GEI Consultants, Inc.

SUPPORT FOR SELECTION OF THE CONTINGENCY CLEANUP PLAN
SOURCE CONTROL REMEDY

O'CONNOR COMPANY SUPERFUND SITE
AUGUSTA, MAINE

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TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1. OVERVIEW AND SUMMARY

On September 27, 1989 the U.S. Environmental Protection Agency (EPA), with concurrence from the Maine Department of Environmental Protection (MDEP), issued a Record of Decision (ROD) for the O'Connor Superfund Site selecting solvent extraction of contaminated soils greater than 1 ppm total polychlorinated biphenyls (PCBs) or 1 part per million (ppm) total carcinogenic polycyclic aromatic hydrocarbons (cPAHs).

After three years of pre-design studies including bench and pilot-scale treatability tests of solvent extraction, the EPA, with concurrence from the MDEP, issued an Explanation of Significant Differences (ESD) on July 11, 1994. The ESD retained solvent extraction as the preferred treatment method for materials contaminated with PCBs and cPAHs at the Site, however, the target cleanup goals were adjusted to 10 ppm total PCBs and 10 ppm total cPAHs.

The ESD also acknowledged the unproven nature of full-scale solvent extraction and difficulty in treating the clayey soils at the Site and a Contingency Cleanup Plan was incorporated in the ESD. The Contingency Cleanup Plan specifies excavation and off-site landfilling of materials without treatment if EPA and Maine DEP determine full-scale implementation of the solvent extraction source control remedy is not feasible.

From July 29, 1994 through June 28, 1995, CMP proceeded with Source Control Remedial Design employing solvent extraction treatment. Design analyses identified significant technical and administrative implementation difficulties with anticipated full-scale implementation of solvent extraction at the Site. In addition, in April 1995, CMP received final bids from two solvent extraction vendors which were significantly higher than cost estimates previously prepared for the project. Preliminary bids were also received in April 1995 from remedial action contractors, waste disposal facilities, and off-site laboratories which also showed greater cost estimates in many of the remedial requirements necessary to support the implementation of solvent extraction.

In June 1995, CMP transmitted detailed cost estimate information to EPA and Maine DEP to demonstrate the significant escalation in cost to implement the solvent extraction remedy. On June 28, 1995, with EPA's concurrence, CMP suspended 95 percent Remedial Design for the solvent extraction remedy and asked EPA to consider invoking the Contingency Cleanup Plan.

As requested by EPA on June 28, 1995, CMP presents this report to provide supporting documentation which demonstrates that full-scale implementation of solvent extraction at the

O'Connor Company Superfund Site is not feasible. CMP requests EPA's and DEP's concurrence with this determination and that the Contingency Cleanup Plan for the Site, in accordance with the Explanation of Significant Differences (ESD) signed on July 11, 1994, be invoked.

The Contingency Cleanup Plan is consistent with the statutory requirements in the National Contingency Plan (NCP) since it is protective of human health and the environment and will meet all Applicable or Relevant and Appropriate Requirements (ARARs). This report comprises the following sections:

- Section 2 - Infeasibility of solvent extraction;
- Section 3 - Summary of experience at other Superfund sites; and
- Section 4 - Detailed evaluation of the Contingency Cleanup Plan.

The NCP, EPA's Guidance on conducting Remedial Investigation and Feasibility Studies under CERCLA, EPA/540/G-89/004 (RI/FS Guidance), and EPA's Guidance on Remedial Actions for Superfund Sites with PCB Contamination, EPA/540/G-90/007 (PCB Guidance) were used in preparing this report.

2. INFEASIBILITY OF SOLVENT EXTRACTION

2.1 Introduction

The ESD stated that the Contingency Cleanup Plan could be invoked if EPA and DEP determined that full-scale implementation of solvent extraction was not feasible. The following subsection describes how solvent extraction treatment of contaminated soils at the Site is not feasible on the basis of implementability and cost. As described in the RI/FS Guidance, implementability is evaluated on the criteria of technical feasibility, administrative feasibility, and availability of services and materials. This evaluation is based on design level data that was not available during formulation of the original ROD and ESD. An evaluation of the criteria that support the determination of infeasibility is provided below.

A slightly expanded version of this document containing confidential business information was provided to EPA and DEP for their review. Areas where confidential business information have been deleted from the text have been noted in this document. The confidential business information which could not be provided for public release related to bid cost information provided by potential contractors for the remedial action.

2.2 Implementability

2.2.1 Technical Infeasibility

During Remedial Design efforts from July 29, 1994 through June 28, 1995, engineering analyses were performed to determine the design details for:

- Soil screening and crushing;
- Soil drying;
- Soil blending;
- Excavation sequencing;
- Storage and treatment of excavation and storm water; and
- Solvent extraction equipment layout.

The design details required for the above activities at this Site are extremely complex, difficult to implement and involve non-standard applications which have limited full-scale demonstrations. The following problems were identified which prevent full-scale implementation of solvent extraction at the Site:

- The clayey Site soil is difficult to dry, sieve and crush in order to attain the necessary solvent extraction pre-treatment requirements.
- Clayey soils are inherently difficult to treat via solvent extraction even if pretreatment requirements are met.
- Limited area exists on-site for soil drying operations which require relatively level ground surface and sizable work areas.
- All Site operations are constrained by the physical Superfund boundaries and the requirement to minimize impacts to and restore on-site wetlands.

Provided below is a detailed explanation of the problems stated above:

- **Soil Properties and Pre-Treatment Requirements**

Pretreatment of the feed material to remove debris, homogenize, and reduce the size of the soil particulates to less than one inch is required for feedstock preparation prior to solvent extraction treatment by Ionics Resources Conservation Company (RCC). For CF Systems (CF), the feedstock must be less than 1/4 inch prior to treatment. In addition, it is necessary to dry the clayey soil in order to separate, sieve, and, in some cases, crush the material to meet these pretreatment requirements.

Aeration and forced drying have been evaluated during the design process. Aeration of the feedstock soils can be accomplished with a front end loader fitted with an auger aerator. This drying process is slow, with highly variable production rates which are particularly sensitive to relative humidity and weather conditions. Operation under a covered structure equipped with air emission control equipment for fugitive dust and potential VOC emissions may, therefore, be necessary. Calculations of available on-site space revealed that insufficient space is available for aeration.

Alternately, forced drying using a commercial soil drier is also not feasible. Most commercial soil driers are not designed to handle debris of greater than 1-inch, nor can they effectively dry clayey material. Only one U.S. vendor is currently equipped with a pilot-scale drying equipment designed to handle clayey soils. This vendor

cannot handle debris larger than 9 inches. Batch operations of this commercial drier would require air emission control equipment to reduce particulate and VOC emissions. In addition, the energy requirements and potential uncontrolled thermal treatment of Site soils render this option infeasible.

- **Soil Properties and Solvent Extraction Performance**

Pilot-scale treatability testing by CF in 1992 indicated poor performance in treating Site soils to the 1989 ROD cleanup standard of 1 ppm PCBs and cPAHs due to inadequate mixing. This information was used to support the ESD which adjusted the PCB and cPAH treatment level to 10 ppm. CF conducted additional pilot-scale treatability testing in December 1994 to demonstrate the anticipated better performance of their reconfigured mixing apparatus using high sheer and to evaluate dewatering procedures.

CF was successful in improving PCB extraction efficiencies; however, the high sheer mixer was subject to high rates of erosion. The mixer needed to be replaced with every 500 pounds of soil to complete pilot-scale testing. This repeated maintenance at full-scale implementation is expected to seriously impede production. Solvent extraction technology of today is, therefore, still not capable of producing a system which efficiently and effectively mixes soil.

