

**KENNECOTT UTAH COPPER CORPORATION  
JORDAN VALLEY WATER CONSERVANCY DISTRICT**

**Proposal to the Utah State NRD Trustee and  
USEPA CERCLA Remedial Project Manager**

**for a**

**Groundwater Extraction and Treatment Remedial Project  
In the Southwestern Jordan Valley**

June 11, 2004

## Table of Contents

1.0	INTRODUCTION .....	1
1.1	Executive Summary.....	2
1.2	Adjustments to the Project.....	2
2.0	BACKGROUND .....	4
2.1	Natural Resource Damage Claim and Consent Decree (UDEQ).....	4
2.2	Federal CERCLA Requirements Design (USEPA).....	7
2.3	KUCC/JVWCD Study and Conceptual Design.....	9
2.4	JVWCD System and Service Area .....	9
3.0	PURPOSES OF PROPOSED PROJECT .....	10
3.1	Meet the Requirements and Intent of the NRD Consent Decree .....	10
3.2	Meet the Intent and Remedial Requirements of CERCLA .....	11
3.3	KUCC/JVWCD Purposes.....	11
4.0	AFFECTED AREA AND PUBLIC IN THE AFFECTED AREAS .....	12
4.1	Affected Area .....	12
5.0	PROPOSED PROJECT.....	12
5.1	General .....	12
5.2	Groundwater Extraction .....	12
5.3	Collection Pipelines.....	14
5.4	Water Treatment Plants .....	14
5.5	Treated Water Deliveries .....	16
5.6	Concentrate Disposal .....	16
6.0	GROUNDWATER IMPACTS AND REMEDIATION .....	19
6.1	Groundwater Modeling .....	19
6.2	Hydrogeology.....	20
6.3	Plume Contraction and Containment.....	21
7.0	WATER RIGHTS AND MANAGEMENT WITHIN AFFECTED AREA.....	21
7.1	Consent Decree Requirements.....	21
7.2	Water Rights in the Affected Area.....	21
7.3	Proposal to the State Engineer Concerning Water Rights .....	23
8.0	COST ESTIMATES.....	24

8.1	Capital Costs for Water Treatment.....	24
8.2	Concentrate Disposal Costs.....	25
8.3	Operation, Maintenance and Replacement Costs.....	25
8.4	Avoided Capital Costs.....	25
8.5	Avoided Operating Costs.....	30
8.6	Total Cost Estimate.....	30
9.0	PROJECT FUNDING.....	30
10.0	OPERATION, MAINTENANCE, REPLACEMENT RESPONSIBILITIES.....	35
10.1	Zone A Plant.....	35
10.2	Zone B/Lost Use Integrated Facilities (for Deep Groundwater Extraction).....	35
10.3	Lost Use Facilities (for Shallow Groundwater Extraction).....	35
11.0	ALLOCATION OF PROJECT BENEFITS.....	36
12.0	SCHEDULE, DESIGN & CONSTRUCTION, FACILITIES OWNERSHIP.....	40
12.1	Proposed Project Schedule.....	40
12.2	Design.....	41
12.3	Construction.....	42
12.4	Facilities Ownership.....	42
13.0	LIABILITY AND AGREEMENTS.....	43
13.1	Liability.....	43
13.2	Contract Mileposts.....	43
13.3	KUCC/JVWCD Agreement (“The Project Agreement”).....	43
13.4	KUCC/JVWCD Agreement with the State of Utah.....	44
14.0	ZONES A AND B RATIONALE.....	45
14.1	Zone A.....	45
14.2	Zone B.....	46
15.0	MEETING INTENT OF NRD CONSENT DECREE.....	47

## Figures

Figure 2.4A	Jordan Valley Water Conservancy District Customers and Boundaries
Figure 2.4B	Jordan Valley Water Conservancy District Water System
Figure 4.1A	S.W. Jordan Valley Highest Sulfate Concentration Data
Figure 5.2A	Proposed Groundwater Extraction and Treatment System
Figure 5.4A	Zone A Plume-Treatment Flow Chart
Figure 5.4B	Zone B/Lost Use Integrated Design -Treatment Flow Chart
Figure 5.4C	Zone B/Lost Use Minimum Integrated Design Treatment Flow Chart
Figure 5.4D	Zone B and Lost Use Separate Design Treatment Flow Chart
Figure 6.3A	Sulfate contours Layer 4 at 2025
Figure 6.3B	Sulfate contours Layer 4 at 2050
Figure 8.5A	JVWTP Groundwater Development Project in Southwest Salt Lake Valley, Absent Mining Contamination

## Tables

Table 2.1	State NRD Trust Fund
Table 5.2A	Annual Groundwater Remediation Extraction Volumes
Table 5.4A	Treatment Plant Flows
Table 5.6A	Effect of Zone A Reverse Osmosis Concentrate on Tailings Line Chemistry
Table 5.6B	Project Concentrate Flows
Table 7.2A	Approved Municipal Water Rights in December 1999
Table 7.2B	Approved JVWCD Shallow Groundwater Rights
Table 7.3A	Approved Water Right Change Applications
Table 8.5A	Estimate for Avoided JVWCD Capital Cost of Groundwater Development, Absent Mining Contamination
Table 9.0A	Distribution and funding of Project Costs
Table 11.0A	Allocation of Zone A Treated Water Among Affected Municipalities
Table 11.0B	Illustration of Discounted Wholesale Water Rate Methodology for Zone A Treated Water
Table 12.1A	Proposed Project Schedule
Table 12.2A	Design Responsibility
Table 12.4A	Ownership of Facilities for Proposed Project
Table 14.1A	JVWCD Water Purchase contacts with Affected Municipalities
Table 15.0A	Intent of NRD Consent Decree

## Appendices

- A. KUCC Groundwater Model
- B. Draft Explanation of Significant Differences  
Record of Decision (USEPA)
- C. Reserved
- D. Revised Flow and Transport Model for Southwestern Jordan Valley
- E. Letter to State Engineer & Groundwater Management Plan
- F. Allocation of Zone A water to the Affected Municipalities
- G. Letters of Support from Affected Municipalities
- H. Pilot Study Final Report – Carollo Engineers

## Attachment

CDM Report

KENNECOTT UTAH COPPER CORPORATION  
JORDAN VALLEY WATER CONSERVANCY DISTRICT

**Proposal to the Utah State NRD Trustee and  
USEPA CERCLA Remedial Project Manager  
for a  
Groundwater Extraction and Treatment Remedial Project  
In the Southwestern Jordan Valley**

June 11, 2004

**1.0 INTRODUCTION**

Kennecott Utah Copper Corporation (KUCC) and the Jordan Valley Water Conservancy District (JVWCD) make this joint proposal (Proposal) to Dr. Dianne R. Nielson, the Utah Trustee for natural resource damages (NRD), who also acts as Director of the Utah Department of Environmental Quality (UDEQ). In addition, the Proposal has been made to Dr. Eva J. Hoffman, the United States Environmental Protection Agency (USEPA) Remedial Project Manager for the KUCC Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site remediation and Mr. Jerry Olds, P.E., State Engineer for the State of Utah.

KUCC and JVWCD propose to develop and construct a groundwater extraction and treatment project with groundwater remedial functions that will provide treated, municipal quality water to the public in the Affected Area of the southwestern Jordan Valley (Project) as defined in the Consent Decree dated August 21, 1995, entered in Civil Action No. 86-C-0902G in the United States District Court for the District of Utah ("the Consent Decree"). KUCC and JVWCD seek to utilize for the Project the trust fund set up under the Consent Decree in a manner consistent with the terms of the Consent Decree to restore the injured ground water resource.

The concepts of this Proposal have been presented to the governing organizations of Herriman City, Riverton City, South Jordan City and West Jordan City and a technical review committee comprised of representatives from various federal, state and local governmental agencies, as well as representatives from local municipalities and local residents.

## **1.1 Executive Summary**

In summary, the Project outlined in this Proposal:

- Is designed to provide 8235 acre-feet/year (afy) of municipal quality water to the public in the Affected Area.
- Includes the construction and operation of two reverse-osmosis water treatment plants. One plant, the Zone A Plant, is to be built, owned and operated by KUCC. The other, consisting of the Zone B Facilities and the Lost Use Facilities, is to be built, owned, and operated by JWCD.
- Includes construction and operation of pipelines and extraction wells.
- Seeks to utilize all portions of the Trust Fund, except that relating to administration costs. The Trust Fund consists of the existing Irrevocable Letter of Credit (ILC) and the cash portion of the Trust Fund. KUCC and JWCD seek full credit against the ILC in exchange for 7000 afy of municipal quality water. JWCD seeks the cash portion for an additional 1235 afy of municipal quality water.
- Provides additional costs and in-kind contributions to the Project of more than \$184 million by KUCC and approximately \$16 million by JWCD.
- Anticipates providing some of the municipal quality water to the public in the Affected Area by approximately two years following approval of the Proposal.
- Presents an allocation of water rights to the Utah State Engineer. The allocation of water rights is necessary to meet the intent of the NRD Consent Decree.
- Integrates the CERCLA remedial response for the Bingham Creek acid and elevated sulfate plume with the actions required to satisfy the NRD Consent Decree.

This Proposal provides an overview of the expected development of the Project. Because the Project is intended to be ongoing for more than forty years, not all circumstances can be anticipated, much less addressed. Many of the circumstances, as well as the definitive rights and obligations of KUCC, JWCD and the State under the Project and implementing agreements, are referred to throughout this Proposal and summarized in Section 5.6 (Concentrate Disposal), Section 9 (Project Funding) and in Section 13 (Liability and Agreements).

## **1.2 Adjustments to the Project**

This Joint NRD Proposal was previously submitted to the Trustee and the USEPA on August 7, 2003. Public hearings and a public comment period on the August 7,

2003 Proposal were held between August and November of 2003. Some members of the public expressed opposition to the portion of the Proposal providing for discharge of concentrates from the Zone B Facilities and Lost Use Facilities to the Jordan River. The principal objections related to the presence of selenium in the concentrates from the shallow groundwater to be treated by the Lost Use Facilities. Due to that opposition, JWCD withdrew its discharge permit and adjusted its plans for the Lost Use Facilities.

The August 7, 2003 Proposal and the corresponding Project Agreement and State Agreement have now been updated to reflect these adjustments to the proposed Project as described in this May 25, 2004 Proposal. The adjustments include options for providing water for the Lost Use Facilities from the Zone B deep groundwater and the shallow aquifer, options for concentrate disposal and corresponding easements, as follows:

#### OPTIONS FOR LOST USE FACILITIES

JWCD will investigate and select one of three options for the Lost Use Facilities. These options are briefly described below and in Section 5.4 of this Proposal.

- Integrated Design
  - JWCD may integrate the Lost Use Facilities with the Zone B Facilities, using feed water from the Zone B Deep Wells, for a combined production of 4195 afy of treated water, 3500 afy of which is attributable to the Zone B Facilities and 695 afy of which is attributable to the Lost Use Facilities. JWCD will provide the remainder of 540 afy from other sources available to it in order to satisfy its obligation to provide 4735 afy of treated water.
  - JWCD may proceed as described above, but treat additional feed water from the Zone B Deep Wells, for a combined production of 4735 afy of treated water, 3500 afy of which is attributable to the Zone B Facilities and 1235 afy of which is attributable to the Lost Use Facilities. This will require approval from the Utah State Engineer to change water rights currently approved for other points of diversion into the Zone B Deep Wells.
- Separate Design
  - JWCD may proceed as outlined in the August 7, 2003 Proposal with a separate design for the Lost Use Facilities, in which case the Zone B Facilities will produce 3500 afy of treated water from the Zone B Deep Wells and the Lost Use Facilities will produce at least 1235 afy of treated water from the shallow aquifer. This option differs from the August 7, 2003 Proposal in that, instead of discharging concentrates to the Jordan River, concentrates will be conveyed to the Great Salt Lake, bypassing the



Jordan River and its associated wetlands. Such future discharge is subject to further studies by JWCD concerning selenium to determine impacts to the Great Salt Lake from JWCD's concentrate discharge and permitting and regulatory approval.

