

**WORK PLAN**  
**GEOHERMAL TEST FACILITY**  
**BRINE POND REMOVAL**

(HQ VERSION)



**ENVIRONMENTAL RESTORATION DIVISION**  
**REVISION - 0**  
**SEPTEMBER 19, 1995**

## GEOHERMAL TEST FACILITY (GTF)

### BRINE POND WORKPLAN

#### (HQ VERSION)

This Workplan for the GTF Brine Pond consists of a summary of findings, Milestone Plan (Appendix A), a Limited Feasibility Study (Appendix B), and a Budget Plan (Appendix C). The bulk of the technical data in this Workplan is contained in the Limited Feasibility Study (LFS). This data includes site history, analytical results from samples taken from the brine pond, and cleanup alternatives.

The LFS was performed in 1992 by Bechtel Environmental, Inc. for Battelle under contract with the Department of Energy. The LFS report evaluates a range of distinct management alternatives which can prevent or control waste migration. The LFS also includes the final field investigation report which presents the findings of the field investigation conducted within the pond area. The LFS requires updating, as illustrated in the Milestone Plan. Specifically, costs associated with each option have escalated and should be updated. Additionally, although the LFS recommends the excavation and removal of the Brine Pond residues and disposal at an offsite Class II facility, due to the low risk of this facility and Federal budget reductions, we currently believe Alternative 2 or a modified version thereof is a viable option if acceptable to the RWQCB. Water balance calculations performed using an EPA method predict that, under existing conditions (i.e., in the absence of any remedial action), leachate generation would be negligible and any produced would not migrate to the underlying aquifer. Additional risk analysis may be performed, as requested by the RWQCB, to verify the conclusions that have been reached in the LFS. The updating of the LFS includes determination of a final cleanup option for implementation.

Although the LFS is relatively complete some additional data needs to be collected. Specifically, sampling has not been completed under the 10 mil liner that was installed to contain brine residues. This sampling as well as a review for additional data gaps will be completed as shown in the Milestone Plan.

As a remedial technology has not been selected and will be negotiated with the RWQCB, this workplan does not include specific information of how the remediation will be completed. This workplan will be developed as shown in the Milestone Plan (Appendix A), after additional data has been collected and preliminary discussions with the RWQCB have been completed. The dates proposed in the Milestone Plan and cost shown in the Budget Plan (Appendix C) are contingent upon and assume receipt of congressional funding necessary to support such activities. Additionally, these dates and costs are based on the assumption that no additional contamination will be discovered beneath the brine pond liner.

## LIMITED FEASIBILITY STUDY (LFS) SUMMARY

The former brine holding pond is roughly square and covers an area slightly greater than 6 acres. An 8 foot high soil berm surrounds the pond which varies between 6 and 9 feet deep. A 4- to 8- inch layer of brine sludge remains in the pond. The brine layer is underlain by a 6- to 9- inch protective sand layer over a 10-mil PVC line. No free-standing water is present in the pond. The brine residues are moist with the consistency of a plastic clay below the first 2 to 4 inches, which are typically dry and brittle.

Analytical data indicated that the brine pond residues are not a hazardous waste under the Resource Conservation and Recovery Act (RCRA). Residue samples taken during the field investigation did not exhibit any characteristics of hazardous wastes (i.e., ignitability, corrosivity, toxicity, reactivity). Further, wastes that are listed under 40 CFR Part 261 as hazardous waste are not present at the site. Accordingly, the requirements under RCRA Subtitle C (and the implementing regulations at 40 CFR Part 260 *et seq.*, including land disposal restrictions) are not applicable. The residues also did not exhibit characteristics of hazardous waste under California regulations.

Based upon the hydrogeologic information presented in the report (see Sections 1.2.4 and 1.2.5), water quality in the underlying aquifer is of poor quality because of upward recharge from both the deep geothermal aquifer and the intermediate geothermal aquifer. Water balance calculations performed using an EPA (1975) method predict that, under existing conditions (i.e. the absence of any remedial action), leachate generation would be negligible and any produced would not migrate to the underlying aquifer (see Tables 4-2, 4-3, and 4-4).