As a further measure, CF evaluated the mixing efficiencies for various prepared feedstocks; dried, slurried, and as-received. The study showed that either drying or producing a soil slurry prior to treatment resulted in an evenly mixed feedstock without clumping. Subsequent treatability testing of these prepared feedstocks demonstrated that the dried feedstock had the best treatment efficiency. The slurry also had moderately improved treatment efficiency, but not as high as the dried feedstock. To eliminate screening and drying the soil as a pretreatment step, a design evaluation of producing a slurry feedstock was performed. However, the evaluation indicated higher costs and additional soil handling problems as well as additional disposal of excess water.

Drying of the soil was identified as an important pretreatment requirement for adequate mixing. The necessity of drying for mixing would require extremely consistent moisture content. Variability in the moisture content of the soil would lead to variability in mixing (i.e., clumping) and would likely result in variability in treatment efficiency. This drying requirement is more restrictive than the drying necessary to sieve the soil to achieve maximum particle size. This additional requirement compounds full-scale implementation of solvent extraction.

In addition, for the CF solvent extraction technology, soil properties of the treated soil are not suitable for backfill due to moisture content. This was determined as the result of a dewatering study conducted in December 1994. Therefore, CF's solvent extraction technology will also require drying of the soil post-treatment as well as drying of the soil pre-treatment. This additional requirement further contributes to the infeasibility of full-scale solvent extraction, as adequate on-site space is not available and significantly increased costs will be incurred.

In summary, application of solvent extraction technology to clayey soils has not been demonstrated to be effective or feasible. To date, the current available solvent extraction technology cannot overcome the physical problems associated with preparing or treating clayey soils. To compound matters, in some cases, the treated soil produced by such systems is not suitable for backfill.

- **Physical Site Constraints**

Due to the large area needed to dry the soil sufficiently to allow for screening and crushing even a small change in the average drying rate could result in a large cost impact. In addition, the Site topography is not conducive to easily or economically increasing the drying area. The Site utilization requirements for this remedy make it nearly impossible to economically add another drying area on the Site should it be necessary for additional drying of soils prior to treatment or for drying of soils post-treatment. To further complicate the matter, based on final solvent extraction bids received in April 1995, the solvent extraction treatment area (which was based on preliminary vendor information) proves to be inadequate and will not accommodate the additional equipment recently identified by the vendors such as flare stack, boiler and cooling tower. Due to Site constraints including the northern clean access, eastern Superfund Site boundary, northern property line and required setbacks, it will not be possible to accommodate this additional equipment within the Site boundaries.

- **Wetlands Constraints**

The remedy calls for mitigation and restoration of any impacted wetland. Specific negotiations with the U.S. Fish and Wildlife Service have placed an emphasis on minimizing impacts to the so-called "Upland Marsh". This has placed a constraint on the location of the solvent extraction treatment area, support areas, and access roads. An area needed for drying and solvent extraction treatment cannot be expanded, in part, due to wetland impacts.

2.2.2 Administrative Infeasibility

Activities requiring coordination with agencies on the local level are also contributing to the difficulty in implementing the remedy, thereby making full-scale solvent extraction infeasible. As indicated in the documentation provided in Appendix A, local officials have indicated reservations about the ability of the local fire department to handle explosion and fire concerns at the Site. Independent self-sufficient fire protection for the solvent extraction equipment will be needed. Local officials are also concerned with the type and reliability of fire protection that will be proposed. Though required in the 60 percent design specifications (part of the request for bid), solvent extraction vendors were unresponsive in their bids and did not specify how they would meet fire protection requirements. Estimations of the available potable water supply and potential flow rates to the Site indicate that public water supplies necessary for fire protection will be inadequate. Unless a large volume of fire water is stored on-site either in lagoons or in separate facilities, a self-sufficient fire protection system is not feasible. Additional water storage is unlikely given the physical Site constraints.

Local emergency planning officials are also concerned that they do not have adequate training or experience to respond to explosion and/or fire hazards at the Site given the potential materials to be used by the solvent extraction technologies (flammable triethyl amine and explosive propane).

2.2.3 Availability of Services and Materials

The solvent extraction bids, received by CMP in April 1995 based on the 60 percent remedial design, have confirmed the unavailability of services and materials and the lack of competition. These bids are considered Confidential Business Information and, therefore, have not been provided in this document which can be released for public review. A discussion of these bids was provided to EPA and DEP in an expanded version of this document. The expanded document was identified as containing confidential business information.

2.3 Cost

On June 30, 1995 CMP transmitted to EPA and Maine DEP cost estimate information related to the solvent extraction source control remedy. This information illustrated the significant escalation in cost estimates since the 1989 ROD cost estimate.

Table 1 represents a comparative summary of cost estimates which was included in the June 30, 1995 submittal.

As shown in Table 1 the total estimated cost for the solvent extraction remedy has increased over the course of the project as follows:

- 1989 ROD $13,319,000
- 1992/1994 ESD $13,622,000
- February, 1995 60 percent Remedial Design phase $24,155,000
- June 1995 Supplemental 60 percent Remedial Design phase *Cannot Be Provided Due to Confidential Business Information*

As described in Section 2.2, design efforts from July 1994 through June 1995 and bids from solvent extraction vendors and remedial contractors (preliminary bids) in April 1995 identified and confirmed insurmountable difficulties with full-scale implementation of solvent extraction. Despite an increase in soil cleanup standards from 1 ppm to 10 ppm, reducing the amount of soil requiring treatment from 31,500 cubic yards (cy) to 14,520 cy, the overall unit cost employing solvent extraction has risen from $330/ton (1989 ROD estimate) and $790/cy (1994 ESD estimate) to *[Cannot Provide Costs at this Time as it Is Confidential Business Information]* (June 1995 supplemental 60 percent Remedial Design phase estimate). Table 2 provides a comparative summary of soil treatment levels, volumes, and solvent extraction treatment costs at various project stages.

These escalating cost estimates reflect the lack of commercialization of solvent extraction technology and the misapplication of a technology with extremely high fixed costs to a site with relatively low volume of soil to be treated. The NCP states that "costs that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of several factors used to eliminate alternatives" (40 CFR Part 300.430 (e)(7)(iii). Further, as we move forward to 100 percent design completion, these costs may still continue to increase.

3. SUMMARY OF EXPERIENCE AT OTHER SUPERFUND SITES

3.1 Introduction

As described in Section 2, solvent extraction has experienced difficulties in demonstrating effective treatment during every phase of study or design conducted at the Site. While it may be anticipated that innovative technologies will cause some unpredictable delays or problems, the difficulties associated with solvent extraction have become more intractable and more costly as the remedial effort has moved closer to completion of design. As addressed below, the poor performance of solvent extraction identified through the studies performed for the Site is not atypical of Superfund sites around the country.

3.2 Solvent Extraction Experience at Other Superfund Sites

Solvent extraction technology has been successfully employed only twice at Superfund sites as the full-scale treatment process for treating materials containing PCBs but neither site is comparable to O'Connor:[1]

General Refinery Site, Garden City, Georgia

A full-scale solvent extraction treatment unit (RCC's technology) was used in 1986 and 1987 to treat approximately 3,400 cubic yards of oily sludge. The initial PCB concentration in the raw sludge was reportedly 13.5 ppm. The treated residuals contained less than 0.13 ppm PCBs. The type of material and concentration levels are not comparable to those at the O'Connor Site.

Traband Site, Tulsa, Oklahoma

A full-scale solvent extraction unit manufactured by Terra-Kleen Corporation treated concrete rubble (estimated volume of less than 1,000 cubic yards) containing 5 to 10,000 ppm PCBs. After cleaning, PCB concentrations were reported to be in the range of 0.04 to 100 ppm. Again, the material treated was different from that found at the O'Connor Site and a portion of the material was treated to standards greater than those required by the ESD.

