187,120,000
SE-9	Presence of sediment	Iron Gate	\$76,379,000	2.0	\$152,758,000
WQ 1, 2, 3	Downstream water quality during decommissioning	All Dams	\$899,000	1.5	\$899,000
AQ-2	Loss of spawning areas	All Dams	\$45,000	1.0	\$45,000
AQ-6	Iron Gate Fish Hatchery funding	Klamath Downstream	Presented above as structure removal cost	1.0	Presented above as structure removal cost
TE-1,3	Change in wetland habitat and loss of habitat	All Dams	\$48,000	1.5	\$72,000
TE-2	Invasive species	All Dams	\$5,600	1.5	\$8,400
SR-1	Reservoir restoration	J.C. Boyle	\$2,510,000	1.5	\$3,765,000
SR-4	Reservoir restoration	Copco No.1	\$16,582,000	1.5	\$24,873,000
SR-5	Reservoir restoration	Copco No.2	\$175,000	1.0	\$175,000
SR-7	Reservoir restoration	Iron Gate	\$15,946,000	1.5	\$23,919,000
RE-1,2	PacifiCorp land ownership and Diminution in Property Value	J.C. Boyle, Copco No. 2 & Iron Gate	\$3,375,000		\$12,000,000

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**Table ES-1. Klamath Dam Decommissioning Liability Investigation  
Liability Cost Estimate (Quantifiable Costs)**

<i>Quantifiable Liability Cost Estimates</i>					
<i>Liability #</i>	<i>Liability Description</i>	<i>Dam Affected</i>	<i>Low Estimate</i>	<i>Risk Factor</i>	<i>High Estimate</i>
RE-3	PacifiCorp land ownership	Copco No.1	\$2,500,000		\$3,750,000
RE-4	Diminution in property value	Copco No.1	\$7,500,000	1.5	\$11,250,000
RC-1,4,6	Loss of flatwater recreation	J.C. Boyle, Copco No. 1 & Iron Gate	\$288,000		\$341,000
RC-2,5,7	Increased distance to water feature	J.C. Boyle, Copco No. 1 & Iron Gate	\$488,000		\$488,000
RC-3,8	Changes in recreational opportunities	J.C. Boyle, Copco No. 1 & Iron Gate	\$1,446,000		\$3,744,000
PO-1,2	Loss and replacement of renewable power source	All Dams	\$65,169,000		\$171,911,000
EC-1, 3, 5, 7	Loss of payroll	All Dams	\$4,067,000		\$4,067,000
EC-2, 4, 6, 8	Loss of regional fisheries	All Dams	\$11,896,000 <sup>2</sup>		\$66,406,000 <sup>2</sup>
<b>Quantifiable Liabilities Subtotal</b>			<b>\$337,672,600</b>		<b>\$674,702,400</b>
<b>Decommissioning Design, Studies and Programmatic Costs at 10%<sup>3</sup></b>			<b>\$33,767,300</b>		<b>\$67,470,200</b>
<b>Total of Quantifiable Liabilities</b>			<b>\$465,870,200</b>		<b>\$836,602,900</b>

Notes:

- Physical structure removal cost calculated using the values presented in GEC 2006 with the GEC estimate for hydroseeding removed to prevent double counting with the estimates presented in SR-1, SR-3, SR-4, and SR-6.
- Not included in total: Since sediment removal should negate fisheries' impacts and the sediment removal costs are included in the total, fishery liabilities are noted here, but will not be included in the total.
- 10% contingency calculated using the liabilities subtotal, the contingency does not consider the physical structure removal cost estimates to avoid duplication of contingency estimation completed by GEC in its estimate.

## Other Important Study Findings

Several important findings relative to the decommissioning of the four dams follow.

- Approximately 130 physical, biological, and socioeconomic liabilities associated with the decommissioning action were identified. The top 28 high ranked liabilities and/or uncertainties represent a very large percentage of the decommissioning cost. The

remaining liabilities represent a small cost in comparison to the overall decommissioning action. These liabilities are shown in Table ES-2.

