MANAGEMENT PLAN
(Revision 2)

DEMONSTRATION TESTING AND EVALUATION
OF IN SITU SOIL HEATING

Contract Number DE-AC05-930R22160
IITRI Project C06787

For

Department of Energy
Oak Ridge Operations
P. O. Box 2001
Oak Ridge, Tennessee 37831

ATTN: Mr. Johnny Moore

By

Harsh Dev
IIT Research Institute
10 West 35th Street
Chicago, Illinois 60616
March 6, 1995
FOREWORD

This is the second revision to the Management Plan for US DOE contract entitled, "Demonstration Testing and Evaluation of In Situ Soil Heating," Contract Number DE-AC05-930R22160, IITRI Project Number C06787. The cost plan and schedule have been revised herein. The Management Plan was revised once before, in March 1994.

In this project IITRI will demonstrate its in situ soil heating and decontamination technology which uses 60 Hz AC power to heat soil to a temperature of about 90°C. This technology is aimed at the decontamination of soil by the removal of organic hazardous constituents by the action of heat and a vacuum gas collection system.

Respectfully Submitted
IIT Research Institute

Harsh Dev
Science Advisor
Energy and Environmental Sciences

Approved:

G. C. Sresty
Manager
Energy and Environmental Sciences

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I. EXECUTIVE SUMMARY


This contract was signed on September 30, 1993. IITRI started work on it in October 1993. This second revision to the Plan is being made to reflect the delays encountered by this project as a result of personnel and equipment availability conflicts with and delays in another related IITRI project at Sandia National Laboratory. In the Sandia project, the EM heating technology is being demonstrated along with the in situ RF heating process. Some of the delay in this project is also attributable to the effort and revisions required in the development of the required plans and documents. Further, it is IITRI's understanding that power needed for the demonstration will be available in late March due to the re-wiring and up-grading of the electrical distribution systems at the K-25 site and also due to the delivery schedule of a transformer needed for this demonstration site.

This revised plan has been made to show the new schedule and the cost plan. Other technical objectives of the project remain unchanged. The revised completion dates of the project milestones are summarized below. The projected completion date of the project is September 1995.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestone</th>
<th>Revision 2 Completion Dates</th>
<th>Revision 1 Completion Dates</th>
<th>Original Completion Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8</td>
<td>Submit All Documents</td>
<td>2/1/95*</td>
<td>3/31/94</td>
<td>12/17/93</td>
</tr>
<tr>
<td></td>
<td>All Permits Received</td>
<td>2/1/95*</td>
<td>6/1/94</td>
<td>3/23/94</td>
</tr>
<tr>
<td>7.4</td>
<td>Shakedown Completed</td>
<td>5/15/95</td>
<td>7/25/94</td>
<td>6/8/94</td>
</tr>
<tr>
<td>12.6</td>
<td>Final Report Submitted</td>
<td>9/27/95</td>
<td>Jan-'95</td>
<td>9/30/94</td>
</tr>
</tbody>
</table>

* Actual Completion Dates. Others are Planned Completion dates

There is a potential for the revised schedule to compete with and/or conflict with another IITRI project aimed at in situ decontamination of soil containing heavy hydrocarbons (diesel), and various solvents. This is the project at Sandia National Laboratory as mentioned above. The Sandia project is scheduled to finish the heating of the soil by first week of April 1995. The revised schedule presented here has been made after taking this into account.

In this project IITRI will demonstrate an in situ soil heating technology for the removal of hazardous organic contaminants present in the soil. In Situ heating will be accomplished by the
application of 60 Hz AC power to the soil. The soil will be heated
to a temperature of about 90°C. This technology is suited for the
removal of those organic compounds which have a normal boiling
point in the range of 100° to 210°C, or else for those which
exhibit a pure component vapor pressure of at least 10 mm Hg in the
90° to 100°C temperature range. For example, perchloroethylene,
dichlorobenzene, trichlorobenzene, etc. may be removed by in situ
AC heating.

It is planned to demonstrate the technology by heating
approximately 400 tons of soil in the K-1070 Classified Burial
Ground located at DOE's K-25 Site located in Oakridge, TN. It is
estimated that the heating portion of the demonstration will take
approximately 3 weeks at an average power input rate of 150 to
175 kW. The project objectives will be accomplished by performing
the following 12 tasks:

Task 1: Develop Modify Plans
Task 2: Permitting
Task 3: Sub-contract and Supplies
Task 4: Equipment Testing and Shakedown
Task 5: Site Preparation and Equipment Mobilization
Task 6: Pre-Demonstration Soil Sampling and Analysis
Task 7: Install Treatment System
Task 8: Conduct Demonstration
Task 9: Equipment Removal, Decontamination & Demobilization
Task 10: Post Demonstration Soil Sampling and Analysis
Task 11: Data Review and Economic Analysis
Task 12: Final Report Preparation and Draft Review

During the course of this project, under various tasks, the
following documents will be or have been submitted:

- Project Management Plan (submitted)
- Milestone Plan (submitted)
- Cost Plan (submitted)
- Work Plan (submitted)
- Review/Comment on NEPA documentation (Done)
- Demonstration Test Plan (submitted)
- Demonstration Design (Submitted)
- QA/QC Plan (submitted)
- Health and Safety Plan (submitted)
- Environmental Monitoring and Compliance Plan (Submitted)
- Waste Management Plan (Submitted)
- Monthly Reports -- Status, Summary, Milestone Schedule,
  Cost Management
- Conference and Meeting Records
- Hot Line Report (as and when appropriate)
- Draft Final and Final Report

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US DOE Contract No. DE-AC05-93OR22160
Page 2
II. REVISED MILESTONE SCHEDULE PLAN

Figure 1 depicts the project schedule along with the planned completion dates for the four major milestones (Tasks 4, 7, 11, and 18). The figure also shows the progress to date and the estimated start and end dates for the various tasks. Table 1 is a milestone log summarizing the planned completion dates of the four major milestones.

Table 1. Milestone Log

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestone</th>
<th>Revision 2 Completion Dates</th>
<th>Revision 1 Completion Dates</th>
<th>Original Completion Dates</th>
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</thead>
<tbody>
<tr>
<td>2.8</td>
<td>Submit All Documents</td>
<td>2/1/95*</td>
<td>3/31/94</td>
<td>12/17/93</td>
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<tr>
<td></td>
<td>All Permits Received</td>
<td>2/1/95*</td>
<td>6/1/94</td>
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<td>7.4</td>
<td>Shakedown Completed</td>
<td>5/15/95</td>
<td>7/25/94</td>
<td>6/8/94</td>
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<tr>
<td>12.6</td>
<td>Final Report Submitted</td>
<td>9/27/95</td>
<td>Jan-'95</td>
<td>9/30/94</td>
</tr>
</tbody>
</table>

* Actual Completion Dates. Others are Planned Completion dates

III. REVISED COST PLAN

The cost plan is shown in Table 2. The estimated rate of project expenditures was calculated in the following manner: For each remaining task the required completion date was estimated in order to assure compliance with the milestone plan. Then the monthly cost of each active task was estimated by multiplying the required percentage completion and the estimate of the Task's total cost as prepared in the proposal. Figures 2 and 3 show the planned rate of monthly and cumulative expenditure.
## Revised Project Schedule and Milestone Plan

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Early Start Date</th>
<th>Early Finish Date</th>
<th>Late Start Date</th>
<th>Late Finish Date</th>
<th>Milestone Date</th>
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<tbody>
<tr>
<td>Develop/Modify Plans</td>
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<td>03/31/94</td>
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<td>Subcontracts and Supplies</td>
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<td>05/15/95</td>
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<td>Equipment Testing and Shakedown</td>
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<tr>
<td>All Other Permits Received</td>
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<td>03/28/95</td>
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<td>Pre-Demonstration Soil Sampling/Analysis</td>
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<td>03/10/95</td>
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<tr>
<td>Install Treatment System</td>
<td>02/13/95</td>
<td>05/10/95</td>
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<td>Cool Down</td>
<td>06/06/95</td>
<td>07/03/95</td>
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<td>Equipment Removal, Decon., &amp; Demob.</td>
<td>09/05/95</td>
<td>07/17/95</td>
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<td>Post Demonstration Soil Sampling/Analysis</td>
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<td>Final Report Preparation &amp; Draft Review</td>
<td>07/05/95</td>
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<td>09/27/95</td>
<td>09/27/95</td>
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**Symbol legend**
- **CRITICAL TASK**
- Non-critical task
- Float time
- Completed task
- Non-completed milestone
- Completed milestone
- Today's date

**Project**: DT&E OF IN SITU SOIL HEATING
**Leader**: G. Sresty

Figure 1. Revised Project Schedule and Milestone Plan
Table 2. Cost Plan

<table>
<thead>
<tr>
<th>ELEMENT REPORTING CODE ELEMENT</th>
<th>PLAN FOR CURRENT FISCAL YEAR (FY'95)</th>
<th>Future Fiscal Years</th>
<th>Subsequent Fiscal Years</th>
<th>Total Fiscal Years</th>
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<td></td>
<td>Plan Prior Fiscal Years</td>
<td>Actual This Fiscal Yr. Feb</td>
<td>Mar</td>
<td>Apr</td>
</tr>
<tr>
<td>1 DT&amp;E of Insitu Heating of Soil</td>
<td>$863,765</td>
<td>$149,273</td>
<td>$78,337</td>
<td>$21,000</td>
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<tr>
<td>Total</td>
<td>$863,765</td>
<td>$149,273</td>
<td>$78,337</td>
<td>$21,000</td>
</tr>
</tbody>
</table>

DOLLARS EXPRESSED IN: PLAN: Rounded to nearest thousand dollars for FY'95
ACTUAL: rounded to nearest dollar.

SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE: [Signature] 3/6/95
SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE & DATE: [Signature] 3/6/95
Figure 2. Cost Plan, By FY '95 Month
COST PLAN (REVISION 2)  
(March 2, 1995)

Figure 3. Cost Plan, Cumulative