[1] EPA "Vendor Information System for Innovative Treatment Technology (VISITT), "Version 3.0, Database Search on June 5, 1995.

In order to track the progress of solvent extraction at other Superfund sites which have had RODs issued for solvent extraction but which have not begun remedial action using solvent extraction, two editions of the EPA Innovative Treatment Technologies: Annual Status Report for 1993 and 1994 were reviewed. A total of only five sites appears in the 1993 edition in Table 1-1 for solvent extraction, out of a total of 1,207 RODs signed:

- Norwood PCBs, MA
- O'Connor Co., ME
- Ewan Property, NJ
- Carolina Transformer, NC
- United Creosoting, TX

A sixth site, Pinette's Salvage Yard, was formerly selected for solvent extraction by EPA. Only one solvent extraction ROD has been issued since 1989 - Carolina Transformer, in 1991. As discussed in detail below, none of these sites has successfully gone to full-scale remediation.

Norwood PCBs

Based on a 60 percent design, costs for solvent extraction at the Norwood site have increased from $16 million (1989 ROD) to $65 million (estimated 95 percent design costs).

Ewan Property

The Ewan Property site was deleted from the Status Report between 1993 and 1994. Conversation with EPA's remedial project manager indicated that an ESD was issued to eliminate solvent extraction, because soil contamination was more localized than was thought when the ROD was issued in 1989.

Carolina Transformer

Although the Remedial Design is complete, the Carolina transformer, a fund-financed site, has no selected treatment vendor and the implementation of the remedy is on hold. The EPA community relations contact indicated that request for bids have not gone out to vendors and that funding for the project is uncertain.

Pinette's Salvage Yard

The Pinette's Salvage Yard site did not appear in the Status Report for 1993 or 1994, because solvent extraction failed to perform adequately at the site. A ROD Amendment in 1993 changed the remedy from solvent extraction to a combination of off-site incineration and off-site disposal without treatment.

United Creosoting

United Creosoting is a large industrial facility of particular relevance to O'Connor because the bid from one solvent extraction vendor for O'Connor, CF Systems (CF), was dependent on successful execution of the remedy at United Creosoting in Conroe, Texas. Discussion with the EPA remedial project manager revealed some dissimilarities between the two sites which could substantially affect CF's ability to adequately treat the O'Connor soils:

- Soil Type: Soil at United Creosoting is described as a clayey sand, with about 60 percent sand and 40 percent fines. This grain size distribution would be much less susceptible to difficulties in feed stock preparation than the clay and silty clay at the O'Connor Site.

- Ratio between Required Feed Stock Concentrations and Target Cleanup Goals: At United Creosoting, required removal efficiencies are substantially lower than the required removal efficiency at O'Connor:

Chemical	Maximum Feed Stock Concentration	Cleanup Goal	Required Removal Efficiency
cPAHs	80 ppm	40 ppm	50%
Dioxin	80 ppb	20 ppb	75%
Non-carcinogenic PAHs	5,000 ppm	2,000 ppm	60%
PCP	425 ppm	150 ppm	65%

With a maximum feed stock concentration at O'Connor of 200 ppm PCBs, the 10 ppm target cleanup goal at O'Connor requires 95 percent removal efficiency; if the 50-75 percent removal efficiencies from United Creosoting are more typical, then the 200 ppm feed stock would only be treated to only 50-100 ppm PCBs.

Other Superfund sites where solvent extraction has been selected and abandoned include the Wide Beach Site in western New York and the Alcoa Plant site in Massena, New York.

3.3 Precedent for Changes to Remedy at O'Connor Site

Tenth Street Dump/Junkyard, Oklahoma City, OK

In 1993, EPA issued an amendment to the 1990 ROD for the Tenth Street site following submittal of a 60 percent design cost estimate. The 60 percent design indicated that the cost of the Remedial Action increased from an estimated $4 million to an estimated $8.125 million. EPA stated in the Amended ROD that the actual cost "would likely exceed $10 million." EPA cited several reasons why costs had increased so dramatically, several of which are comparable to the situation at O'Connor:

- In 1989, EPA estimated that approximately 7,500 cubic yards of soil contained greater than 25 ppm PCBs, the site cleanup standard. This number increased following design studies to an estimated 9,800 cubic yards, a 31 percent increase.
- The predominant soil type at the site is clay.
- An innovative treatment technology - in this case, KPEG dechlorination - was selected for on-site treatment of soil containing greater than 25 ppm PCBs which was demonstrated to perform poorly.
- Substantial difficulties in implementing the innovative treatment technology were encountered during treatability testing, including a "soupy" post-treatment soil which required stabilization to render it suitable for backfill.

The amended remedy for the Tenth St. Dump/Junkyard is to cap the soil in place with an improved cap consisting of a geomembrane, 3 feet of clay, and a vegetated soil layer. Based on the increased costs and poor performance of KPEG dechlorination at this site, there appears to be precedence to support the Contingency Cleanup Plan at the O'Connor Site.

3.4 Summary

Solvent extraction has yet to perform successfully at full scale at any Superfund site comparable to the O'Connor Site, and no solvent extraction RODs have been written since 1991. In 1989 (when the remedy was selected and the ROD was written for the Site), EPA may have reasonably assumed that solvent extraction technology would be fully developed and commercially available by the early 1990s; this prediction seems incorrect.

Recent Superfund precedents exist for selection of non-treatment remedies when previously selected treatment technologies fail to perform as anticipated. The conclusion from these sites' histories is that solvent extraction is difficult to implement.

4. DETAILED EVALUATION OF CONTINGENCY CLEANUP PLAN

The July 11, 1994 ESD provides for two source control approaches:

1. Treatment using solvent extraction; and
2. A Contingency Cleanup Plan of excavation and off-site landfilling without treatment.

Section 2 described the infeasibility of source control using solvent extraction. To support the selection of the Contingency Cleanup Plan, GEI evaluated six alternatives including the Contingency Cleanup Plan, in accordance with criteria established in the NCP. These six alternatives were:

- Alternative 1 — Off-Site Landfill Disposal of Soil with Greater than 10 ppm PCBs (Contingency Cleanup Plan)
- Alternative 2 — Stabilization
- Alternative 3 — Vitrification
- Alternative 4 — Thermal Desorption
- Alternative 5 — Cap On-Site
- Alternative 6 — Off-Site Landfill Disposal of Soil with Greater than 50 ppm PCBs

To address the statutory preference for treatment, two alternatives employing on-site treatment of contaminated soils/sediments were evaluated. The results of the evaluation of these alternatives is provided in Appendix B. The result of the evaluation is that the Contingency Cleanup Plan appears to be the most feasible. Implementability complexities and high cost estimates do not support the application of a treatment remedy to this Site.

To further confirm the feasibility and preference for the Contingency Cleanup Plan over the current solvent extraction treatment approach, a detailed evaluation of the two approaches was performed using the nine evaluation criteria established in EPA's RI/FS Guidance. An expanded comparative evaluation by the nine criteria further supporting the Contingency Cleanup Plan is provided below. The State acceptance and community acceptance evaluations were approximated based on historical communications with the State and community.

- **Overall protection of human health and the environment:** The Contingency Cleanup Plan would result in a similar site configuration, including the type of residual materials left on-site. However, the volume of material left on-site would decrease because soil that would have been previously treated and backfilled on-site will be disposed off-site without treatment. The Contingency Cleanup Plan will protect the environment by remediating wetlands, using a combination of excavation of minimally contaminated area, wetlands restoration, and wetlands compensation. The Contingency Cleanup Plan meets remedial response objectives previously identified by EPA for the Site, providing equivalent or better protection as the current remedy. EPA's previous risk calculations for the ESD indicated that materials left on-site with less than 10 ppm PCBs and 10 ppm cPAHs would provide an incremental lifetime cancer risk of less than 10^{-4}, which is within the limits of acceptable risk.