- Decision Process
  - In cooperation with DEQ, EPA, USFWS, USGS, KUCC, and environmental organizations, JWCD will initiate and commission additional studies on the impacts of selenium in Great Salt Lake. JWCD will need to make a decision on which Lost Use facility option to proceed with. The outcome of these studies will help guide JWCD's decision. JWCD will make a decision on which Lost Use Facility alternative to pursue by the summer of 2007. A decision to proceed with the Separate Design and implement a discharge of reverse osmosis concentrate to Great Salt Lake is dependent on the studies concluding that this is an option that will not cause environmental degradation to Great Salt Lake and its surrounding environment. While completing these studies JWCD will complete other activities related to the project such as engineering designs and construction of wells and pipelines.

## CONCENTRATE DISPOSAL

- The concentrate disposal provisions of the August 7, 2003 Proposal and Project Agreement have been modified to clarify the circumstances under which JWCD is able to deliver Zone B Deep Well concentrates to Kennecott's Tailings Impoundment. These circumstances are described in Section 5.6 of this Proposal.

## PIPELINE EASEMENTS

- Kennecott will provide easements to JWCD for delivery of:
  - Deep Well concentrates to the Tailings Impoundment, and
  - Deep Well and shallow aquifer concentrates in the event concentrate discharges to the Great Salt Lake are eventually approved.

## 2.0 BACKGROUND

### 2.1 Natural Resource Damage Claim and Consent Decree (UDEQ)

The Utah Department of Health filed a complaint in 1986 under the provisions of CERCLA seeking damages from KUCC "for injury to, destruction of, and loss of natural resources." The Utah Department of Health was acting as the CERCLA

Trustee in making this claim. The claim pertained to injury to surface and groundwater resulting from the release of pollutants and hazardous substances from milling and mining activities by KUCC and its predecessors in the southwestern part of the Salt Lake Valley.

In 1990, UDEQ, the successor Trustee, arrived at an NRD settlement with KUCC. An NRD Consent Decree was proposed to the United States District Court for the District of Utah.

JVWCD (then the Salt Lake County Water Conservancy District) petitioned the court to allow JVWCD to intervene, claiming that the proposed Consent Decree was insufficient to address damages to the groundwater aquifer. Following a hearing in 1991, the District Court allowed JVWCD to intervene, finding JVWCD uniquely situated to contribute to resolving the underlying factual and legal issues associated with the UDEQ claim. The court did not approve the Consent Decree proposed in 1991.

An appeal to the 10<sup>th</sup> Circuit Court of Appeals followed, which was dismissed for lack of jurisdiction. The subsequent petition for a writ of certiorari to the United States Supreme Court also was denied.

The three parties (KUCC, UDEQ and JVWCD) then entered into negotiations for a revised settlement. Numerous technical discussions were held regarding potential remedial responses. These discussions resulted in a proposed Consent Decree dated May 30, 1995. In August 1995, the District Court approved and entered the final NRD Consent Decree.

The 1995 Consent Decree required KUCC to complete all source control efforts it had been pursuing since 1990. It also created a trust fund for administration by the State CERCLA Trustee for natural resource damage. KUCC has now completed all source control work.

The Trustee utilized the cost of restoration methodology in computing the amount of damage. The value of the settlement was based on the cost of a possible alternative for returning the volume of contaminated water (8,235 afy) to beneficial use. This method is to extract water through wells, and build and operate a treatment plant to produce municipal quality water. It was calculated that a treatment plant using nanofiltration or reverse osmosis technology would have an 85 percent net output of municipal quality water. This equates to 7,000 acre-feet of water as provided for in the Consent Decree, with a loss of 1,235 acre-feet of water in the treatment process.

The treatment system concept used for damage calculation requires extraction wells and related facilities, collection pipelines, a treatment plant, a brine discharge pipeline and a distribution pipeline. The costs of producing 7,000 acre-feet of water

annually for 50 years in 1995 dollars, was calculated to be \$4,000 per acre-foot. The \$4,000 per acre-foot cost of treatment includes the capital costs of construction of a treatment plant (40%) and the cost to operate, maintain and replace facilities over an estimated life of 50 years (60%). The present value of funding for such a project was estimated at \$28 million in 1995 dollars.

The Consent Decree required that KUCC provide funding for a Natural Resource Damages Trust Fund with two components. First, KUCC provided the ILC in the amount of \$28 million, escalating annually at seven percent. The \$28 million was equivalent to the present value of the cost of restoring the ground water through the restoration methodology described above. Second, the Trust Fund included a cash payment of \$9 million that was provided to the State Trustee. The \$9 million was estimated as the cost of replacing that amount of ground water that would be lost in the concentrate from the treatment process and is sometimes referred to as the “lost use” component of the NRD Trust Fund. The Consent Decree provides that the \$9 million “shall be expended only to restore, replace or acquire the equivalent of the surface or groundwater resources for the benefit of the public in the affected area...” The \$9 million has been invested by the State of Utah and has increased in value. This portion of the Trust Fund, also sometimes referred to as the cash portion, is to be used for the Lost Use component of the Project or Lost Use Facilities as more fully described in Sections 5 and 10 below.

The following table shows the increasing value of the \$28 million ILC and the \$9 million cash payment from January 1995 through January 2004:

Date	KUCC Irrevocable Letter of Credit Value <sup>(a)</sup> (Millions)	\$9 Million Cash Payment Value <sup>(b)</sup> (Millions)	Total Value (Millions)
September 1995	\$28.0	\$9.0	\$37.0
January 2004	\$49.382	\$13.227	\$62.609
<sup>(a)</sup> Increases at seven percent annually <sup>(b)</sup> Increase at PTIF rate as invested by UDEQ.			

The NRD Consent Decree acknowledges the separate CERCLA remedial action process by the USEPA. The Consent Decree contemplates the likelihood of formulating a remedial response for the NRD that would correlate with the remedial response required by USEPA under federal CERCLA requirements. Because of this, the Consent Decree requires that “the Trustee shall not expend funds secured by the letter of credit until the earlier of two years after the issuance of the Record of Decision (ROD) or July 1, 2000, unless the Trustee determines that there exists a

direct and immediate threat to the public health or the environment that necessitates expenditures to restore, replace or acquire the equivalent of the resource.”

Prior to the expenditure of such funds, KUCC can obtain a reduction in the amount of the ILC if KUCC provides and delivers municipal quality water through treatment of contaminated water to a system of a purveyor of municipal and industrial (M&I) water in a manner that is acceptable to the Trustee, and in a manner that meets the specific requirements of the credit provisions. “Municipal Quality Water” is defined in the Consent Decree as water originating west of the Welby Canal with total dissolved solids (TDS) concentration of 500 mg/L (and 250 mg/L sulfate), and water originating east of the Welby Canal to 800 mg/L TDS (and 250 mg/L sulfate). Allocation of the right to use surface or groundwater resources “shall be by the Utah State Engineer pursuant to Utah water law.”

The other requirements that KUCC must satisfy to receive the reduction described above include the following:

- a. The water must be accepted by the M&I purveyor with the water right to put the water to beneficial use, in exchange for which the purveyor is to pay KUCC no more than the operation and maintenance costs absent the contamination up to \$49 per acre-foot in 1995 dollars;
- b. The extraction of the contaminated water must proportionately prevent or reduce the spread of aquifer contamination;
- c. The municipal quality water must be a sustainable water supply of 40 years or more; and
- d. KUCC’s project cannot increase materially the Trustee’s unit cost to produce the remainder of the 7000 afy of municipal quality water.

As indicated above, two years after the issuance of the ROD or July 1, 2000, whichever is later, the ILC portion of the Trust Fund not allocated for a KUCC project may, at the Trustee’s option, be converted to cash which shall be used by the Trustee to restore, replace or acquire the equivalent of the natural resource for the benefit of the public in the Affected Area.

The Project outlined in this Proposal seeks to utilize one half of the ILC for a KUCC project and one half of the ILC for a JVVCD project. The KUCC project is generally referred to as the Zone A Plant and the JVVCD project is generally referred to as the Zone B Facilities, which are more fully discussed in Sections 5 and 10 below.

## **2.2 Federal CERCLA Requirements Design (USEPA)**

Substantial commencement of remedial studies under the federal requirements of CERCLA (also known as Superfund) followed the approval of the NRD Consent Decree. The main concern of the CERCLA process is the protection of human health and the environment.

In 1995, the USEPA Remedial Project Manager (of Region VIII) formed a Technical Review Committee (TRC) to oversee the remedial studies. Represented on the TRC are UDEQ, USEPA, Utah Department of Natural Resources, Utah State Engineer, Salt Lake City-County Health Department, JVVCD, US Geological Survey (USGS), University of Utah, local municipalities, a local chapter of the Sierra Club and other community stakeholders.

During 1995-1998, KUCC conducted many studies as part of a remedial investigation/feasibility study (RI/FS). The TRC provided oversight during this process. Much information and data were produced and provided by KUCC regarding the characteristics of the Affected Area, including hydrogeology, groundwater quality, groundwater recharge sources, a well inventory and future groundwater and contaminant movement in the Affected Area.

The feasibility study portion of the RI/FS included groundwater modeling by KUCC to project various scenarios of future groundwater and contaminant movement. This modeling involved groundwater flow modeling, particle tracking and solute transport modeling. Various scenarios of remedial action were modeled, addressing future time periods of 25, 50 and 150 years. A groundwater model provided by the USGS served as the basis of this modeling, and the final results were reviewed and approved by the USGS. A summary of this modeling is attached (Appendix A).

The final draft RI/FS reports were issued by KUCC in March 1998. In March 2000, KUCC formulated a remedial response that correlates with the NRD Consent Decree requirements and presented this response to the USEPA, UDEQ and TRC. The USEPA Remedial Project Manager accepted this proposed remedial action plan and submitted the integrated remedial response program to the federal Remedy Review Board for their consideration and approval in May 2000. The next steps in the federal CERCLA process involved public hearings and ultimately issuance of a ROD by USEPA, which occurred on December 13, 2000 (Appendix B).

Following the issuance of the ROD, KUCC prepared a Remedial Design Work Plan, Preliminary Design and Final Remedial Design and submitted these to USEPA and the State of Utah. The Final Remedial Design (December 2002) details the technical and operating design of the ground water remediation program, including the Zone A Plant discussed in Section 5 below. The Final Remedial Design also includes a groundwater monitoring plan and third party mitigation plan in the event of quantity or quality related issues at third party sites. This document is available at the West Jordan library or at UDEQ offices.

As a result of details presented in the Final Remedial Design, USEPA issued a draft "Explanation of Significant Differences" dated June 23, 2003 (Appendix B), for the selected remedy in the ROD. Generally, the differences do not change the overall

approach, which uses barrier wells to prevent the spread of contamination; treatment and beneficial use of the sulfate contaminated water; and extraction of the low pH plume.

### **2.3 KUCC/JVWCD Study and Conceptual Design**

KUCC and JVWCD jointly commissioned a study to determine the best method of accomplishing the goals of the NRD Consent Decree and federal CERCLA remedial requirements for contaminated groundwater in the southwestern Salt Lake Valley. KUCC and JVWCD retained the firm of Camp Dresser and McKee (CDM) to perform this study, which resulted in a conceptual design for an extraction well and treatment project that meets State and Federal expectations (see Attachment). The conceptual design will produce 7,000 afy<sup>1</sup> of municipal quality water, as was contemplated for the treatment component of the State NRD Consent Decree. It also provides for additional replacement of water beyond that contemplated by the Consent Decree, including the 1,235 afy of water otherwise lost in the treatment process. This “Lost Use” water will result from treatment of shallow groundwater or of water from the Zone B Deep Wells under JVWCD water rights, depending on the option regarding the Lost Use Facilities selected by JVWCD as described in Section 1.2.

KUCC and JVWCD requested that CDM consider a 50-year operating period for the Project. CDM has shown net present value of costs for construction and 50 years of operation, maintenance and replacement for the Project. This exceeds the 40-year operation period specifically required in the Consent Decree. Later sections in this Proposal will show that some of these costs based on the 40-year period will exceed the Trust Fund amounts. KUCC and JVWCD will provide additional funds to make up this difference.