Alternative cleanup actions include:

- Alternative 1 - No action.
- Alternative 2 - Capping of residues in-place using berm fill.
- Alternative 3 - Onsite containment.

Alternative 3A - Placement of the excavated brine residues in an unlined but capped waste management unit constructed onsite.

Alternative 3B - Placement of the excavated brine residues in a lined and capped waste management unit constructed onsite.

- Alternative 4 - Excavation and removal offsite of the residues with disposal in a Class II facility.

A brief summary of each alternative is presented in the following paragraphs.

Alternative 1, no action, would result in no changes in current practices at the site. There are no remedial action costs associated with the selection of this alternative.

Alternative 2, Capping of residues in-place using berm fill. This alternative employs soil capping as a physical containment technology. the primary benefit of this alternative is the establishment of a physical barrier against human contact with the waste and natural weathering and erosion of the waste. A secondary benefit of this alternative is a significant reduction in the volume of precipitation that may contact the brine waste. Some precipitation would be stored in the soil cover placed over the waste.

Major actions taken as part of this remedial alternative would include excavation 12,000 cubic yards (cy) of berm fill to place as soil cover, installing a boundary perimeter fence, and installing four monitoring wells. Placing the berm fill as cover over the waste would restore the final grade of the pond to the pond area. Water balance calculations have indicated that the generation of leachate is highly unlikely, however; monitoring wells may be used to track the quality of the underlying aquifer. The total present worth of this alternative, including a 20-year period of operation, maintenance for the cap, and groundwater sampling, is approximately \$860,000. Monitoring would continue for the life of the closure. The actual frequency of monitoring would be established through consultation with the RWQCB.

Alternative 3A, Placement of the excavated residues in an unlined waste management unit with a landfill cover constructed onsite. This alternative (similar to Alternative 2) employs soil capping with the intent of establishing a physical barrier to prevent human contact with the waste, prevent wind erosion of the waste, and reduce the volume of precipitation that may contact the waste. The cap would consist of a soil cover underlain by a synthetic drain layer placed over a synthetic, impermeable geomembrane liner. The soil cover, under typical conditions, would retain almost all precipitation (as discussed under Alternative 2). Precipitation in excess of soil storage capacity would move down through the cap, be captured by the drainage layer overlying the geomembrane liner, and drained away from the unit.

Action to implement this alternative would include excavation and placement of 9,000 cy of waste into the northern side of the pond, excavation and placement of 4,000 cy of berm fill over the waste and of 8,000 cy of berm fill over the remainder of the pond area, installation of the synthetic drainage layer and geomembrane, and installation of a boundary perimeter fence. Over most of the pond area, the final grade of the capped area would be near the present site grade. In the capped area, the slope would vary from 3 to 10 percent. The total present worth of this alternative, including a 30 year period of operation and maintenance for the cap and groundwater sampling, is approximately \$1.36 million. The actual frequency of monitoring for the life of the closure would be established through consultation with the RWQCB.

Alternative 3B, Placement of the brine residues into a lined and capped waste management unit. Implementation of Alternative 3B would include construction of the landfill cover described for Alternative 3A with the addition of a liner system placed at the bottom of the landfill to completely isolate the brine residues from the environment. The liner system would consist of a leachate collection system, a primary synthetic liner, a leak detection system (groundwater monitoring wells), and a secondary composite liner of clay and synthetic material. The total present worth of this alternative is approximately \$2.66 million. As noted for Alternatives 2 and 3A, the actual frequency of monitoring for the life of the closure would be established through consultation with the RWQCB.

Alternative 4, Excavation and removal of residues with disposal in an offsite Class II facility. This alternative involves excavation and removal from the site of all the brine residues and material within the former pond. Berm fill would be placed within the excavation and amended with imported fill to restore the pond to near the present site grade. Excavated material would be transported to an offsite Class II landfill. The total present worth of this alternative is approximately \$1.93 million.

Alternative 4 appears to represent the most effective, long term and easily implementable alternative based on the apparent preference of the local RWQCB and surrounding geothermal operators for off site disposal, the requirements of the existing Waste Discharge Requirement order (1989) the current classification of the brine residues as designated wastes, and the pending interpretation of the local RWQCB of state regulations.