- **Compliance with ARARs:** The Contingency Cleanup Plan will attain all ARARs. CMP acknowledges that the Contingency Cleanup Plan must meet all ARARs. The EPA and Maine DEP have previously acknowledged the acceptability of the Contingency Cleanup Plan through its incorporation into the July 11, 1994 ESD.

- **Long-term effectiveness and permanence:** The Contingency Cleanup Plan provides better long-term effectiveness and permanence due to the smaller quantity of contaminated (1 to 10 ppm) soil remaining on-site. The Contingency Cleanup Plan will reduce long-term, residual risks associated with PCBs and cPAHs as a result of excavation and transportation of the materials exceeding 10 ppm to secure landfill facilities. The remaining capped soil (< 10 ppm) consolidated in the designated area is not expected to result in long-term, adverse impacts to on-site ground water.

  Long-term monitoring and maintenance requirements, such as periodic inspection of cap integrity, ground water sampling from monitoring wells located downgradient of the cap, and a five-year review of the effectiveness of the selected remedy, would be unchanged from the current ESD.

- **Reduction of toxicity, mobility, or volume through treatment:** The Contingency Cleanup Plan will remove a volume of approximately 12,700 cy of PCB- and cPAH- contaminated material above 10 ppm in concentration from the Site. This material will be transported and disposed at off-site secure

landfills. An estimated 9,200 cy of PCB- and cPAH- contaminated material between 1 and 10 ppm will be consolidated in the designated area, on-site. These quantities were estimated using in-situ quantities including debris and cobbles, and including the quantity anticipated to be excavated beyond the delineated excavation limits (over excavation). Placement of soil beneath the cap will greatly reduce the mobility of residual PCBs and cPAHs (at concentrations of less than 10 ppm), since soil will be isolated from wind, human dermal exposure or ingestion, and burrowing animals. This is the same approach as the current solvent extraction source control remedy, with the exception that all material currently above 10 ppm would be disposed off-site rather than treated and backfilled on-site. Therefore, the Contingency Cleanup Plan achieves the same relative amount of reduction of toxicity, mobility, and volume but not through the NCP preference for treatment.

Stabilization of soil and sediment containing high concentration of lead should permanently reduce the mobility of the lead. This element of the Contingency Cleanup Plan is the same as for the solvent extraction remedy.

- **Short-term effectiveness:** The Contingency Cleanup Plan will be effective in the short-term. The remedy can be implemented rapidly, with appropriate protection of workers and the community during construction. The solvent extraction remedy would require a significantly longer timeframe to implement and would likely pose more risk to workers and the community. As indicated in the documentation in Appendix A, local officials are very concerned about fire and explosion hazard posed by solvent extraction. Impacts from additional truck traffic could be minimized by control measures. Potential control measures such as control of work hours will be discussed with local officials and will be designed to meet local ordinances.

- **Implementability:** The implementation of the Contingency Cleanup Plan is technically feasible and significantly less complex than the solvent extraction remedy. Administratively, CMP could immediately and quickly proceed with the Contingency Cleanup Plan design and implementation upon EPA and Maine DEP authorization as provided in the existing ESD. A significant amount of the 95 percent Remedial Design for the solvent extraction remedy could be readily incorporated into the design of the Contingency Cleanup Plan. By directly proceeding to the Contingency Cleanup Plan current design and construction resources could be retained to efficiently proceed with the project. The anticipated duration of the Contingency Cleanup Plan is nine months to two years compared to the three to four years for the current remedy design.

- **Cost:** The cost estimate to implement the Contingency Cleanup Plan is moderate when compared to the solvent extraction remedy.

- **State acceptance:** The State actively participated in the July 11, 1994 ESD, and contributed to the development of the Contingency Cleanup Plan option in the ESD. Based on verbal communications with Maine DEP in June 1995, CMP believes Maine DEP supports the implementation of the Contingency Cleanup Plan at the Site. Both EPA and Maine DEP must make the determination that full-scale implementation of the solvent extraction source control remedy is not feasible at the Site in order to proceed with the Contingency Cleanup Plan. The State's formal concurrence with this position will confirm State acceptance of the Contingency Cleanup Plan.

- **Community acceptance:** Community acceptance of the Contingency Cleanup Plan is anticipated to be preferred to the current solvent extraction remedy due to:

  1) potential for air emission releases under the solvent extraction remedy;

  2) potential for fires/explosions under the solvent extraction remedy; and

  3) duration of remedial action associated with the solvent extraction remedy.

  Appropriate traffic controls would be needed to minimize the additional truck traffic expected under the Contingency Cleanup Plan.

TABLE 1 - COST COMPARISON SUMMARY
Source Control Remedy (Solvent Extraction)
O'Connor Company Superfund Site
Augusta, Maine

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COST ESTIMATE (IN THOUSANDS OF DOLLARS)							
Pay Item	Description	1989 ROD Cost Estimate[1]		1992/1994 ESD Cost Estimate[2]		February 1995 60 Percent Design Cost Estimate[3]	June 1995 Supplemental 60 Percent Design Cost Estimate[4]
		Original Estimate	Adjusted for Inflation[5]	Original Estimate	Adjusted for Inflation[6]		
1	Site Water Treatment Building	0	0	249	265	1,894	2,208
2	General Site Preparation	1,490	1,753	84	90	1,679	3,602
3	Barn Demolition	5.6	6.6	47	50	49	107
4	Lagoon Modifications, Pumping Station, Storm Water Controls	238	280	415	441	1,218	898
5	Soil Treatment Excavation	176	207	339	360	421	244
6	Soil Handling and Preparation	1,269	1,493	443	471	2,234	967
7	Soil Treatment	5,635	6,629	6,358	6,757	9,787	[7]12,928-22,758
8	Site Closure and Wetlands	205	241	1,166	1,240	844	991
9	Off-Site Waste Disposal	2,150	2,529	1,903	2,023	2,254	2,164
10	Independent Quality Assurance Team	0	0	0	0	84	84
11	Health and Safety	0	0	0	0	114	114
12	Verification Testing	2,150	2,529	2,618	2,782	3,231	3,852
13	Operation and Maintenance of Source Control, Wetlands	0	0	0	0	346	346
	TOTAL ESTIMATE	$13,319	$15,668	$13,622	$14,478	$24,155	$28,505-38,335

Notes:
1. Contingency applied to each pay item was 25%.
2. Contingency applied to each pay item was 25%. Costing was provided to EPA in November 1992 and was used in support of the 1994 ESD.
3. Contingency applied to each pay item was 20%.
4. Contingency applied to each pay item was 20%.
5. Adjusted for inflation to 1995 dollars (17.6% increase). Costing was performed in 1988. Source Means (1995) historical and city cost indexes.
6. Adjusted for inflation to 1995 dollars (6.27% increase). Costing was performed in 1992. Source Means (1995) historical and city cost indexes.
7. Low number reflects CF Systems bid which assumed a schedule extension to the O'Connor project and use of their unit from Conrail, Texas project. The high number reflects an alternate bid from CF Systems to build and provide a unit for the O'Connor project. RCC's bids were contingent on the Norwood project and were within the range of CF System's bids.