Since the completion of the CDM report, pilot studies, additional preliminary design and cost estimates have been completed by Carollo Engineering (Zone B and Lost Use) and KUCC Engineering Services (Zone A). The CDM, Carollo and KUCC estimates have been further updated as indicated in Section 8.0.

### **2.4 JVWCD System and Service Area**

JVWCD is a political subdivision of the State of Utah. It was created in 1951 by the State Legislature under the Water Conservancy Act. The District remains under the jurisdiction of the Third District Court of the State of Utah. A board of eight trustees, who represent seven geographical divisions, governs JVWCD. Board members are

---

<sup>1</sup>CDM noted that the recovery rate (85%) assumed in the supporting document for the Consent Decree would likely not be achieved for a portion of the project. Thus additional groundwater extraction may be required to produce the 7,000 AF of treated water as required under the Consent Decree.

nominated by either the county commission or city council, depending upon the division they represent. The Governor appoints each trustee for a four-year term.

JVWCD provides M&I water to most areas of Salt Lake County that lie outside of the Salt Lake City service area. Parts of northern Utah County are also served by JVWCD. Figure 2.4A shows this service area.

JVWCD provides water under wholesale water purchase contracts to nineteen member agencies, including cities, improvement districts, state agencies and private companies. JVWCD also provides and distributes water to individual homes and businesses on a retail basis in areas where no viable retail agency exists. JVWCD also provides wholesale service indirectly to High Country Estates Phase II Homeowners Associates. JVWCD treats and transports water to the Metropolitan Water District of Salt Lake & Sandy.

JVWCD operates a raw water collection system that collects water not only from local mountain streams in Salt Lake Valley, but also imports water from the Weber, Provo and Duchesne Rivers. JVWCD operates two water-treatment plants and a treated-water transmission system within Salt Lake Valley. This system is shown in Figure 2.4B. The system contains hundreds of miles of aqueduct, transmission and distribution pipelines, and can convey water from any source to virtually any point within Salt Lake Valley. The system also involves wells, booster pump stations and treated water storage reservoirs.

### **3.0 PURPOSES OF PROPOSED PROJECT**

KUCC and JVWCD have formulated the Project to meet the intent of the NRD Consent Decree, as well as the requirements and intent of the federal CERCLA process. These purposes are described in the following paragraphs.

#### **3.1 Meet the Requirements and Intent of the NRD Consent Decree**

The purposes of this Project include the following:

- Reduce the spread of aquifer contamination through extraction of contaminated water that will proportionately prevent or reduce the spread of contamination.
- Restore the ground water resource by treating contaminated water and providing drinking quality water for the public in the Affected Area, and
- Remediate the aquifer over the long term.

### **3.2 Meet the Intent and Remedial Requirements of CERCLA**

The ROD detailed the preferred remedy addressing groundwater contamination in the southwestern Jordan Valley. The preferred remedy includes groundwater treatment and is intended to work in conjunction with this Proposal. The Project includes the following elements outlined in the ROD and reconfirmed in the draft "Explanation of Significant Differences" dated June 23, 2003 (Appendix B).

- Protect human health and the environment,
- Withdraw and treat the heavily contaminated waters from the core of the acid plume in Zone A (discussed in Section 4 below),
- Install barrier wells at the leading edge of the contamination (1500 ppm sulfate or less) and pump and treat the waters to prevent further plume movement,
- Provide reverse osmosis treated water for municipal use,
- Monitor the plume,
- Dispose of treatment concentrates in pipeline used to slurry tailings to the tailings impoundment prior to mine closure, and
- Develop a post-mine closure plan to handle treatment residues.

### **3.3 KUCC/JVWCD Purposes**

KUCC and JVWCD have additional purposes that will benefit the public beyond the requirements of the State NRD Consent Decree or federal CERCLA requirements, which are included in the Proposal. These purposes are to:

- Implement a project that is comprehensive and efficient in groundwater development, water delivery, operational and political issues,
- Improve the treated water quality delivered to JVWCD beyond the 500-800 mg/L total dissolved solids (TDS) level contemplated in Section I.D. of the Consent Decree, to 250 mg/L TDS,
- Restore and replace groundwater from the Affected Area (see Consent Decree for definition of Affected Area) that is lost as a concentrate stream resulting from membrane treatment processes. JVWCD proposes a shallow groundwater membrane treatment project under its own water rights to accomplish this purpose, which is contemplated in the Consent Decree,
- Initially utilize existing facilities for concentrate disposal, in order to create additional cost savings and permitting efficiency.



## **4.0 AFFECTED AREA AND PUBLIC IN THE AFFECTED AREAS**

### **4.1 Affected Area**

The NRD Consent Decree requires that the Trustee use the benefits of the Trust Fund to “restore, replace or acquire the equivalent of the natural resource for the benefit of the public in the Affected Area...” (V.D.4). The Consent Decree further defines “injury to...groundwater” as contamination caused by KUCC’s mining and leaching operations resulting in: 1) increased levels over baseline of total dissolved solids, including sulfates, 2) pH levels lower than baseline, 3) metals concentrations exceeding baseline, or 4) solid phase contamination in the aquifer that can be re-dissolved in the future.” (Section I(c))

For purposes of the Proposal, the total affected area is divided into two zones, Zone A and Zone B as shown on Figure 4.1A. Zone A encompasses approximately the western half of the Affected Area, and includes a sulfate plume with a low pH core emanating from the Bingham Canyon area. Zone A includes the area commonly referred to as the “acid plume.”

Zone B encompasses approximately the eastern half of the Affected Area, and includes areas affected by the former evaporation ponds in South Jordan. It includes the majority of the area referred to by the TRC as the “sulfate plume.”

## **5.0 PROPOSED PROJECT**

### **5.1 General**

The physical facilities of the proposed Project are described in the conceptual design report by CDM (See Attachment). That report provides substantial detail regarding extraction, treatment process, pipelines, water treatment plants, treated water delivery locations and concentrate disposal provisions.

The proposed Project facilities are divided into Zone A Plant, Zone B Facilities and Lost Use Facilities. The CDM conceptual design report explains the cost-effective reasons for this segregation. Since the completion of the CDM report, additional preliminary designs and cost estimates have been completed by Carollo Engineers (Zone B and Lost Use) and KUCC Engineering Services (Zone A).

### **5.2 Groundwater Extraction**

Estimated annual volumes of groundwater extraction to support the project are tabulated in Tables 5.2a and 5.2b.

KUCC plans to utilize existing extraction wells 1193 and 1200<sup>2</sup> in Zone A. Additionally, KUCC will operate well 1147, its “sulfate extraction well”, north of Herriman, which will contain and contract the plume in the Lark area. Extraction of up to 4670 afy from these wells will provide sufficient feed water to the Zone A Plant to provide 3,500 afy of treated water from the deep, principal aquifer.

KUCC plans to operate its acid plume extraction wells 1146 and 1201 and possibly other acid extraction wells . KUCC is required as part of the Consent Decree to extract 400 afy annually from the acid plume. KUCC intends to exceed this requirement in order to remove the majority mass of the acid plume as quickly as possible (see Appendix D). However, the extraction rate from these wells will be constrained by the capacity of KUCC’s water rights and the safe yield of the aquifer. KUCC’s existing water rights (Section 7.2) will allow for extraction of 2020 afy per year from the acid wells.

If necessary, additional extractions may be made by KUCC to contain and contract critical portions of the acid and highly elevated sulfate plume to protect human health and the environment. These extractions would require transfer of additional water rights to the remedial area.

JVWCD will utilize new extraction wells B1 through B7 in Zone B (collectively designated the Zone B Deep Wells) for groundwater extraction from the principal aquifer for treatment at the Zone B Facilities and the Lost Use Facilities, if constructed on an Integrated Design basis, as shown in Figure 5.2A. Table 2-1 in the CDM report gives more information on each well. (Note that wells B6 and B7 from the CDM report have been combined to a single, higher production well shown as B6 in Figure 5.2A. Well B8 from the CDM report is shown as B7 in Figure 5.2A.)

Whether JVWCD proceeds with the Lost Use Facilities on an Integrated Design basis or a Separate Design basis, JVWCD will use some water from the shallow aquifer (which lies above the deeper principal aquifer in areas just west of the Jordan River) to remineralize the permeate produced from the reverse osmosis process. New wells SW1 through SW4 are additional shallow wells that will be used for that purpose. Additional shallow wells may be used if JVWCD proceeds with the Lost Use Facilities on a Separate Design basis. Table 5.2A tabulates the average annual extractions from these wells. The annual extraction volumes from individual shallow wells and Deep Wells may vary, based upon operating experience that will be gained by KUCC and JVWCD over the forty year life of the Project.

---

<sup>2</sup> In the past, or in other documents, KUCC wells 1193 and 1200 were previously referred to as wells K60 and K109.

<b>TABLE 5.2A</b>	
<b>Zone A Annual Groundwater Extraction Volumes</b>	
Wells	Annual Extraction (AF)
Acid (1146 and 1201)	2020
Sulfate (1193, 1200, and 1147)	4670

<b>TABLE 5.2B</b>			
<b>Zone B Annual Groundwater Extraction Volumes</b>			
Wells	Annual Extraction (AF)		
	Separate Design	Minimum Integrated Design	Full Integrated Design
Zone B Deep	4300	4300	4867
Shallow Aquifer	1400	750	842

JVWCD will monitor metals in the shallow aquifer wells. This monitoring will be done on a quarterly basis for five years and a yearly basis thereafter. These results will be reported to DEQ on an annual basis showing the trends of all previous data collection. This data will enable the tracking of metals migration into JVWCD's shallow wells if it occurs.

### 5.3 Collection Pipelines

Collection pipelines ranging in diameter from 8-16 inches will collect extracted water from Project extraction wells and convey the feed water to either the Zone A Plant or Zone B/Lost Use Facilities. Collection pipelines for the Project are shown in Figure 5.2A.

### 5.4 Water Treatment Plants

CDM originally evaluated the treatment process required to produce municipal quality water from groundwater in the Affected Area in their 1999 study and report. The membrane process known as reverse osmosis (RO) was selected by CDM. JVWCD has selected a treated water quality with a maximum TDS concentration of 250 mg/L. The process to accomplish this has been further studied through pilot testing by KUCC and JVWCD.

Two RO water treatment plants are proposed. Figure 5.2A shows a Zone A Plant, located south of the Bingham Reservoir, at approximately 8400 West 10400 South. The Zone A Plant will be constructed on land owned by KUCC. The Zone B Facilities and Lost Use Facilities will be constructed on land owned by JWCD, at 8300 South 1000 West and will be combined in a common treatment plant building. This location is also shown in Figure 5.2A.

Figure 5.4A is a treatment flow chart for the Zone A Plant that schematically shows water flows and facility relationships. Figures 5.4B through 5.4D are treatment flow charts of the proposed options for Zone B and Lost Use Facilities.

KUCC has prepared design criteria and a preliminary site layout for the Zone A Plant. Carollo Engineers has prepared design criteria for the Zone B/Lost Use Facilities processes. These design criteria are explained in Table 6.1 in Appendix H. Carollo has also prepared site layouts for the Zone B/Lost Use Facilities, which are shown on Figures 6.1 and 6.3 in Appendix H.

As described in Section 1.2, JWCD will proceed with the Zone B Facilities and Lost Use Facilities either as separate operations (i.e., the Separate Design basis) or as an integrated operation (i.e., the Integrated Design basis), depending on JWCD's assessment, during the design stage, of the best way for it to proceed with the Lost Use Facilities. For purposes of plant flows in Table 5.4A, it has been assumed that JWCD will proceed on an Integrated Design basis. Treatment plant flow rates are shown on Table 5.4A. Abbreviations in this table include acre-feet per year (afy) and million gallons per day (MGD).

Source	Feed Water		Product (Treated) Water	
	(afy)	(MGD) <sup>b</sup>	(afy)	(MGD) <sup>b</sup>
Zone A	4600 <sup>a</sup>	4.46	3500	3.46
Zone B	4300	4.26	3445-3890	2.78-3.13
Shallow Aquifer	750-842	0.61-0.68	750-842	0.61-0.68

<sup>(a)</sup> Approximate. Zone A will deliver sufficient feed water to produce 3500 AF/yr of permeate.