2. Decommissioning approaches reviewed as part of this study proposed and evaluated the passage of sediment to the Lower Klamath River through to the Pacific Ocean. The North Coast Regional Water Quality Control Board (NCRWQCB) effectively prohibits the discharge of sediments to the Klamath River system including dam decommissioning projects, and the mouth of the Klamath River at the Pacific Ocean is an Area of Special Biological Significance (ASBS), with further restrictions on sediment discharge. As has been seen on other dam removal programs, including Condit on the White Salmon River in Washington, this approach has many regulatory challenges and has high potential for litigation.
3. The Federal Power Act grants the Federal Energy Regulatory Commission (FERC) significant authority to impose mitigation and restoration measures related to project decommissioning, potentially including measures to address the liabilities described in this report.
4. There is the high potential for litigation with a dam removal program that proposes to pass large volumes of sediment due to the damage to downstream fisheries and the aquatic ecosystem. On other dam removal projects including the Condit dam on the White Salmon River, arguing the state's authority to issue a CWA 401 Water Quality Certification has been used as an effective litigation tool to impede a dam's removal. Potential litigation could come from the Lower Klamath River tribes, fishery groups, riparian residents, boaters, and recreational users. The Siskiyou County Board of Supervisors has openly opposed the Klamath dam removal program sighting many of the above issues.
5. Dam decommissioning would result in the likely PacifiCorp divestiture of Keno Dam to Reclamation or another entity. The new owner/operator would be responsible for fish passage at Keno Dam and screening of three major canals on Keno Reservoir. Keno Dam would likely become the new water quality compliance point for water entering the lower Klamath River. Water quality in Keno Reservoir and Lake Ewauna has historically been very poor. Meeting water quality compliance goals and managing endangered fish species in Keno Reservoir, together with providing agricultural supply and return flow, will present significant challenges to the new operator.

Evaluation of Potential Liability Associated with the Removal of  
Four Hydroelectric Dams on the Klamath River

**Table ES-2. Liabilities Representing High levels of Liability  
and/or Uncertainty**

Liability	Topic	Dam	Liability Level	Uncertainty
HH-3	Concurrent reservoir drawdown and sediment passage	All Dams	High	High
HH-4	Operations of Keno Dam	All Dams	High	Mod
HH-6	No low water outlet structure	Copco No. 1	High	Low
HH-7	Dam foundation removal	Copco No. 1	High	Mod
HH-9	Iron Gate Fish Hatchery	Iron Gate	High	High
SE-1	Presence of sediment	J.C. Boyle	High	High
SE-2	Composition of sediment	J.C. Boyle	High	High
SE-3	Sediment organic content	J.C. Boyle	Mod	High
SE-4	Reservoir drawdown rates	J.C. Boyle	Low	High
SE-5	Presence of sediment	Copco No. 1	High	High
SE-6	Composition of sediment	Copco No. 1	High	High
SE-7	Sediment organic content	Copco No. 1	Mod	High
SE-8	Reservoir drawdown rates	Copco No. 1	Low	High
SE-9	Presence of sediment	Iron Gate	High	High
SE-10	Composition of sediment	Iron Gate	High	High
SE-11	Sediment organic content	Iron Gate	Mod	High
SE-12	Reservoir drawdown rates	Iron Gate	Low	High
SE-13	Water temperature and sediment	Iron Gate	Mod	High
WQ-4	CWA Compliance at Keno Reservoir	All Dams	High	High
SR-4	Reservoir restoration	Copco No.1	High	Mod
RE-4	Diminution in property value	Copco No.1	High	Mod
PO-1	Loss of electricity currently generated	All Dams	High	Low
PO-2	Procurement of replacement power	All Dams	High	Low
PO-3	Removal of an emissions-free, renewable power source	All Dams	High	Low
RL-1	FERC Authority to impose mitigation	All Dams	High	High
RL-2	CWA Compliance	All Dams	High	High
RL-3	ITAs	All Dams	High	High
RL-4	Potential for litigation	All Dams	High	High