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TABLE 2 - CHRONOLOGICAL COST COMPARISON SOLVENT EXTRACTION REMEDY Source Control Remedies O'Connor Company Superfund Site Augusta, Maine

	1989 ROD	1992/1994 ESD	1995 June Supplemental 60 Percent Design
Cleanup standard	1 ppm - PCB 1 ppm - cPAH 248 ppm - Lead	10 ppm - PCB 10 ppm - cPAH 248 ppm - lead	10 ppm - PCB 10 ppm - cPAH 248 ppm - lead
Estimated quantity of soil above cleanup standard (cy)	31,500 cy[1][2]	12,260 cy[1][2]	14,520 cy[3]
Estimated quantity of soil above cleanup standards in tons	47,250 tons[4]	18,390 tons[4]	19,000 tons[5]
Cost estimate - Source Control ($)[6]	$15,668,000	$14,478,000	$38,335,000
Estimated Source Control unit treatment cost ($/ton)	$330	$790	$2,000

Notes:

1. Cubic yards (cy) are based on the in-situ soil volumes plus the EPA-developed factors of 20 percent for swell and 50 percent for overexcavation.
2. Quantity of soil is higher than that estimated in 1989 as a result of pre-design soil sampling and subsequent revised estimates of extent of contamination.
3. Cy are based on in-situ soil volumes minus cobbles and debris and a swell factor of 20 percent. Overexcavation was accounted for by identifying and estimating volumes for specific areas anticipated to be excavated beyond the delineated excavation limits. This calculation of quantity of soil above cleanup standards was used to be comparable to the method used in the 1989 Record of Decision (ROD) and 1994 Explanation of Significant Differences (ESD).
4. Assumes an approximate factor of 1.5 tons/cy in-situ.
5. Conversion to tons was based on design data and in-situ unit weight of 122 pounds per cubic feet, in-situ water content of 25.2% and a drying to a plastic limit of 20.2%.
6. See June 30, 1995 CMP submittal. Costs are adjusted for inflation to reflect 1995 dollars.

APPENDIX A

Meeting Minutes with Local Officials

GEI Consultants, Inc.

53 Regional Drive
Concord, NH 03301-8500
603 · 224 · 7979

MEMORANDUM

TO: Charles R. Nickerson, P.E.
Central Maine Power Company

FROM: Boyd P. Smith, C.G.

SUBJECT: **Meeting Minutes - April 12, 1995**
Emergency Response Community Relations Support Plans
O'Connor Company Superfund Site
Augusta, Maine
Project 94359

DATE: April 24, 1995

The purpose of this memorandum is to summarize the discussions and actions resulting from a meeting held at the Central Maine Power Company (CMP), Anthony Avenue office in Augusta, Maine on April 12, 1995. The purpose of the meeting was to develop the strategy for completion of the Emergency Response Plan (ERP) section of the Site Management Plan (SMP) for the O'Connor Company Superfund Site (Site). The SMP is contained in Volume I of the Source Control Project Operations Plan (POP) being prepared as part of the 95 percent Remedial Design for the Site. In addition, preparation of the Community Relations Plan (CRP) and the Community Relations Support Plan (CRSP) section of the SMP was also discussed.

The following persons were in attendance:

Central Maine Power Co. (CMP)
- Charles Nickerson
- Normand Michaud
- Tim Vrabel

GEI Consultants, Inc.
- Boyd Smith
- Loretta Sanford

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Emergency Response Plan

The primary purpose of the meeting was to decide how to address concerns raised by City of Augusta (City) officials concerning City response to potential Site emergencies. Primary concerns of City officials appear to include the risk of responding to emergencies, such as fire and/or serious injuries to personnel, at a hazardous waste site where contamination exists. However, it is unclear at this time what the exact nature and extent of the City's concerns are.

In a memorandum to Daniel Spaulding of CMP dated March 27, 1995, GEI proposed a strategy which included identifying and contacting local emergency response officials for input during the development of the ERP. A proposed schedule for meeting with local officials was also provided in the March 27, 1995 memorandum. This schedule was designed to meet the overall project schedule for the submittal of the 95 percent Remedial Design.

The desirability of establishing a proactive position with regard to involvement of the local community was agreed upon during the meeting. It was also noted that the potential hazards during the Remedial Action are similar to those for other types of existing industrial facilities. However, if the City is unable or unwilling to provide emergency response support, CMP may expand its existing contracts for emergency response support to provide coverage during the Remedial Action.

CMP is preparing the CRP at the request of the U.S. Environmental Protection Agency (EPA). CMP is also preparing the CRSP, which will be provided to GEI for inclusion in the SMP for submittal with the 95 percent Remedial Design.

ACTIONS

Emergency Response Plan

- CMP will contact the local emergency response planning coordinator to determine who should be involved in emergency response planning, and how to contact such persons.
- CMP will determine how to establish communications with the local media to distribute information concerning Site activities. Currently anticipate involving local media at public presentation of final ERP to local emergency responders.
- CMP will prepare a letter to local emergency response officials which will include Site background information and a request for a meeting to provide specified input to the ERP. Preparation of this letter, if necessary, will follow conversations with the local emergency response planning coordinator.
- CMP will establish and maintain contact with the local community, with support from GEI, as needed.

Community Relations/Community Relations Support Plans

- CMP will develop the CRP and the CRSP. The CRSP will be submitted to GEI for inclusion in the 95 percent Remedial Design POP.
- The CRP will lag behind the ERP schedule to allow resolution of major local hazard concerns prior to CRP/CRSP public meetings.

BPS:cab

cc: Norm Michaud, CMP
Tim Vrabel, CMP
Loretta Sanford, GEI
Jeff Klaiber, GEI

GEI Consultants, Inc.

53 Regional Drive
Concord, NH 03301-8500
603-224-7979

MEMORANDUM

TO: Charles R. Nickerson, P.E.
Central Maine Power Company

FROM: Jeffrey A. Klaiber, P.E.
Boyd P. Smith, C.G.
Loretta M. Sanford, C.E.T.

SUBJECT: Meeting Minutes - May 16, 1995
Emergency Response Plan
Source Control Project Operations Plan
95 Percent Remedial Design
O'Connor Company Superfund Site
Augusta, Maine
Project 94359

DATE: May 18, 1995

The purpose of this memorandum is to provide minutes of a meeting held on May 16, 1995 between Central Maine Power Company (CMP), GEI Consultants, Inc. (GEI) and City of Augusta (City) personnel. The purpose of the meeting was to initiate discussions between CMP and the City with regard to the preparation of the Emergency Response Plan section of the Source Control (SC) Project Operations Plan (POP). The POP is being developed for submittal with the 95 percent Remedial Design for the O'Connor Company Superfund Site (Site). The following persons were in attendance:

CMP

- Charles Nickerson
- Joan Deering

GEI

- Boyd Smith
- Loretta Sanford

Winchester, MA Raleigh, NC Englewood, CO Carlsbad, CA Chicago, IL

City

- Richard Dolby (Director, Code Enforcement)
- Norm Arbour (Chief, Fire Department)

A copy of the meeting agenda is attached and a summary of key issues is presented below:

- C. Nickerson presented a summary of project background, current and future Site conditions, and project schedule.

- R. Dolby and N. Arbour stated that the City does not have the technical training or equipment necessary to respond to an emergency involving hazardous materials. However, they do have foam fire suppressant capability.

- Due to current liability issues, City personnel are forbidden from entering an area where hazardous materials are known to be located. R. Dolby also indicated that City personnel would not provide emergency services to injured persons until after any necessary decontamination procedures had been performed.

- B. Smith and L. Sanford noted that there are several levels of contamination, ranging from dirt to polychlorinated biphenyl (PCB) oils, that risks to response personnel would vary accordingly, and that different levels of personnel protection and decontamination are anticipated. N. Arbour indicated that this issue should be discussed directly with key personnel in his department.

- R. Dolby indicated that if additional training was provided by CMP, emergency response personnel could potentially enter the Site during an emergency. Maine Yankee currently provides site-specific training to local response personnel.