<sup>(b)</sup> Based on treated volume produced in 330 to 333 days per year.

The feed water and treated water rates from Zone B Deep Wells and the shallow aquifer are shown in Table 5.4A by ranges. The lower range corresponds to the volume that can be produced using existing JWCD water rights in Zone B. This is the first option available to JWCD as described in Section 1.2. The upper range corresponds to the minimum treated water annual volume of 1,235 acre-feet, as required by the Consent Decree to offset lost use of concentrate and will require additional water rights in Zone B. This is the second option available to JWCD as described in Section 1.2.

KUCC and JWCD have completed pilot/demonstration RO plants for Zone A and Zone B over the last three years. Results from these pilot plant studies have demonstrated the technical and economical feasibility for the use of RO technology as proposed in this document. Scale up of RO technology is not difficult, as the RO plants will be constructed in a modular fashion (i.e. larger RO plants require additional banks of membranes and additional pumps to feed them). Both pilot plants produced permeate for several months, the quality of which was significantly better than primary drinking water standards.

The pilot study report for the Zone B RO plant is attached as Appendix H. A copy of the Zone A Plant pilot study report is available for review at the State Division of Environmental Response and Remediation upon request.

## **5.5 Treated Water Deliveries**

The two treatment plants are located within the service area of the JWCD infrastructure for treated water conveyance. The delivery of treated water to the JWCD system is shown in Figures 5-5 and 5-8 of the CDM report, and slightly modified in Figure 5.2A herein.

The Zone A Plant will produce water at a relatively high elevation, in JWCD's pressure zone C or higher. This plant will produce water that will be conveyed to the Zone A metering station along 10200 South. From this point, JWCD will route water into their distribution system. This will be a substantial benefit to the public in the Affected Area by receiving treated water at a high elevation to allow for westward land development in Herriman, Riverton, South Jordan, and West Jordan.

The Zone B treated water will be conveyed westward to JWCD's 78-inch Jordan Aqueduct at 7800 South 3600 West. This will provide water to the public in the Affected Area, either directly or by exchange.

## **5.6 Concentrate Disposal**

KUCC proposes to use its existing tailings slurry conveyance pipeline from Bingham Canyon to the North Tailings Impoundment for conveyance of concentrate from the Zone A Plant (see Figure 5.4A). The much greater flow of KUCC tailings slurry in this pipeline will serve to stabilize the Project concentrate streams (Table 5.6A).

Table 5.6A indicates that the change in chemistry in tailings water from addition of RO concentrate is very small, within the range of variability of tailings water quality. Therefore, it is unlikely that this addition will change the characteristics of the tailings discharge significantly.

<b>Table 5.6A</b>				
<b>Effect of Zone A Reverse Osmosis Concentrate on Tailings Line Chemistry</b>				
Parameter	Tailings Line 2002 Ave.	Zone A RO Concentrate (Typical)	Composite Flow*	Net Change (percent)
SO <sub>4</sub>	4103	5971	4135	0.78
TDS	7934	10,317	7975	0.5
pH	6.97	7.3	6.97	0.00
Ca	716	2054	739	3.21
Cl	1623	680	1607	-0.99
K	142	19	140	-1.41
Mg	510	620	512	0.39
Na	940	294	929	-1.17
Al	0.094	< 0.010	0.092	-2.13
As	0.007	0.023	0.007	0.00
Cd	0.003	< 0.001	0.003	0.00
Cu	0.155	0.027	0.155	0.00
Mn	12.11	< 0.010	11.904	-1.70
Pb	< 0.005	< 0.005	< 0.005	NA
Se	0.042	0.014	0.042	0.00
Zn	0.054	0.022	0.05300	-1.85

Notes: All values in mg/L except pH  
\*Composite flow uses MDL as concentration of metals in concentrate  
Tailings water flow, 34,500 gpm; RO concentrate flow, 600 gpm. Range of tailings concentrations typically  $\pm$  20 percent.  
NA = Not Applicable

Disposal of RO concentrate in the KUCC tailings impoundment is authorized under KUCC's existing UPDES (Utah Pollutant Discharge Elimination System) permit. Water reporting to the tailings impoundment is largely recycled back into KUCC's process circuit; excess water, including meteoric water, is discharged to the Great Salt Lake pursuant to the terms of KUCC's UPDES permit. KUCC will be responsible for meeting discharge requirements specified in the permit. After mine closure or at such other time when operation of the tailings line slurry may cease, KUCC proposes to discharge the RO concentrate directly to the Great Salt Lake through the existing tailings pond discharge system. The composition of the discharge after 30 years is estimated to be similar to that shown in Table 5.6A and meets the requirements of KUCC's existing discharge permit.

Sections 3 and 6 of the CDM report fully explain the recovery rate of the RO treatment processes and the concentrate streams. Pilot studies have confirmed these approximate rates. In summary, they will be as shown in Table 5.6B:

<b>Table 5.6B Project Concentrate Flows</b>		
<b>Treatment Process</b>	<b>Concentrate Flow Rate (MGD)</b>	<b>Concentrate Discharge Location</b>
Zone A Plant	1.1	Before mine closure to KUCC tailings pipeline and tailings impoundment; After mine closure to GSL via concentrate discharge pipeline or alternative disposal method.
Zone B Facilities, and Lost Use Facilities if feed water comes from Deep Wells (i.e., the Integrated Design)	0.8-1.0	Before mine closure, to KUCC tailings impoundment; after mine closure, to GSL via concentrate discharge pipeline or alternative disposal method.
Lost Use Facilities if feed water comes from shallow aquifer (i.e., the Separate Design)	0.0-0.3	Possibly to Great Salt Lake after additional studies and regulatory approvals

KUCC is willing to accept the concentrate stream from treatment of Zone B deep groundwater in its tailings impoundment (see Figure 5.4B) for the operational period of the Zone B Facilities, provided JWCD satisfies various requirements, including the following:

- The concentrates must comply with the specifications of KUCC's UPDES permit and other specifications; and
- JWCD may only deliver 1000 acre feet of concentrates per year, determined on a five year rolling average basis, with no more than 1100 acre feet delivered in any calendar year.

JWCD proposes, as the initial approach for the Project, to discharge the concentrate streams resulting from the Zone B Deep Wells to the KUCC tailings impoundment. Direct discharge to the Great Salt Lake of concentrate from either the Zone B Facilities or the Lost Use Facilities will be considered following additional research and verification that discharge of such concentrates will not be harmful to

the Great Salt Lake ecosystem. Any future discharge will be subject to permitting and regulatory approval.

Certain assumptions concerning disposal of concentrate were made in reaching the NRD settlement and in developing this Proposal. The following assumptions will be important to the feasibility of this Project:

- Prior to mine closure, the concentrate streams from the Zone A Plant and, if applicable, the Zone B Facilities, and Lost Use Facilities if its feed water comes from the Zone B Deep Wells, can be managed in the tailings disposal system operated by KUCC. Water decanted from the concentrate stream would be recycled back into KUCC's process water circuit or handled in accordance with KUCC's UPDES and groundwater discharge permits.
- After mine closure, or prior to that time if for any reason the concentrate stream cannot be managed within the tailings disposal system, direct discharge to the Great Salt Lake of the concentrate streams from the Zone A Plant and, if applicable, the Zone B Facilities and Lost Use Facilities, if its feed water comes from Deep Wells, will be addressed through KUCC's UPDES discharge permit and after additional study of potential ecological impacts.

## **6.0 GROUNDWATER IMPACTS AND REMEDIATION**

### **6.1 Groundwater Modeling**

**Flow Model.** KUCC developed a groundwater model of the southwestern Jordan Valley as part of the RI/FS to analyze flow paths and groundwater velocities in the principal aquifer and to evaluate remedial options. The Affected Area is within the southwestern Jordan Valley. The model area extends from the bedrock/alluvial interface at the base of the Oquirrh Mountains on the west, to the bedrock/alluvial interface at the base of the Wasatch Mountains on the east, and from approximately 6000 South on the north to the northern base of the Traverse Mountains on the south. Model calibration closely simulated observed aquifer conditions in the southwestern Jordan Valley. A more complete description of this model is included in Appendices A and D.

**Transport Model.** KUCC's calibrated groundwater flow model was then coupled with a contaminant transport code to model historical and future migration of storm and mine waste water that leaked from the former Bingham Creek reservoir. This model combines groundwater flow with the physical aspects of contaminant transport including advection, dispersion and chemical reactions. The transport model was calibrated to observed 1996-1997 sulfate concentrations down gradient of the former Bingham Creek reservoirs. Calibration was achieved by finding a set of transport parameters (i.e., retardation, dispersivity and porosity) within an



accepted range that reasonably reproduced field-measured concentrations. The model is believed to be a reasonable first approximation of the kinematics of the Bingham Creek and former evaporation ponds plumes and allows the feasibility of various remedial strategies to be tested.

Both the flow and transport models were extensively reviewed by USEPA, UDEQ, the USGS, the TRC and outside international and nationally - recognized reviewers.

## 6.2 Hydrogeology

**Groundwater Recharge.** The principal aquifer is recharged from surface infiltration of precipitation, irrigation water and canal water, bedrock inflow and to a limited extent surface infiltration of waters emanating from Butterfield Creek. The bedrock of the Oquirrh Mountains provides recharge to the groundwater in the western part of the southwestern Jordan Valley, and this groundwater then travels eastward into the basin. Aquifer recharge is greater in the eastern part of the southwestern Jordan Valley and in the Herriman area due to recharge from surface water.

**Groundwater Extraction.** Most of the water extracted from the principal aquifer is used for municipal or industrial purposes. A summary of extractions used in the modeling is included in Appendix A.

**Groundwater Elevation Changes.** The average depth below ground surface to the potentiometric surface of the principal aquifer in the southwestern Jordan Valley is about 235 feet. Groundwater flow is predominantly west to east from the base of the Oquirrh Mountains to the Jordan River. Groundwater elevations declined substantially throughout the southwestern Jordan Valley from 1986 to 1996. A noteworthy area of decline is in the region of the West Jordan City well field, to the north of the Affected Area. A description of recent groundwater elevation changes used in the modeling is included in Appendix A.

**Groundwater Velocity.** Average horizontal groundwater velocities have been estimated by KUCC to be about 550 feet per year. Isotopic analyses were conducted by KUCC to confirm this estimate. These analyses yielded a linear groundwater velocity estimate of 500-650 feet per year. A more complete discussion of these estimates and analyses is included in Appendix A.

### **6.3 Plume Contraction and Containment**

Using the groundwater flow and transport models, the region adjacent to KUCC production wells 1200 and 1193 and the West Jordan municipal well field was investigated using the following pumping parameters: West Jordan pumping 3600 afy, well 1200 at 1930 afy, well 1193 at 1930 afy, Lark sulfate well 1147 at 800 afy, and acid extraction wells (1146 and future wells) at 2020 afy. Zone B Deep Wells are pumped at 5085 afy. Based on these extractions, predictions can be made regarding the disposition of sulfate (Appendix D). The modeled extractions from the acid plume and Zone A are consistent with KUCC's current water rights.

The modeling runs suggest that the proposed containment and extraction system will be effective at keeping acidic and elevated sulfate (> 1500 mg/L) groundwater on KUCC property near the acid and sulfate extraction wells in Zone A. It also reduces sulfate concentrations throughout Zones A and B in the Affected Area (Figures 6.3A and 6.3B). These modeling runs also suggest that the ideal environment for sulfate containment and restoration of the aquifer involve West Jordan City limiting its well field pumping to less than 3,000 afy. This is close to the sustained yield of the aquifer in that area. KUCC and West Jordan are continuing to work together to optimize extraction amounts and investigate other mitigation technologies such as injection. See Appendix D for further detail on plume containment and remediation as well as potential regional drawdown from extraction.

Modeling of the additional extraction from Zone B proposed under the Integrated design results in negligible additional drawdown.