However, Alternative 2 may be accepted by the regulatory agencies to be in compliance with the intent of regulations for protecting the existing waster quality of the state. Furthermore, Alternative 2 is about half the cost of Alternative 4. Therefore, it may represent an additional option.

## APPENDIX A

### MILESTONE PLAN (MP)<sup>1</sup>

FY95:

- 9/15/95 Provide response to 6/23/95 Water Board letter: submit MP and LFS
- 10/24/95 Meet with Water Board to discuss project status (approximate date)

FY96:

- 10/20/95 Proposals due, competitive procurement for cleanup contractor
- 10/24/95 Begin negotiating remediation plans/Corrective Measures Study with Water Board<sup>2</sup>
- 11/15/95 Complete proposal evaluations
- 11/17/95 Competitive range determination
- 12/15/95 Source Evaluation Board Report due
- 1/3/96 Contractor competitive selection
- 2/27/96 Definitive award, issue contract
- 3/22/96 Provide Statement of Work/task contractor for FY96 characterization work<sup>3</sup>
  - Brine pond additional characterization
  - Brine pond risk assessment (alternative to option 4)
  - Asbestos removal
  - Sampling of septic system and laboratory drain lines
- 6/1/96 Review and Analyze current site brine pond data and determine data gaps
- 7/1/96 Provide workplan for brine pond additional characterization
- 8/1/96 Provide workplan for septic system and laboratory drain lines
- 9/30/96 Complete additional brine pond, septic system and laboratory drain lines characterization
- 9/30/96 Update Limited Feasibility Study
- 9/30/96 Submit detailed regulatory workplan for remediation
- 9/30/96 Complete Plan for asbestos removal

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<sup>1</sup> Assumes FS option 4, offsite disposal.

<sup>2</sup> Subject to Water Board completion of their review of Final MP and FS

<sup>3</sup> Subject to award date for competitive contract

FY97:

- 10/1/96 Provide funding for FY 97 cleanup activities
- 10/1/96 Begin asbestos remediation
- 11/1/96 Negotiate Final Remediation Plan with Water Board
- 12/1/96 Complete asbestos remediation
- 12/1/96 Initiate site remediation (brine pond, septic system, laboratory drain lines).
- 9/30/97 Complete site remediation

**APPENDIX B**  
**(previously submitted to Headquarters)**

**Limited Feasibility Study**

**Remedial Activities at  
U.S. Department of Energy's  
Former Geothermal Test Facility  
Near El Centro, California**

**August 12, 1992**

**Prepared for  
Department of Energy  
San Francisco Field Office  
under Contract DE-AC06-76RLO 1830**

**Environmental Management Operations  
Operated for the U.S. Department of Energy  
by Battelle Memorial Institute**



## APPENDIX C

### GEOHERMAL TEST FACILITY

#### BUDGET PLAN

September 14, 1995

(Assumes Limited Feasibility Study Option #4)

FY96:

- 6/1/96 Review and Analyze current site brine pond data and determine data gaps (\$40K)
- 7/1/96 Provide workplan for brine pond additional characterization (\$40K)
- 8/1/96 Provide workplan for septic system and laboratory drain lines (\$20K)
- 9/30/96 Complete additional brine pond, septic system and laboratory drain lines characterization (\$280K)
- 9/30/96 Update Limited Feasibility Study (\$40K)
- 9/30/96 Submit detailed regulatory workplan for remediation (\$50K)
- 9/30/96 Complete Plan for asbestos removal (\$30K)

1996 SUBTOTAL \$500K

FY97:

- 12/1/96 Complete asbestos remediation (\$50K)
- 9/30/97 Complete site remediation (\$2.7 million)<sup>4</sup>

1997 SUBTOTAL \$2.750 M

TOTAL PROJECT COST \$3.250 M

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<sup>4</sup> Assumes no contamination found under liner., and no contamination from septic system or laboratory drain lines. Calculated using 1992 estimate for FS option 4 for brine pond only and adding approximately 25% for 5 years escalation.