- N. Arbour indicated that there are 39 fire fighters, of whom 22 are trained as paramedics. The current level of Fire Department training is through the "operations" level. Additional training through the "technician" level or higher would be required for personnel to respond to a hazardous materials-related emergency. N. Arbour also indicated there are several Fire Department personnel interested in further training for responding to hazardous materials emergencies, and that Ed Charles of the Fire Department is developing a pilot program for decontaminating injured persons prior to treatment.

- R. Dolby and N. Arbour provided information regarding traffic control and emergency response contacts. Traffic control should be coordinated through Wayne McCamish (Chief, City Police Department). Emergency response for fire and ambulance service is coordinated through central dispatch (9-1-1).

- It is unclear at this time how the media would be contacted in the event that isolation of the Site or evacuation of the surrounding area is required. N. Arbour indicated that information would likely be provided by central dispatch, or directly through the responding personnel.

- R. Dolby indicated that CMP should present information to other City departments during one of the scheduled bi-weekly staff meetings. The bi-weekly staff meeting is coordinated by Kathleen Fuller of the City Planning Department. The purpose of the meeting is to discuss upcoming construction and other related projects to coordinate logistics and input from various City departments, including water, fire, police, planning, school, and public works.

ACTIONS

The following actions were agreed upon:

CMP

- Contact the City to present Site background information and a brief overview of project requirements that could impact the City. The presentation is tentatively scheduled on June 7, 1995 from 10:00 - 10:30 a.m., immediately following the regular bi-weekly staff meeting. CMP will contact the City on May 25, 1995 to confirm the June 7 meeting time and location.

- Schedule a follow-up meeting with key emergency response personnel immediately following the June 7, 1995 meeting. Attendees would be identified as an action item on the June 7 meeting agenda. The follow-up meeting would be held within approximately one week after the bi-weekly staff meeting to provide more detailed information and receive input from key City response personnel on the Emergency Response Plan.

GEI

- Prepare meeting minutes from May 16, 1995 meeting.

- Prepare draft agendas, outline of issues, draft informational packages, and outline of presentation graphics for both meetings. Provide to CMP by May 24, 1995 (Design Team meeting).

BPS:cab

Attachment

Central Maine Power Company
Meeting Agenda
May 16, 1995
8:00 a.m.

Augusta City Center

Subject: O'Connor Site - Emergency Response Plan

Attendees: Norm Arbour, City of Augusta
Joan Deering, CMP
Dick Dolby, City of Augusta
Charlie Nickerson, CMP
Loretta Marino Sanford, G.E.I.
Boyd Smith, G.E.I.

I. Project Background

II. Current & Future Site Conditions

III. Project Schedule

IV. Emergency Response Planning

A. Regulatory Overview
B. Coordination of Services & Support
- Traffic control
- Media contact
- Fire
- Ambulance
- Contact (911)
- Specialists
- Access (vehicular & personnel)
- Contaminant information
- Safety equipment
- Contact list

V. Dissemination & Presentation of Emergency Response Plan

Central Maine Power Company
O'Connor Site - Project Schedule

Year	Anticipated Project Status
1995	no scheduled work
1996 & 1997	construction site with active earthwork (5 days/week, regular hours)
1998	solvent extraction site (7 days/week, 24 hours/day)
1999	passive site

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APPENDIX B

Evaluation of Alternatives

EVALUATION OF ALTERNATIVES

The July 11, 1994 ESD specifies excavation and off-site disposal as the Contingency Cleanup Plan. To confirm the appropriateness of this Contingency Cleanup Plan and to address the statutory preference for treatment, GEI evaluated the general feasibility and cost effectiveness of six source control alternatives to the existing solvent extraction remedy. GEI's evaluations also considered other remedial activities associated within the source control such as barn demolition, debris handling, surface water management, and interface requirements with the Management of Migration (MOM) component of the project. GEI's evaluations, unless otherwise noted, retain the current soil cleanup levels of 10 ppm PCBs, 10 ppm cPAHs, and 248 ppm lead. For the purpose of subsequent discussions, remedial approaches for PCBs will also address the presence of cPAHs at the Site, and continual reference to cPAH remediation has been excluded. The six alternatives follow:

- **Alternative 1 - Off-Site Landfill Disposal of Soil with Greater than 10 ppm PCBs (Contingency Cleanup Plan):** Transport the soil containing greater than 10 ppm PCBs to landfills for disposal. The soil would be disposed as a special waste (PCBs less than 50 ppm), as a chemical waste (PCBs greater than 50 ppm) or as a chemical/hazardous waste requiring stabilization for lead (PCBs greater than 50 ppm and leachable lead). The soil containing between 1 and 10 ppm PCBs would be consolidated into a Designated Area on-site.

- **Alternative 2 - In Situ Stabilization:** Use in situ stabilization to immobilize the soil containing greater than 10 ppm PCBs. The soil containing between 1 and 10 ppm PCBs would be consolidated into the Designated Area. Soil failing to be adequately stabilized would be disposed at an off-site landfill.

  In situ stabilization is conducted by mixing the soil with Portland cement and/or other admixtures to fix the contaminants and reduce mobility. To adequately reduce the mobility of the contaminants, thorough mixing is required. The method used to mix the soil with the admixtures will determine how uniform the resulting mixture is. Based on the estimated depth of contaminated soil at the Site, the soil mixing could be performed with a single large diameter auger (6 to 12 feet in diameter) or a gang of smaller inter-meshed augers.

- **Alternative 3 - Vitrification**: Use in situ vitrification to treat the soil containing greater than 10 ppm PCBs. The soil containing between 1 and 10 ppm PCBs would be consolidated into the Designated Area. Soil failing to be vitrified would be disposed at an off-site landfill.

  In situ vitrification transmits high voltage electricity to the contaminated soil through electrodes. Heat generated by the resistance of the soil to the flow of electricity between the electrodes raises the temperature of the soil above its melting point. When cooled, the result is a glass-like material which is

resistant to leaching and further chemical action. The high temperatures created by the process and the off-gas treatment system destroy the PCBs.

- **Alternative 4 - Thermal Desorption**: Use thermal desorption to treat the soil containing greater than 10 ppm PCBs. The soil containing between 1 and 10 ppm PCBs would be consolidated into a Designated Area. Soil which failed to be treated to 10 ppm would be disposed at an off-site landfill. Thermal desorption uses heat to separate the organics from the soil in a vapor form. The residual gasses are cooled to allow the organics to condense. The condensate is then disposed at a licensed chemical waste incinerator.

- **Alternative 5 - Cap On-Site**: A containment measure which would include in situ stabilization of the soil containing greater than 248 ppm lead, followed by consolidation and capping of soil containing greater than 1 ppm PCBs.

- **Alternative 6 - Off-Site Landfill Disposal of Soil with Greater than 50 ppm PCBs**: Transport the soil containing greater than 50 ppm PCBs to a chemical waste landfill for disposal. Lead-contaminated soil requiring stabilization would be disposed at a hazardous waste landfill after stabilization. Soil containing between 1 and 50 ppm PCBs would be consolidated into the Designated Area.

Two alternatives (Alternative 3 - Vitrification, Alternative 4 - Thermal Desorption) could be considered technologies which address the statutory preference of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), at §121, (b) to permanently and significantly reduce the volume, toxicity or mobility of hazardous substances through treatment. However, it should be noted that CERCLA §121, (b) adds further clarification that this is to be done to the maximum extent practicable. As further discussed in this subsection, similar site-specific and technology-specific limitations exist for full-scale implementation of Alternatives 3 and 4 at the Site which make these alternatives infeasible as well.