## **7.0 WATER RIGHTS AND MANAGEMENT WITHIN AFFECTED AREA**

### **7.1 Consent Decree Requirements**

The Consent Decree states that, "allocation of the right to use surface or groundwater resources by the public shall be by the Utah State Engineer pursuant to Utah water law." In order to obtain a credit against the ILC, the Consent Decree requires that groundwater be treated to municipal quality, and provided to a M&I water purveyor. It anticipates that municipal water rights will be used for Project groundwater extractions.

### **7.2 Water Rights in the Affected Area**

The only water rights approved for municipal use in the area, as of the date of the first version of this Proposal in December 1999 are shown in Table 7.2A.

<b>TABLE 7.2A</b>				
<b>Approved Municipal Water Rights in December 1999</b>				
Water Right Number	Owner	Priority Date	Flow Rate (cfs)	Potential Annual Withdrawal (AF)
59-1210	JVWCD	1955	3.55	850
59-1536	JVWCD	1959	5.0	3613
59-1572	West Jordan City	1960	1.0	723
59-1533	Riverton City	1959	1.25 <sup>(a)</sup>	903
<sup>(a)</sup> One of four points of diversion lies near the Affected Area.				

Since December 1999 KUCC has gained change application approvals for some of its industrial water rights to provide municipal supply in the JVWCD service area.

JVWCD has gained approval of various change applications for shallow groundwater rights near the Jordan River in the Affected Area. These are summarized in Table 7.2B.

<b>TABLE 7.2B</b>				
<b>Approved JVWCD Shallow Groundwater Rights</b>				
Water Right Number	Underlying Water Right Owner	Priority Date	Flow Rate (cfs)	Potential Annual Withdrawal (AF)
57-5513 (a23590)	JVWCD	1870	11.78	5000
59-5619 (a23711)	Utah & Salt Lake Canal Co.	1870	15.48	2882
59-3500 (a23622)	South Jordan Canal Company	1870	5.77	1205
59-5622 (a23863)	WJWUC/East Jordan Irrigation Company	1870	16.85	4797
59-3529 (a23486)	JVWCD	1870	5.3	31.5

The water rights listed in Table 7.2C have been approved by the State Engineer and will be utilized to supply feed water to the treatment plants.

Water Right Number	Owner	Annual Volume (AF)	Zone	Extraction Wells
59-1210 (a24623)	JVWCD	850	B	B6-8
59-1536 (a24622)	JVWCD	3613	B	B1-8 <sup>a</sup>
59-1535 (Pending)	JVWCD	625	B	B1-7
59-1653 (a26312)	KUCC	2896 <sup>b</sup>	A	1193, 1200, 1147, 1139, 1146, 1201
59-1042 (a26312)	KUCC	3214 <sup>b</sup>	A	1193, 1200, 1147, 1139, 1146, 1201
59-5314 (a26312)	KUCC	376 <sup>b</sup>	A	1193, 1200, 1147 and 1139, 1146, 1201
59-1671 (a25110)	KUCC	66.13	A	1147
59-1352 (a25109)	KUCC	136.45	A	1147

<sup>(a)</sup> JVWCD intends to correct the original 8 Zone B wells sites to the current 7 sites by means of a change application.

<sup>(b)</sup> Under water right change application a26312, which includes seven potential points of diversion, KUCC will also extract water from the acid wells (1146 and 1201) under the CERCLA response.

As indicated in Table 7.2C, JVWCD will be making an application to the State Engineer to transfer additional water rights into the Zone B area. This will enable JVWCD to proceed with the Integrated Design option for the Lost Use Facilities for the full 1235 afy, as described in the second option in Section 1.2. Preliminary evaluation by JVWCD suggests that the additional proposed extraction will not result in appreciable additional drawdown. JVWCD's application will provide information to the State Engineer regarding potential impacts to other water rights holders in the area. The water right change application will be open to public comment.

### **7.3 Proposal to the State Engineer Concerning Water Rights**

In August 1999, KUCC proposed to the State Engineer that certain restrictions be placed on future water development in the southwestern Jordan Valley to facilitate the NRD remedial process proposed here and to prevent further migration of existing contamination. These restrictions included:

- Completion depth and pumping rate restrictions on wells drilled within 3,000 feet south of the known 250 mg/L sulfate isoconcentration line in the Herriman area (Figure 4.1A).

- Completion depth and pumping rate restrictions on wells drilled within 3,000 feet north of the known 250 mg/L sulfate isoconcentration line in the West Jordan area (Figure 4.1A).
- Prohibition of new well development within the 250 mg/L sulfate isoconcentration line in the former KUCC evaporation pond area (South Jordan) until KUCC installs its NRD remediation and water supply and treatment systems, achieves hydraulic containment of the up-gradient groundwater plume, and the system reaches steady state and achieves a sulfate level in the area below 250 mg/L.

Appropriate completion depths and pumping rates would be determined on a case-by-case basis using the most recent information on location and depth of contamination, aquifer properties and user needs. KUCC would supply this information to the State Engineer and any water user upon request. The restricted area will shrink as remediation and natural attenuation reduce the size of the contaminated zone.

The practical aspects of this request were incorporated in the State Groundwater Management Plan issued by the State Engineer in 2002 (Appendix E). Specific details regarding groundwater management in the southwestern Jordan Valley are detailed in the plan.

KUCC is committed to assist property owners affected by KUCC remediation efforts in obtaining an adequate water supply by identifying alternative water sources, providing technical assistance in siting and completion of supply wells, and providing supplemental financing in cases where the presence of contamination causes an additional cost burden to the property owner.

## **8.0 COST ESTIMATES**

Table 7-2 in the CDM report shows the initial cost estimates for the Project. These estimates were updated as of October 2002 and again as of January 2004. Unless otherwise indicated the cost estimates used in Sections 8 and 9 of this Proposal are based on estimates as of January 2004. (Note, however that a number of the costs used in the Project Agreement continue to be stated in October 2002 dollars.) In addition, the cost estimates for the Zone B Facilities and Lost Use Facilities used in this Proposal assume that JVWCD proceeds with the Lost Use Facilities on an Integrated Design basis.

### **8.1 Capital Costs for Water Treatment**

The Zone A Plant and the Zone B Facilities are involved in deep groundwater extractions for the Project. This is the base project that was initially contemplated by

the State NRD Consent Decree. The Lost Use Facilities also may involve extractions from Deep Wells, as well as extractions from the shallow aquifer

As previously mentioned, additional design and cost estimates have been completed since the original CDM report. JVVCD retained the engineering firm of Carollo Engineers to perform membrane treatment pilot testing and to prepare a cost estimate for the Zone B component of the proposed Project. Table 9.0A summarizes the capital costs, for both the Zone A Plant and the Zone B/Lost Use integrated facilities

## **8.2 Concentrate Disposal Costs**

As indicated above, Zone A concentrates are to be disposed in KUCC's tailings impoundment. Zone B Deep Well concentrates also may be disposed in KUCC's impoundment if JVVCD so elects and certain conditions are satisfied. If the concentrates cannot be disposed in the impoundment for various reasons, such as permitting or after mine closure (estimated to occur in 2015-2030), it is anticipated the concentrates will be conveyed to the Great Salt Lake via a concentrate discharge line, provided the water chemistry at that time meets regulatory discharge limits. Bench scale testing of this alternative indicate that disposal of such concentrates to the Great Salt Lake is technically feasible without exceeding current KUCC UPDES discharge criteria or generating aesthetic issues due to low-density precipitates. If one or both of the concentrates is not suitable for direct discharge, then alternative disposal will be needed. If Zone B Deep Well concentrates are being managed through KUCC's operations, and an alternative disposal option is necessary, JVVCD and KUCC will share costs, subject to the cap on JVVCD's contribution specified in the Project Agreement, to develop the alternative disposal project based on the relative flows of each.

## **8.3 Operation, Maintenance and Replacement Costs**

Current operation, maintenance and replacement (OM&R) costs for the Zone A Plant and Zone B and Lost Use Facilities (assuming and Integrated Design) are summarized in Table 9.0A. The OM&R costs for Zone A Plant, Zone B Facilities, and Lost Use Facilities, constructed based on the integrated design are shown in Table 9.0A on a net present value (NPV) basis over a 40-year operational period.

## **8.4 Avoided Capital Costs**

The NRD Trust Fund was created to address contamination of groundwater that might otherwise have been developed for municipal purposes by M&I water purveyors. The Consent Decree contemplates that the water purveyor(s) receiving the Trust Fund benefits would pay the avoided cost of developing groundwater,

absent contamination. This is referred to as “cost of development without contamination” in Attachment 16 of the Consent Decree and as the “avoided” costs herein.

JVWCD has performed a more detailed estimate of this avoided capital cost of development without contamination than was provided in the Consent Decree. Figure 8.5A shows the location of four wells that would have been developed by JVWCD (to extract 7000 AF annually) if contamination had not been present. The location of JVWCD transmission pipelines, pump station and reservoir facilities throughout the Affected Area would have made this an efficient endeavor. Table 8.5A lists the assumptions, and provides the details for the avoided capital cost estimate. The estimated avoided capital cost was estimated as \$2.801 million in September 1999 dollars. This amount is indexed to January 2004 dollars, resulting in an estimate of \$3.413 million.

**TABLE 8.5A**

**Estimate for Avoided JWCD Capital Cost of  
Groundwater Development, Absent Mining Contamination**

September 1, 1999

1. Typical Well Drilling Cost Estimate:

Mobilize/Demobilize	1 LS	\$27,000
Special conditions	1 LS	\$6,480
Conductor casing	120 LF @ \$223	\$26,760
Drill 24" borehole	580 LF @ \$59.40	\$34,452
Geophysical logging	1 LS	\$2,700
Caliper survey	1 LS	\$1,080
Well installation:		
- 16" steel casing	500 LF @ \$41.28	\$20,640
- 16" well screen	200 LF @ \$183.34	\$36,668
- 2" gravel feed tube	300 LF @ \$4.32	\$1,296
Install gravel pack	500 LF @ \$32.40	\$16,200
Install annular grout seal	200 LF @ \$40.42	\$8,084
Initial well development	40 hr @ \$243	\$9,720
Install test pump	1 LS	\$4,235
Well development pumping	40 hr @ \$135	\$5,400
Well pump testing	34 hr @ \$135	\$4,590
Video camera survey	1 LS	\$1,945
Plumbeus/alignment testing	1 LS	\$1,080
Disinfection/capping	1 LS	\$1,570
Fluids/cuttings disposal	1 LS	\$2,700
<b>Total for typical well:</b>		<b>\$212,600</b>



## 2. Pump building and site improvements:

Land purchase	\$50,000
Mobilize/demobilize	\$15,060
Site improvements	\$15,000
Landscaping/irrigation system	\$20,800
Yard piping/structures	\$6,100
Pump building/architecture	\$43,420
Pump station mechanical	\$41,260
Supply/install pump/motor	\$41,800
Electrical systems	\$28,680
Instrumentation/controls	\$9,500
JVWCD RTU	\$12,000
Change orders	\$6,000
<b>Total for typical well:</b>	<b>\$289,620</b>

## III. **Summary of total project costs:**

Pipelines - 16,500 LF 10" PVC pipe at \$4.00/LF	\$66,000
Well drilling (4 wells)	\$850,400
Well equipping (4 wells)	\$1,158,480
<b>Subtotal:</b>	<b>\$2,074,880</b>
Engineering @ 25%	\$518,720
Contingency @ 10%	\$507,488
<b>Total Cost Estimate (rounded):</b>	<b>\$2,801,000</b>
<b>Total Cost Indexed to January 2004 Dollars:</b>	<b>\$3,413,000</b>

Notes:

Assumptions:

- 7000 AF per year extraction
- Constant flow over 330 days per year (this is equivalent to flow pattern from NRD project)
- Total flow rate = 10.7 cfs
- 4 wells, each at average flow rate of 2.7 cfs (1200 gpm)
- Average well depth of 700 feet
- Brick pump building and site improvements/landscaping at each well
- Discharge to existing JVVCD transmission system.
- Well drilling costs are based on JVVCD's 1997 1159 East 4500 South well drilling costs, plus 8%.