While CERCLA §121 notes preference for treatment, implementation over the past six years of innovative treatment approaches to PCB-contaminated materials have generally not been successful. Numerous solvent extraction, thermal desorption, and incineration projects have seen significantly escalating costs, and in some cases abandonment to more standard (and implementable) remedies. These treatment technologies have not evolved to a commercial level for hazardous waste sites as was hoped in the late 1980s.

GEI performed an evaluation of the six alternatives to determine the relative feasibility and approximate costs of implementation. The evaluations were performed using seven of the nine criteria specified in the NCP as follows:

- Compliance with ARARs;

- Overall protection of human health and the environment;

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability; and
- Cost.

The results of the screening are provided in Table B-1. Cost estimates are provided in Table B-2. While initial screening of alternatives are typically based on three criteria (effectiveness, implementability, cost), the use of the seven criteria for this evaluation provided a better means to compare alternatives. For discussion purposes the effectiveness, implementability, and cost (NCP initial screening criteria) for each of the six alternatives is provided below:

- **Alternative 1 - Off-site Landfill (Contingency Cleanup Plan)**

The excavation and off-site landfilling alternative (Contingency Cleanup Plan) is anticipated to be effective and reliable. Short-term risks to workers would be minimal due to the straightforward nature of this remedy. Precautions could be taken to promote safety to the community due to the expected additional truck traffic. The time to implement this remedial alternative would potentially be significantly less than other alternatives. Long-term effectiveness would be promoted through the relocation of the contaminated materials to secure off-site landfill facilities which comply with regulatory requirements for containment.

The excavation and off-site landfilling alternative is readily implementable. The remedial action could be easily undertaken. The approach is reliable and consistently demonstrated on other projects. Administratively, the current ESD provides the mechanism by which EPA and DEP can determine that full-scale implementation of solvent extraction source control remedial action at the O'Connor Site is not feasible and invoke the Contingency Cleanup Plan. This would minimize administrative delays to remediation of this Site which may have occurred under ROD amendments or other avenues to change the remedy for this project. CMP, through its previous design efforts for this project, has direct ongoing communication with numerous remedial contractors who could implement this remedy. Off-site landfill facilities exist that meet current regulatory standards and have sufficient capacity.

The cost for this remedial alternative is moderate as compared to other alternatives.

- **Alternative 2 - In Situ Stabilization**

Stabilization may be effective at the O'Connor Superfund Site. Precedence in successful in situ or ex situ stabilization of PCB-contaminated soil is limited. The likelihood of successful implementation of stabilization at the Site is difficult to predict, especially for clayey soils. With regard to technical feasibility, the reliability of the technology to fix PCBs is relatively undemonstrated on other sites. With regard to constructability, this technology could be relatively easily implemented. A bulking of the Site soil volume would need to be considered in final Site use and grades. This would likely complicate on-site wetland restoration and off-site wetlands replacement issues. From an administrative feasibility standpoint, a ROD amendment would likely be required, requiring public comment and extensive coordination with local, state and federal agencies. This would likely extend the overall implementation schedule for the project.

This alternative would result in a moderate cost as compared to other alternatives.

- **Alternative 3 - Vitrification**

In situ vitrification would likely be effective in reducing the toxicity and mobility of hazardous constituents on-site. The reliability of this technology to address the site-specific contaminants and conditions is questionable due to the unproven nature of full-scale vitrification.

It is anticipated that the full-scale implementation of in situ vitrification would be moderately difficult. The technology has not been reliably demonstrated full-scale. Numerous technical difficulties would be expected due to the unknowns associated with the technology. Due to the substantial deviation from the current remedial approach for the Site, a ROD amendment with an associated public comment period and significant interface between local, state, and federal agencies would be expected. The result would be a likely substantial delay in implementation of remedial action at the O'Connor Site. The availability of services and materials to support an in situ vitrification implementation remedy is extremely limited.

The cost of in situ vitrification is moderate to high as related to other remedial alternatives. In addition, a significant contingency would be expected beyond vendor quotations to address ancillary costs in implementing a technology with limited full-scale application.

- **Alternative 4 - Thermal Desorption**

Thermal desorption would be marginally effective for this Site. It would require an extensive period of time to implement due to the clayey nature of the Site materials. Material bulking by adding granular material would likely be required to promote treatment. Extensive storm water controls would be required due to the expected duration of the project. Additional considerations would need to be made with regard to air emissions. Problems similar to those for the current remedy related to soil pretreatment handling and space restrictions would be expected.

Thermal desorption of the O'Connor Site materials would be difficult to implement. Precedent on the few thermal desorption projects on clay materials (Wide Beach, Anderson Development Company) has not shown good results from an implementability standpoint. From an administrative feasibility standpoint additional coordination efforts with local, state and federal agencies, would be required. A ROD amendment would likely be required with public opposition to thermal units typical.

The cost of a thermal desorption remedy would be high compared to other alternatives, as support and pre-treatment costs would be similar to the solvent extraction remedy.

- **Alternative 5 - Cap On-Site Greater Than 1 ppm**

On-site capping would likely be effective. Protection of workers and timeframes to implement would be positive, and long-term effectiveness in terms of reduction of mobility or containment would be moderate.

This alternative could be readily implemented. It could be easily constructed. The alternative would be reliable to minimize dermal contact and infiltration of rainfall. Some restrictions on future Site use would be needed. Long term monitoring would be required due to leaving the waste materials in place. Administratively, a ROD amendment and significant interface with local, state, and federal agencies and the community would be anticipated. Construction services and materials are readily available.

The cost of this alternative is low as related to other alternatives.

- **Alternative 6 - Off-site Landfill Disposal of Soil with Greater than 50 ppm PCBs**

This alternative would be relatively effective with higher concentration materials going off-site to secure landfill facilities. PCB materials less than 50 ppm would be consolidated and placed on-site.

Implementability of this remedial alternative from a technical standpoint is good. Administratively, raising the current cleanup level from 10 ppm to 50 ppm would likely require additional risk assessment evaluations and potential reclassification of future Site use. This remedial alternative would likely also require a ROD amendment and significant interface with local, state, and federal agencies and the community.

The cost of this remedial alternative is moderate as compared to other alternatives.

Based on this screening level evaluation of these alternatives, the Contingency Cleanup Plan remedy (excavation and off-site disposal) is preferred. Treatment alternatives (Alternative 4 - Thermal Desorption and Alternative 3 - Vitrification) possess many similar technical and implementation problems due to Site conditions, lack of successful full-scale demonstrations and administrative hurdles. On-site containment (Alternative 5 - Capping >1 ppm) and immobilization (Alternative 2 - Stabilization), while technically feasible and implementable, would not be as protective as the Contingency Cleanup Plan and would likely pose administrative challenges. Alternative 6 - Off-Site Landfilling of Materials >50 ppm and capping the remainder of material above 1 ppm would be more protective than Alternative 5 (Capping >1 ppm), but would require raising the cleanup level from 10 ppm to 50 ppm for PCBs and cPAHs. At a similar cost estimate, the Contingency Cleanup Plan is more protective than Alternative 6.

For these reasons, only Alternative 1 - the Contingency Cleanup Plan has been carried through for detailed evaluation (see Section 4 of report).

TABLE 8.1 - EVALUATION SUMMARY
Source Control Remedies
O'Connor Company Superfund Site
Augusta, Maine

Evaluation Criteria	Current Remedy Solvent Extraction >10 ppm	Alternative 1 Off-site Landfill (Contingency Remedy) >10 ppm	Alternative 2 Stabilization >10 ppm	Alternative 3 Vitrification >10 ppm	Alternative 4 Thermal Desorption >10 ppm	Alternative 5 Cap On-site >1 ppm	Alternative 6 Off-site Landfill >50 ppm
Overall protection of human health and the environment	Residual risks minimized through treatment and containment.	Secure landfill will minimize opportunity for exposures.	High if soil remains stabilized.	Residual risks minimized through treatment and containment.	Residual risks minimized through treatment and containment.	Will depend on long-term integrity of the cap.	Secure landfill will minimize opportunity for exposures.
Compliance with ARARs	Satisfies ARARs.	Satisfies ARARs.	May need to demonstrate that groundwater ARARs will be attained.	Would probably satisfy ARARs. Air emissions would need evaluation.	Would satisfy ARARs. Air emissions would need evaluation.	ARARs for chemical waste landfill may need to be met.	Satisfies ARARs.
Long-term effectiveness and permanence	Moderate. Minor management of Designated Area needed.	Moderate. Minor management of Designated Area needed.	Unknown. Stabilization of PCBs is not demonstrated.	Moderate. Minor management of Designated Area needed.	Moderate. Minor management of Designated Area needed.	Low. Long term cap integrity essential to exposure reduction.	Moderate. Minor management of Designated Area needed.
Reduction of toxicity, mobility, or volume through treatment	High. Most PCBs and cPAHs destroyed. Mobility of remainder isolated in Designated Area.	Moderate. PCBs and cPAHs not treated. Mobility reduced by placement in a secure landfill. Soil remaining on-site isolated in Designated Area.	Unknown. Not demonstrated that PCB mobility can be reduced.	High. Most PCBs and cPAHs destroyed. Mobility of remainder isolated in Designated Area.	High. Most PCBs and cPAHs destroyed following desorption. Mobility of remainder isolated in Designated Area.	Low. No PCBs or cPAHs treated. Erosion mobility reduced by cap.	Moderate. PCBs and cPAHs not treated. Mobility reduced by placement in a secure landfill. Soil remaining on-site isolated in Designated Area.
Short-term effectiveness	Low. Extensive storm water controls currently escaped to avoid impacts to Riggs Brook. Long project duration.	Moderate. Shorter period of remediation would reduce impacts. Trucking risks could be minimized with control measures.	Moderate. Remediation could proceed rapidly.	Moderate. Consolidation of soil into treatment cells will minimize run-off. Air emissions controls necessary.	Low. Extensive storm water controls necessary to avoid impacts to Riggs Brook. Long project duration.	High. Remediation would proceed rapidly with fewer short-term impacts.	Moderate. Shorter period of remediation would reduce impacts. Trucking risks could be minimized with control measures.
Implementability	Extensive feedstock preparation. Technology relatively undemonstrated. Limited availability of services to obtain competitive (and/or responsive) bids.	High. Simple technology.	Unknown. While physical stabilization of clay can be accomplished insitu, PCBs may be unaffected.	Low to Moderate. Site grading will be needed. Soil treatment area preparation relatively unimportant. Limited full-scale operations. Limited availability.	Low-Moderate. Demonstrated technology, but not well demonstrated on clays. Feedstock preparation required.	High. Simple technology.	High. Simple technology.
Estimated Cost (Millions of Dollars)	*Confidential Business Information*	11.3	11.5	17.9	20.3	7.6	11.2

Notes: 1) Concentrations in alternative descriptions refer to polychlorinated biphenyls (PCBs) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs).
2) Estimated costs obtained from Table A.2. All costs include a 25 percent contingency.

TABLE B.2 - COST ESTIMATE COMPARISON SUMMARY
Evaluation Summary
Source Control Remedies
O'Connor Company Superfund Site
Augusta, Maine

Cost Estimate (in Thousands of Dollars)							
Cost Component	**Current Remedy Solvent Extraction >10 ppm (June 1995 Estimate)**	**Alternative 1 Off-Site Landfill (Contingency Remedy) > 10 ppm**	**Alternative 2 In situ Stabilization > 10 ppm**	**Alternative 3 Vitrification > 10 ppm**	**Alternative 4 Thermal Desorption > 10 ppm**	**Alternative 5 Cap On-Site > 1 ppm**	**Alternative 6 Off-Site Landfill > 50 ppm**
Site Water Treatment Building	*Confidential Business Information*	613	613	613	1,839	613	813
General Site Preparation		1,501	1,501	1,501	3,002	1,501	1,501
Barn Demolition		89	89	89	89	89	89
Lagoon Mod., Pump Station, Storm Water		748	374	249	249	748	249374
Soil Excavation		203	120	175	203	120	203
Soil Handling and Preparation		0	0	0	807	0	0
Soil Treatment		0	2,850	7,980	4,294	318	0
Site Closure and Wetlands		827	827	827	827	414	827
Off-Site Waste Disposal		3,519	451	451	1,503	451	2,694
Internal Quality Assurance Team		18	35	35	70	35	18
Health and Safety		48	48	48	95	48	48
Verification Testing		1,070	1,070	1,070	1,605	803	1,070
O&M of Source Control, Wetlands		288	288	288	288	288	288
Additional Design		300	400	500	500	400	300
Clean Backfill		334	0	0	0	0	127
Treatability Testing		0	25	60	50	0	0
Miscellaneous Additional Costs		200	0	0	0	0	200
ESTIMATED SUBTOTAL		**9,384**	**8,566**	**13,886**	**15,920**	**5,329**	**8,352**
Contingency (20%)		1,877	1,913	2,977	3,384	1,266	1,870
ESTIMATED TOTAL		**11,261**	**10,479**	**16,863**	**19,304**	**6,595**	**10,222**

TABLE B.2 - **COST ESTIMATE COMPARISON SUMMARY**
Evaluation Summary
Source Control Remedies
O'Connor Company Superfund Site
Augusta, Maine

Notes:

1. The costs provided in this table were generated by estimating the relative effort for each task in comparison with the current remedy and are intended to be used only in comparison to the current remedy. The costs for the current remedy are based on preliminary contractor bids (April 1995) and final solvent extraction vendor bids. A 20 percent contingency has been added to the total for each option.
2. Soil treatment costs include mobilization, treatment residue disposal and soil treatment.
3. For all Alternatives, any soil which remains on-site and contains between 1 parts per million (ppm) and 10 ppm polychlorinated biphenyls (PCBs) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) would be moved to an on-site Designated Area.
4. Cost of off-site waste disposal for Alternative 1 assumes that soil contaminated with PCBs less than 50 ppm can be classified as a special waste and disposed in a special waste landfill (Subtitle D).
5. The treatability testing costs for Alternatives 2, 3, and 4 are based on vendor estimates.
6. The soil treatment cost for Alternative 2 is based on a vendor estimate and actual remedial costs for other sites.
7. Soil excavation cost for Alternative 2 and 5 is for moving soil with PCB and cPAHs concentrations between 1 ppm and 10 ppm into a Designated Area.
8. The soil treatment cost for Alternative 3 is a vendor estimate.
9. The soil excavation cost for Alternative 3 is for consolidating soil prior to treatment and moving soil containing PCBs and cPAHs between 1 ppm and 10 ppm into a Designated Area.
10. Landfilling costs are based on special waste and chemical waste landfill transportation and disposal vendor estimates of $70/ton and $336/ton, respectively.
11. The soil handling and preparation cost for Alternative 4 is assumed to be the same as the current remedy.
12. The miscellaneous costs for Alternative 1 and 6 are for road improvements to Route 17 to accommodate additional truck traffic.
13. Soil treatment cost for Alternative 5 is for stabilization of soil containing greater than 248 ppm lead.
14. Additional design costs are estimates for comparison purposes only and would need to be refined for each alternative.
15. Alternative 6 includes costs for consolidating and capping of soil containing between 1 ppm and 50 ppm PCBs and cPAHs.