Facilities:

(See Figure 8.4A)

- Pump building/site improvement costs are based on JVVCD's 1998-1000 1159 East 4500 South Well costs, plus 4%.

## 8.5 Avoided Operating Costs

The Consent Decree (article V.D.2.b.i.) requires that avoided operating costs for groundwater development without contamination be paid to KUCC toward a KUCC-proposed project funded from the Trust Fund. These avoided operating costs are to be paid by the benefiting water purveyor(s). The Consent Decree sets this cost at \$49 per acre-foot in 1995 dollars. This cost is to escalate in accordance with the ENR "20 Cities" cost index. JWCD has calculated the net present value of this operating cost contribution for a 40-year period, assuming a seven percent discount rate. The net present value is calculated as \$2.834 million (in January 2004 dollars), as shown in Table 9.0A, for the Zone A Plant.

## 8.6 Total Cost Estimate

The total cost of the proposed Project is shown in Table 9.0A. In summary, the costs are as follows (in thousands of January 2004 dollars):

1. Zone A (Table 9.0A) –	\$41,823
2. Zone B/Lost Use Integrated Facilities (Table 9.0A) -	<u>\$51,450</u>
<b>Total</b>	<b>\$93,273</b>

These total Project costs do not include the costs of pilot testing and Zone A operating costs regarding the additional CERCLA response actions that KUCC has provided. They also do not include cost of land acquisition that has been expended by JWCD and KUCC or the easements that KUCC is providing to JWCD.

## 9.0 PROJECT FUNDING

Table 9.0A details the Project costs in January 2004 dollars. The various Project cost components are shown, including capital, O&M, and replacement. The O&M and replacement cost components are net present costs for 40 years of operation at a seven percent discount rate, based upon January 2004 dollars.

KUCC and JWCD propose that the Project be constructed, operated and maintained by means of funding from various sources. The allocation of these funding sources is shown in Table 9.0A. However, Table 9.0A is not intended to reflect the timing of funding disbursements for various components of the Project. The Project Agreement and State Agreement set forth the detailed arrangements for funding sources and timing of funding disbursements.

To date, KUCC and JWCD have funded membrane pilot testing, land acquisition and other activities in order to advance the Project. The following generally describes the stages of continued funding of the Project:

**Stage 1:**

KUCC will provide the capital costs for design and construction of the Zone A Plant and Zone B Facilities and advance a portion of the Lost Use Facilities.

**Stage 2:**

Design and construction of the Lost Use components of the Project will be funded largely from the cash portion of the Trust Fund, by means of scheduled monthly disbursements by the Trustee directly to JWCD. JWCD will then reach the "Complete and Operational" milestone for the Lost Use Facilities.

**Stage 3:**

When KUCC has compensated JWCD for Zone B construction costs equal to one-half of the Zone B ILC<sup>3</sup>, the Trustee will reduce the Zone B ILC by 50 percent and JWCD will commit to deliver to the Affected Municipalities 1750 afy of municipal quality water. Incremental increases in such compensations or disbursements will result in corresponding reductions to the Zone B ILC and increases in JWCD's commitments for water delivery. When KUCC has reimbursed JWCD for construction costs equal to the full amount of the Zone B ILC, the ILC will be reduced to zero and JWCD commitment to deliver water to the Affected Municipalities will be 3500 afy, whether or not the Zone B Facilities reach Complete and Operational.

**Stage 4:**

Upon reaching Complete and Operational status for the Zone A Plant the Trustee will reduce the Zone A ILC by 60 percent.

**Stage 5:**

KUCC will operate the Zone A Plant following the Complete and Operational milestone. JWCD will operate Zone B and Lost Use Facilities following the Complete and Operational milestone.

**Stage 6:**

KUCC will fund all OM&R expenses at the Zone A Plant. However, during the first five years of operation of the plant, the Trustee will annually release 15 percent of the remaining balance of the Zone A ILC for OM&R expenses, with a complete release at the end of five years. JWCD and KUCC will fund all OM&R expenses at the Zone B Facilities.

---

<sup>3</sup> The ILC held in the Trust Fund is to be divided into two ILCs for the Project – the Zone A ILC for the Zone A component and the Zone B ILC for the Zone B Facilities. See Section 13.4 below.

**Stage 7:**

The Trustee will release amounts from the cash portion of the Trust Fund directly to JVVCD annually for OM&R costs incurred by JVVCD in operating and maintaining the Lost Use Facilities until the cash portion reaches zero.

In addition to the capital, operating, maintenance and replacement costs contributed by KUCC and JVVCD, as shown in Table 9.0A, the following contributions of land and assets currently owned by KUCC and JVVCD, or to be acquired by JVVCD, will be made to the Project:

- Zone A treatment plant site owned by KUCC
- Zone A wells and sites owned by KUCC
- Zone A water rights for wells 1193, 1200 and 1147 owned by KUCC
- Zone B treatment plant site owned by JVVCD
- Zone B and Lost Use wells owned by JVVCD
- Zone B and Lost Use water rights owned by JVVCD
- Additional In-kind contribution by JVVCD includes use of its water storage and distribution system
- Additional in-kind contributions by KUCC include:
  - Use of its tailings slurry pipeline and impoundment for concentrate disposal
  - Acid plume well facilities and OM&R
  - Sulfate extraction well facilities and OM&R
  - Easements for JVVCD's concentrate disposal pipeline across KUCC land

**Table 9.0A**  
**Distribution and Funding of Project Cost (in thousands of January 2004 dollars)<sup>a</sup>**

Facility	Capital	Net Present Cost of 40 Year Operational Period		Funding Allocation			
		OM&R	Total	Trust Fund		KUCC	JVWCD
				ILC <sup>b</sup>	Cash <sup>c</sup>		
<b>Overall Project</b>							
Source control	138,205	31,159	169,364			169,364	
<b>Zone A:</b>							
Acid wells	4,804	7,363	12,167			10,646	
Sulfate well w/R/O wells							
Pilot testing	1,632		1,632				
RO feed wells	1,109	6,491	7,600				2,834 <sup>g</sup>
RO plant & pipelines	13,297	6,103	19,400				2,628 <sup>f</sup>
JVWCD process enhancement <sup>d</sup>	304	720	1,024				1,024
<b>Subtotal Zone A</b>	<b>21,146</b>	<b>20,677</b>	<b>41,823</b>	<b>24,691<sup>e</sup></b>	<b>0</b>	<b>10,646</b>	<b>6,486</b>
<b>Zone B/Lost Use Integrated Design:</b>							
Pilot testing	358		358			179	179
Land and R/W	934		934				934
RO plant	15,496	4,380	19,876			4,287	7,936
Pipeline and wells	23,556	5,958	29,514				785 <sup>i</sup>
Trustee admin expense <sup>h</sup>	815		815		815		
<b>Subtotal Integrated Design</b>	<b>41,159</b>	<b>10,338</b>	<b>51,497</b>	<b>24,691<sup>e</sup></b>	<b>12,412</b>	<b>4,466</b>	<b>9,834</b>
<b>Zone A and Integrated Design Totals</b>	<b>62,305</b>	<b>31,015</b>	<b>93,320</b>	<b>49,382</b>	<b>13,227<sup>j</sup></b>	<b>15,112</b>	<b>16,320</b>
<b>TOTALS</b>	<b>200,510</b>	<b>62,174</b>	<b>262,684</b>	<b>49,382</b>	<b>13,227<sup>i</sup></b>	<b>184,476</b>	<b>16,320</b>

Notes:

- a. Based on present cost, 10% contingency, 40 years operational period, and discount rate of 7%. Cost estimates (\$x1000) are based on latest designs (October 2002) and 2004 cost estimates from Kennecott and JVVCD/Carollo Engineering.
- b. Irrevocable letter of credit, worth \$28 million in 1995 dollars, to be replaced with Zone A ILC and Zone B ILC. January 2004 value: \$49,382,800.
- c. Cash portion of the Trust Fund, worth \$9 million in 1995. January 30, 2004 value: \$13,227,045.
- d. Improvements to RO Plant to produce water with TDS at 250 mg/L, rather than higher TDS allowed by Consent Decree, (from December 2000 Table 9.0A, indexed to January 2004 per ENR index. Pursuant to the Project Agreement, JVVCD will pay KUCC \$8.36 per AF for the first 70,000 AF to reimburse capital costs and \$12.30 per AF (October 2002 dollars indexed to ENR) to reimburse KUCC for OM&R costs.
- e. 50 percent of Letter of Credit value as of January 20, 2004.
- f. 75% of JVVCD avoided capital cost (75% of \$3.413 million, or \$2.628 million for groundwater development without contamination (see Section 8.4), at January 2004 value; amortized in Project Agreement over 20 years.
- g. JVVCD avoided O&M cost for groundwater development of 3,500 AF/yr without contamination - paid annually to KUCC (see Section 8.5). Cost is \$49 per AF in 1995 dollars, indexed to January 20, 2004 by ENR index.
- h. Fixed amount for Trustee administrative expenses.
- i. 25% of JVVCD avoided capital cost (25% of \$3.413 million) for groundwater development without contamination, at January 2004 value. See Section 8.4
- j. Value of cash trust fund in January 2004 dollars.

## **10.0 OPERATION, MAINTENANCE, REPLACEMENT RESPONSIBILITIES**

### **10.1 Zone A Plant**

KUCC will construct, own, operate, maintain and replace when necessary the following extraction wells:

1. Extraction wells 1193 and 1200 (the Zone A sulfate extraction wells)
2. Wells ECG1146 and 1201 (the “acid plume” extraction wells) and other acid wells to be drilled 5 to 15 years after initiation of Project to continue to capture acid plume.
3. Well LTG1147 located near 6200 West 11800 South (“the sulfate extraction well”).

The collection pipelines from the Project extraction wells to the Zone A water treatment plant, and the concentrate discharge pipeline (to KUCC’s tailings line) will be owned and operated by KUCC. The Zone A RO plant will be constructed in three phases over a period of two years. The three-phased approach of design and construction of the Zone A Plant through 2005 will allow KUCC to gain operating experience and reach a point of optimization in operational mode. The Zone A Plant and the treated water (permeate) delivery pipeline to the JVWCD system will also initially be owned and operated by KUCC. At KUCC’s discretion, the ownership, operations and/or maintenance of the Zone A Plant may be transferred to JVWCD or another entity at a future time.

### **10.2 Zone B/Lost Use Integrated Facilities (for Deep Groundwater Extraction)**

The facilities for extraction and treatment of water of Zone B deep groundwater on an Integrated Design basis will include seven extraction wells, collection pipelines, an RO treatment plant and related facilities at 1000 West 8300 South, a concentrate discharge pipeline to KUCC’s tailings impoundment, and a delivery pipeline to the JVWCD system. Following construction and startup testing, ownership of these facilities will remain with JVWCD. JVWCD will commit to operate, maintain and replace these facilities for at least 40 years thereafter. If JVWCD’s operation of the Zone B Facilities becomes infeasible due to changing drinking water regulations or discharge permits or any other reason, JVWCD will commit to continue delivering 3,500 afy of water, from its other sources, to the Affected Municipalities for the remainder of the Operational Period.

### **10.3 Lost Use Facilities (for Shallow Groundwater Extraction)**

If the Lost Use Facilities proceed on a Separate Design basis, these facilities will include shallow extraction wells, collection pipelines, RO and other membrane treatment facilities located in an enlarged treatment building (together with the Zone B deep groundwater treatment facilities) at 1000 West 8300 South, a concentrate



pipeline to the Great Salt Lake, and a delivery pipeline to the JWCD treated water transmission system.

Following initial construction and startup testing, ownership of these facilities will remain with JWCD. JWCD will then commit to operate, maintain and replace these facilities for at least 40 years. If JWCD's operation of the Lost Use shallow groundwater facilities becomes infeasible due to changing drinking water regulations or discharge permits or any other reason, JWCD will commit to continue delivering at least 1,235 afy of water, from its other sources, to the Affected Municipalities for the remainder of the Operational Period.

## **11.0 ALLOCATION OF PROJECT BENEFITS**

Half of the 7,000 afy of treated water from deep groundwater (3,500 afy) will result from KUCC's rights shown in Section 7.2. The 3,500 afy of treated water that is produced by the Zone A Plant will be allocated by JWCD to directly benefit the four incorporated communities in the Affected Area. These "Affected Municipalities" are: Herriman City, Riverton City, South Jordan City and West Jordan City. The benefit to the four Affected Municipalities will be in the form of a water supply at high elevation, with discounted water rates as further described hereafter in this Section.

Under this Project Proposal, JWCD will use its water rights to produce half of the 7,000 afy of water from Zone B Deep Wells that will be treated at the Zone B Facilities. In addition, it may use its Utah Lake/Jordan River rights for shallow groundwater extraction and treatment, as well as additional groundwater rights in the Zone B Deep Wells for treatment at the Lost Use Facilities. These treated waters will be reserved for the four Affected Municipalities during the entire 40-year Operational Period under wholesale contract water purchase agreements to be executed between those Affected Municipalities and JWCD. When not contracted for by the four Affected Municipalities, these waters will be available for the benefit of any of the member agencies and customers of JWCD (see Section 14 for further description of the rationale for this allocation).

JWCD has performed an analysis to derive the allocation of Zone A treated water benefits to the four Affected Municipalities. The factors considered in this evaluation were: 1) total population of each Affected Municipality; 2) area of each Affected Municipality within the overall Affected Area; 3) area of each Affected Municipality within Zone A of the Affected Area, and 4) 1999 approved municipal groundwater rights in the principal aquifer within the overall Affected Area, and within Zone A of the Affected Area. Tables 1 through 4 in Appendix F show methods 1-4 of comparing and evaluating these factors. The allocation percentages for methods 1-4 are summarized in Table 11.0A. An allocation of Zone A treated water benefits is also shown in Table 11.0A.

**TABLE 11.0A**

**Allocation of Zone A Treated Water Among Affected Municipalities<sup>(a)</sup>**

<b>Affected Municipality</b>	<b>Allocation (percent)</b>	<b>Maximum Annual Volume<sup>(b)</sup> (acre-feet)</b>	<b>Maximum Flow Rate<sup>(c)</sup> (MGD)<sup>(d)</sup></b>
West Jordan City	35	1225	1.21
South Jordan City	30	1050	1.04
Riverton City	20	700	0.69
Herriman City	15	525	0.52

**Notes:**

- <sup>(a)</sup> These allocations will be held for the Affected Municipalities for five years, based upon a notification by JWCD to the Affected Municipalities at the time of execution of Project Agreement. After the five year period, any of the Zone A waters that is not contracted for within the allocations shown above would be held for the four Affected Municipalities for Operational Period and would available for contract with any of the four Affected Municipalities.
- <sup>(b)</sup> Each Affected Municipality may purchase up to its allocated percent of the actual Treated Water Annual Volume produced by the Zone A Plant, which may not exceed the volumes of water shown in this column.
- <sup>(c)</sup> Each Affected Municipality may purchase up to its allocated percent of the actual Treated Water flow rates produced by the Zone A Plant, which may not exceed the flow rates of water shown in this column.
- <sup>(d)</sup> Million gallons per day.

These four communities show differences in population and area in the Affected Area. Other than JWCD's municipal water rights, only two currently approved municipal water rights, those of West Jordan City and Riverton City, lie within or near the Affected Area. Both of these lie at the extreme fringe areas, at the northeast and southern edges. KUCC and JWCD do not propose to require capital and operating cost contributions from these municipalities. However, their benefits will be subject to the following:

- West Jordan City will not develop its water right #59-1572 at a point of diversion closer than 2,000 feet from the Affected Area as defined in the Consent Decree during the Operational Period.
- Riverton City will apply to the State Engineer to move point of diversion No. 1 of its Water Right #59-1533 to the current location of its Garamandi well, located near 4000 West 12600 South. Riverton City will not move any point of diversion under Water Right #59-1533 to a location closer than 2000 feet from the Affected Area.

JWCD will hold the allocations shown in Table 11.0A open for the four Affected Municipalities for five years. To provide adequate time for Affected Municipalities to contract for Zone A water, JWCD will provide written notice no later than the date of execution of the Project Agreement stating when the lower cost Zone A water becomes available. The allocations will then be held open for five years. Thereafter, throughout the Operational Period, any Affected Municipality would be able to contract for any Zone A water amount not previously contracted for within the allocations.

JWCD proposes to provide benefits from treated water produced from Zone A Plant to the four Affected Municipalities by providing treated water deliveries at reduced water rates. JWCD will accomplish this by providing Zone A water to the four Affected Municipalities at less than its base wholesale rate, without surcharges for pumping or peaking. In spite of no pumping charges, this water would be provided at a storage elevation of at least 5,150 feet above sea level, in the JWCD pressure Zone C that normally includes pumping surcharges. The Zone A water will also be delivered, by agreement with KUCC in the Project Agreement, to an elevation of 5,350 feet above sea level, to allow for a future JWCD pressure Zone D.

For example, the 2002 wholesale water rates for JWCD pressure Zone C to West Jordan City, and South Jordan City are:

West Jordan City: \$329.45/AF  
South Jordan City: \$324.79/AF

During 2002 the estimated pressure Zone D wholesale price would be at least \$355 per acre foot.

In contrast, the 2002 JVVCD rate offered to the four Affected Municipalities would have been as shown in Table 11.0B.

<b>Table 11.0B</b>	
<b>Illustration of Discounted Wholesale Water Rate Methodology for Zone A Treated Water<sup>(a)</sup></b>	
<b>Water Rate Components</b>	<b>Unit Cost for 1999 (per AF)<sup>(g)</sup></b>
• JVVCD wholesale rate (without pumping or peaking surcharges) <sup>(b)</sup>	\$239.22
• Less JVVCD average water source unit cost	(\$142.49)
• Less JVVCD weighted average surface water treatment/wells O&M unit cost <sup>(c)</sup>	(\$34.62)
• Plus JVVCD “avoided operating cost” <sup>(d)</sup>	\$55.15
• Plus JVVCD additional O M&R cost to reduce TDS to 250 mg/L (Zones A and B average) <sup>(e)</sup>	\$25.48
• Plus JVVCD’s amortized capital contribution to the Proposal <sup>(f)</sup>	\$61.05
<b>Net Discounted Water Rate:</b>	<b>\$203.79</b>
<b>Notes:</b> <sup>(a)</sup> The illustration uses actual figures from 1999. <sup>(b)</sup> The wholesale rate is determined annually by JVVCD using its then current rate methodology. The methodology for calculating rates in 1999, 2000 and 2001 is the “Base-Extra Capacity Method” of the American Water Works Association, as interpreted and implemented by JVVCD . <sup>(c)</sup> Includes personnel, electricity, chemical, and equipment, calculated from the previous year. <sup>(d)</sup> As described in the Consent Decree, this is \$49 per acre-foot, in 1995 dollars, escalated at the ENR “20 Cities” cost index. <sup>(e)</sup> See CDM Report and Proposal. <sup>(f)</sup> \$4.9 million amortized at 6%, 20 years. Thereafter, this will become a replacement sinking fund contribution, at the amortized base, indexed to future years.	

The Zone A water will be made available at this reduced rate, as calculated each year by JVVCD under its then current wholesale water rate formulas and water rate study, by execution of water purchase agreements with the four Affected Municipalities. This water rate methodology will remain in effect for the Operational Period of 40 years. Appendix 4 of the Project Agreement fully explains the price methodology and conditions for the Zone A water.

Zone B and Lost Use treated water will also be reserved by JWCD for the Affected Municipalities throughout the Operational Period of 40 years. It will be made available through normal wholesale water purchase agreements with the Affected Municipalities. Appendix 4 of the Project Agreement fully explains the water rate methodology and other conditions for these water sales to the Affected Municipalities.

KUCC and JWCD met with city managers, technical staff and mayors of the four Affected Municipalities during September and October 1999. Upon invitation by the communities, KUCC, JWCD and city staff made presentations to the councils of Herriman City, South Jordan City, and West Jordan City during November 1999 and September 2003. KUCC and JWCD have held numerous subsequent meetings with officers and staff of the Affected Municipalities.

The Herriman City Council and the South Jordan City Council voted to endorse the Project during those meetings. Enclosed in Appendix G are the following: letters of endorsement from Herriman City and West Jordan City, the minutes from the South Jordan City Council meeting, and a letter expressing support for the Project and a desire for its allocation of reduced-price water from Riverton City.

## **12.0 SCHEDULE, DESIGN & CONSTRUCTION, FACILITIES OWNERSHIP**

### **12.1 Proposed Project Schedule**

Section 10 of the CDM conceptual design report recommended a schedule for pilot testing, design, construction, and startup/testing. Table 12.1A includes components of the schedule with other updates and project elements shown. Completion of construction would be accomplished by December of 2005 for Zone A and December 2008 for Zone B based on the latest available estimates and schedules associated with this Project. The schedule shown in Table 12.1A is conditioned upon:

- State Trustee and staff evaluation completed - June 2004.
- Trustee approval of Project (and execution of agreements) - July 2004

Any delay in any of the above referenced milestone dates (as well as any delay in the activities mentioned in Table 12.1A) will create a corresponding delay in the overall project schedule.

<b>TABLE 12.1A Proposed Project Schedule</b>		
<b>Activity</b>	<b>Completed By</b>	
	<b>Zone A</b>	<b>Zone B</b>
Land purchases by KUCC and JWCD	Sep. 2000 ✓	July 2005
USEPA remedial Project manager evaluation	Dec. 2000 ✓	Dec. 2000 ✓
USEPA Record of Decision	Dec. 2000 ✓	N/A
State Engineer change application approvals	April 2003 ✓	Jan. 2003 ✓
State Trustee and staff evaluation	June 2004	June 2004
State Engineer evaluation of Proposal	July 2003 ✓	July 2003 ✓
State public hearings	Aug-Nov 2003 ✓	Aug-Nov 2003 ✓
Trustee approval of Project Proposal	July 2004	July 2004
Execution of Project Agreement and State Agreement	July 2004	July 2004
Preliminary design	2004	2005
Final design	2004	2006
Division of Drinking Water approval	2004	2006
Award construction contracts	2004	2006
Complete construction	2005	2008
Startup, testing, begin operation, reach C & O status	2006	2009
Deliver Treated Water to Public	2006	2010
<u>Notes:</u> ✓ = Completed N/A = Not applicable		

## 12.2 Design

The design work would be performed by, or commissioned and managed by the parties shown in Table 12.2A, with oversight from UDEQ and USEPA:

<b>TABLE 12.2A Design Responsibility</b>	
<b>Project Component</b>	<b>Designed By</b>
Zone A Extraction Wells	Existing/KUCC
Zone A Plant	KUCC
Zone A Concentrate Pipeline	KUCC
Zone A Treated Water Discharge Pipeline	KUCC
Zone B/Lost Use Deep Extraction Wells	JVWCD
Lost Use Shallow Wells	JVWCD
Zone B/Lost Use Facilities	JVWCD
Zone B/Lost Use Concentrate Discharge Pipeline	JVWCD
Zone B/Lost Use Treated Water Discharge Pipelines	JVWCD

### 12.3 Construction

Construction may be performed, through contractors, by the same parties that performed the design work shown in Table 12.2A. The same parties will perform startup and testing and begin operations.

### 12.4 Facilities Ownership

Ownership of facilities would be as shown in Table 12.4A.

<b>TABLE 12.4A Ownership of Facilities for Proposed Project</b>	
<b>Project Component</b>	<b>Owned By</b>
Zone A Extraction Wells	KUCC
Zone A Plant	KUCC
Zone A Concentrate Pipeline	KUCC
Zone A Treated Water Discharge Pipeline to Meter	KUCC
Meter to Pressure Zone C or D reservoir	JVWCD
Zone B/Lost Use Deep Extraction Wells	JVWCD
Lost Use Shallow Wells	JVWCD
Zone B/Lost Use Facilities	JVWCD
Zone B/Lost Use Deep Well Concentrate Discharge Pipeline	JVWCD
Zone B/Lost Use Treated Water Discharge Pipeline	JVWCD

## **13.0 LIABILITY AND AGREEMENTS**

### **13.1 Liability**

KUCC has certain CERCLA liabilities in remedial actions for contaminated groundwater. KUCC will defend, indemnify and hold JWCD harmless from environmental claims relating to existing contamination as described in the Consent Decree and RI/FS, the feed water for and its treatment at the Zone A Plant before it becomes permeate delivered to JWCD, and concentrates KUCC disposes. The indemnity does not apply to claims that arise from JWCD's own gross negligent or intentional wrongful actions, among other claims.

### **13.2 Contract Mileposts**

The following mileposts are important in the agreements for the Project:

- Complete and Operational - This milepost will be reached for each treatment plant and associated facilities when the plant operator has received an operating permit from the Utah Division of Drinking Water, the operator has notified the Trustee that the facility is Complete and Operational, and the Trustee has provided the notice required by the State Agreement..
- Operational Period - 40 years following the Complete and Operational status date for each plant

### **13.3 KUCC/JWCD Agreement (“The Project Agreement”)**

KUCC and JWCD have negotiated a Project Agreement to govern their relationship and obligations during the design, construction, and Operational Period of components of the Project. In general, the Project Agreement includes the following provisions:

- KUCC will design, construct, operate and maintain the Zone A Plant and associated facilities for the Operational Period of the plant. JWCD will deliver the treated water from the Zone A Plant to the Affected Municipalities for the Operational Period.
- JWCD will design, construct, operate and maintain the Zone B and Lost Use Facilities. JWCD will deliver the requisite amount of water from such facilities or alternative sources to the Affected Municipalities for 40 years.
- KUCC has advanced certain capital funds during the right-of-way acquisition and pilot testing phases of the Project. KUCC will advance additional capital funds



for the design and construction phases of the Project. These arrangements are further described in the Project Agreement, and are partially reflected in Table 9.0A.

- JWCD will pay to KUCC the “avoided OM&R costs” for 3500 afy of Zone A treated water at a price defined in the Consent Decree. (See Section 8.5.) JWCD will also pay to KUCC its “avoided capital cost” of developing groundwater, absent contamination, in the Affected Area. (See Section 8.4)
- JWCD is responsible for supplemental capital funds (if any) and O M&R funds, to construct and operate the Zone B and Lost Use Facilities.
- Concentrate disposal is also addressed, as more fully discussed under Section 5.6 of this Proposal.

#### **13.4 KUCC/JWCD Agreement with the State of Utah (“The State Agreement”)**

KUCC and JWCD have negotiated an agreement with the State of Utah to implement the Project. The State Agreement includes provisions for replacement of the Trust Fund irrevocable letter of credit with two irrevocable letters of credit (the Zone A ILC and Zone B ILC) to be reduced in exchange for (a) KUCC’s agreement to construct, operate and maintain the Zone A Plant and fund the construction of the Zone B Facilities, and (b) JWCD’s agreement to construct, operate and maintain the Zone B and Lost Use Facilities, or alternative sources, in each case in order to provide municipal quality water to the Affected Municipalities.

The Zone A ILC will be reduced in capital and OM&R phases. The State Agreement provides for a 60 percent reduction of the Zone A ILC for capital expenditures upon reaching “Complete and Operational” status. At that time, KUCC commits to deliver 3500 afy of treated water for the Operational Period. The remaining 40 percent of the Zone A ILC, representing OM&R, is released at 15 percent annually over the next four years with the remainder released in the fifth year.

The Zone B ILC will be reduced by 50 percent when KUCC has compensated JWCD for Zone B construction costs equal to one-half of the Zone B ILC. At that time, JWCD commits to deliver to the Affected Municipalities 1750 afy of water for 40 years. Further reductions to the Zone B ILC will occur consistent with increases in compensation made by KUCC and increases in JWCD’s commitments for water delivery. The Zone B ILC will be reduced to zero when KUCC has compensated JWCD for construction costs equal to the full amount of the Zone B ILC. At that time, JWCD’s commitment to deliver water to the Affected Municipalities will be 3500 afy for 40 years, whether or not the Zone B Facilities reach Complete and Operational status.

The State Trustee will release defined amounts of the cash portion of the Trust Fund directly to JVVCD during its design, construction, operation and maintenance of the Lost Use Facilities. Whether or not the Lost Use Facilities are Complete and Operational, JVVCD's commitment to deliver water to the Affected Municipalities will be 1235 afy for 40 years, JVVCD will provide additional OM&R funds to operate the Lost Use Facilities throughout the Operational Period, after the cash portion of the Trust Fund has been exhausted.

## **14.0 ZONES A AND B RATIONALE**

### **14.1 Zone A**

The groundwater in Zone A contains both elevated sulfate (NRD) and acid (CERCLA) contamination, with sulfate concentrations mainly above 1500 mg/L and acidic water containing elevated heavy metal concentrations. KUCC has designed a hydraulic containment system to contain and extract the acid and the elevated sulfate plumes as detailed below (see Appendix B for scope of CERCLA remedy).

The containment system will consist of acid extraction wells in the core of the acidic plume, and sulfate barrier wells 1193 and 1200. The extracted sulfate water will be treated by a reverse osmosis membrane-filtration plant located on KUCC property. Concentrate reject from the reverse osmosis treatment process will be placed in the KUCC tailings line. Extracted acidic water also will be routed to the tailings line for neutralization by the tailings. If the tailings do not contain sufficient neutralization potential, supplemental lime will be added to the tailings. The resulting neutralized water will be recycled through the tailings impoundment for use at the Copperton Concentrator. (An alternative approach will be developed if this plan for managing concentrate streams becomes infeasible, see Final Remedial Design, Appendix A, for analysis of conceptual options.) Figures 6.3A and 6.3B show the potential layout of the extraction wells and the model-computed distribution of sulfate concentrations in 2025 and 2050 based on this scenario (see also Appendix D).

The Bingham Creek sulfate plume would be pumped at approximately 2000 gpm and the acid plume at approximately 1500-2000 gpm. The total extraction rate of a maximum of 4000 gpm is approximately the sustained yield of the principal aquifer in the Bingham Creek area. The pumping rate of the acid plume is well above the rate required by the NRD Consent Decree (250 gpm or 400 afy average over a five-year period) in order to remove the main mass of the acid plume as quickly as possible and extend the time in which the sulfate containment system can extract sulfate at levels below 2000 mg/L. The extraction of 2000 gpm from the sulfate extraction wells plus another potential 1000 gpm from the Lark sulfate well has been modeled to yield at least 3500 afy of municipal quality water after RO treatment.

KUCC will utilize its existing industrial groundwater rights (part of which have been converted to municipal water rights) to extract groundwater from this zone for treatment and will deliver 3500 afy of treated, deep groundwater to the JWCD, who will make the water available to the cities of Herriman, Riverton, South Jordan and West Jordan.

The rationale for JWCD receiving and distributing these waters is as follows:

- JWCD owns all of the currently approved municipal groundwater rights in Zone A
- The Consent Decree requires that the public in the Affected Area receive benefits from the Trust Fund
- JWCD has existing infrastructure to distribute Zone A water to the four Affected Municipalities. This provides an efficiency and economy of scale to the proposed Project
- JWCD's existing infrastructure will allow the public in the Affected Area to obtain the benefits of the Trust Fund and the M&I water
- JWCD has current wholesale water delivery contracts and relationships with West Jordan, South Jordan and Riverton cities (see Table 14.1A). JWCD serves retail connections in Herriman, and has held discussions with Herriman City regarding near future wholesale water deliveries from the JWCD

South Jordan City	8675
West Jordan City	10,400
Riverton City	620
Herriman	1000

## **14.2 Zone B**

Groundwater in Zone B is the majority of the "sulfate plume," with sulfate concentrations lower than those in Zone A. JWCD will utilize its existing municipal groundwater rights in the Affected Area to extract principal aquifer groundwater for treatment, will receive the 3,500 afy of treated, deep groundwater, and will make that water available to all of its member agencies, including the four Affected Municipalities. This water will be reserved for the four Affected Municipalities, throughout the Operational Period, if they desire to execute wholesale water contracts to purchase this water from the JWCD.

The basis for JWCD treating and delivering these waters, and making them available to all of its member agencies until the Four Affected Municipalities contract for them, includes the following issues:

- JWCD owns 79 percent of the currently approved municipal groundwater rights in the Affected Area.
- These JWCD groundwater rights are assets that belong to all of the member agencies of JWCD throughout Salt Lake County.
- JWCD has the existing infrastructure to convey Zone B treated groundwater throughout Salt Lake County to benefit the member agencies that jointly own the JWCD municipal groundwater rights. These member agencies have paid for the construction of infrastructure to serve Zones A and B.
- JWCD has contributed valuable information and guidance during Consent Decree negotiations and technical review oversight of the RI/FS process.
- JWCD is willing to utilize its Utah Lake/Jordan River rights to accomplish the Trust Fund purpose to “replace, restore or provide the equivalent” of the groundwater from the Affected Area lost as concentrate streams from membrane treatment processes in both Zones A and B, by providing Lost Use water.
- JWCD has the expertise and staff to operate and maintain project facilities in an efficient manner.
- West Jordan, South Jordan, Riverton, and Herriman cities are member agencies of JWCD, and can receive Zone B water.

## **15.0 MEETING INTENT OF NRD CONSENT DECREE**

The following table summarizes the intent of the NRD Consent Decree and delineates the features of this Proposal that meet this intent.

**TABLE 15.0A  
Intent of NRD Consent Decree**

<b>Actions</b>	<b>CD Sect.</b>	<b>Response</b>	<b>Date</b>	<b>Meets Intent</b>	<b>Comments</b>
RI/FS	V.A.	Completed by KUCC	1998	Yes	Reviewed and approved by USEPA and TRC; ROD issued in 2000.
Acid Well	V.B.	Completed by KUCC	1997	Yes	Currently 1100 AF pumped. Meets pumping criteria.
Source Control	V.C.	Completed by KUCC	1997	Yes	Eastside Collection system permitted under UGWDP.
Trust Fund	V.D.1	Paid by KUCC	1995	Yes	Trust Fund established with \$9 million cash and \$28 million ILC, (valued at \$13 million and \$49 million as of January 2004.)
Restoration of aquifer, including solid phase contamination	V.D.1	Extraction of sulfate and acid	1997	Yes	Installed sulfate and acid wells have removed 58,000 tons of sulfate since August 1997; this Proposal will continue process perpetually.
Replace water	V.D.1	This Proposal	2004	Yes	Will produce 7000 AF of water annually from Affected Area; and will produce 1235 AF/yr to replace lost concentrate, as "Lost Use" portion of the project.
Acquire equivalent	V.D.1	N/A	N/A	N/A	The Trust Fund will only be expended to restore, replace, or acquire the equivalent of the surface or ground water resources for the benefit of the public in the Affected Area.
Treatment	V.D.2b	This Proposal	2004	Yes	Treatment system described.
Accepted by M&I Purveyor- with water right put to beneficial use	V.D.2bi	This Proposal	2004	Yes	3500 afy water to be accepted by JWCD, a purveyor of M&I water. Both KUCC and JWCD are supplying water rights for municipal purposes.
Prevent and Replace Spread of Contamination	V.D.2bii	This Proposal	2005-2045	Yes	See section 6.3 of Proposal.
Sustainable water supply for 40 years	V.D.2bii i	This Proposal	2005-2045	Yes	See section 6.1 of Proposal.
Does not materially increase unit cost to produce remainder of 7000 afy	V.D.2biv	This Proposal	2005	Yes	This Proposal will produce all of the 7000 AF/yr, within the Trust Fund amount. Also supplies 1,235 afy for Lost Use.
Beneficial Use	V.D.5	This Proposal	2005	Yes	JWCD agencies benefit; specifically those in affected area. KUCC water rights converted to municipal use.
Restore, Replace, Acquire the Equivalent	V.D.4	This Proposal	2010	Yes	JWCD provides 3500 AF/yr - Zone B