

JAN 28 1994

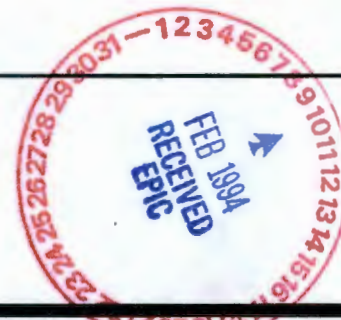
11

ENGINEERING DATA TRANSMITTAL

1. EDT 600870

Station # 12

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Geosciences	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: 81235	6. Cog. Engr.: E. C. Thornton	7. Purchase Order No.: N/A
8. Originator Remarks:		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks:		12. Major Asm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 1/24/94



15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Impact Level	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-EN-ES-042		0	Selection of a Field Demonstration Site for In Situ Chemical Treatment of Soil Testing Activities	4	1	1	

16. KEY		
Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

(G)		(H)	17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)					(G)	(H)
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2/1	1	Cog. Eng. E. C. Thornton	<i>E.C. Thornton</i>	1-24-94	G. T. Berlin	L0-18		3	
2/1	1	Cog. Mgr. R. L. Jackson	<i>R.L. Jackson</i>	1-24-94	R. D. Miller	H6-06		3	
		QA			M. E. Peterson	K2-47		3	
		Safety			EPIC (2) (1)	H6-08		3	
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18. E. C. Thornton <i>E.C. Thornton</i> 1-24-94 Signature of EDT Date Originator	19. <i>R.L. Jackson</i> 1/24/94 <i>R.L. Jackson</i> Authorized Representative Date for Receiving Organization	20. <i>R.L. Jackson</i> 1/24/94 R. L. Jackson Cognizant/Project Date Engineer's Manager	21. DOE APPROVAL (if required) Ltr. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
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List attachments.				
Date Release Required January 28, 1994				

Title Selection of a Field Demonstration Site for In Situ Chemical Treatment of Soil Testing Activities
 Unclassified Category: UC-
 Impact Level: 4

New or novel (patentable) subject matter? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes If "Yes", has disclosure been submitted by WHC or other company? <input type="checkbox"/> No <input type="checkbox"/> Yes Disclosure No(s).	Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Identify)
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Publication Services	<input checked="" type="checkbox"/>	<input type="checkbox"/>	L.A. Brown		1/21/94
Other Program/Project	<input type="checkbox"/>	<input checked="" type="checkbox"/>			

Information conforms to all applicable requirements. The above information is certified to be correct.

References Available to Intended Audience	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Transmit to DOE-HQ/Office of Scientific and Technical Information	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
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E. C. Thornton <i>E.C. Thornton</i>	1-20-94
Intended Audience	
<input type="checkbox"/> Internal <input type="checkbox"/> Sponsor <input checked="" type="checkbox"/> External	
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R. L. Jackson <i>R. L. Jackson</i>	1/20/94

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SUPPORTING DOCUMENT		1. Total Pages 9
2. Title Selection of a Field Demonstration Site for In Situ Chemical Treatment of Soil Testing Activities	3. Number WHC-SD-EN-ES-042	4. Rev No. Rev. 0
5. Key Words In Situ Chemical Treatment Field Demonstration Chromium <div style="text-align: center;"> APPROVED FOR PUBLIC RELEASE </div>	6. Author Name: E. C. Thornton <i>E.C. Thornton</i> 1-20-94 Signature Organization/Charge Code 81235/HIDAA	
7. Abstract <i>v. Burkland 1/24/94</i> Selection of site for a field demonstration of the In Situ Chemical treatment approach is a milestone deliverable for TTP# RL431001. Discussions conducted with the staff of the DOE In Situ Remediation Integrated Program and the DOE Mixed Waste Landfill Integrated Program have lead to the identification of a suitable field site located in the Chemical Waste Landfill at Sandia Nation Laboratories. This document presents the criteria utilized to make this decision and summarizes activities that will be undertaken to support the demonstration.		
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9. Impact Level 4		

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1.0 INTRODUCTION

Funding has been provided to the Westinghouse Hanford Company (WHC) during FY93 and FY94 by the U.S. Department of Energy (DOE) In Situ Remediation Integrated Program (ISRIP) to undertake developmental activities directed towards the in situ treatment of contaminated soils using reactive gases (TTP# RL431001). A milestone associated with this work is the selection of a waste site by February 1, 1994, for continuing laboratory tests and a field demonstration. This document is intended to satisfy this milestone by identifying the demonstration site selected and by providing justification for the selection. A field demonstration will be conducted by WHC during FY95 at the site under the support of ISRIP and the operator of the site.

2.0 CRITERIA FOR SITE SELECTION

Discussions have been conducted with staff associated with ISRIP and with the staff of the environmental restoration program at the Hanford Site and at several other DOE sites as a means of identifying a suitable test site. In particular, a waste site containing soil contaminated with hexavalent chromium at a concentration of at least several hundred parts per million has been sought. Additional considerations associated with the site selection process have included the following:

- favorable site geotechnical characteristics (e.g., soil permeability and homogeneity)
- adequate site characterization information (e.g., distribution of contamination)
- availability of site support resources (e.g., engineering, drilling, analytical).

It is considered necessary that the operator of a candidate site indicate a willingness to provide or collect sufficient site characterization data to support the demonstration and also offer to provide and coordinate support services such as site preparation, monitoring, and drilling activities at the operator's expense. The host should also have a good working relationship with regulatory personnel so as to expedite completion of regulatory approval requirements (e.g., permits and cleanup performance criteria).

3.0 SELECTION OF DEMONSTRATION SITE

The criteria identified above were utilized to evaluate several candidate waste sites. In addition, soils from the Hanford Site, Fernald/Feed Materials Production Center, and Sandia National Laboratories (SNL) have been obtained and utilized in laboratory testing activities. These tests suggest

that the gas treatment approach should be viable for chromate-contaminated soils at the Hanford Site and at Sandia. However, a suitable waste site has not yet been identified at the Hanford Site due to insufficient characterization data regarding chromium distribution.

The most promising location for a field test that has been identified to date is at SNL in Albuquerque, New Mexico. The Chemical Waste Landfill, which is associated with the Mixed Waste Landfill Integrated Demonstration (MWLID), contains a collection of landfills and disposal cells that have received chromium and various acids and organic solvents. These sites do not contain radioactive wastes. The MWLID is hosting several demonstrations of innovative technologies, and discussions between MWLID and ISRIP staff have resulted in an expression of interest in undertaking a demonstration of the in situ chemical treatment approach at the Chemical Waste Landfill.

A visit was made to Albuquerque by WHC staff on December 2 and 3, 1993, to obtain information to better evaluate the potential of a field demonstration. Mr. Jim Phelan of SNL, who is the technical coordinator of MWLID, acted as host. He covered many of the geotechnical aspects and introduced the WHC personnel to other MWLID staff, who provided information regarding other important aspects of the demonstration. A visit was made to the Chemical Waste Landfill, where a section referred to as the 60's pits was examined. One of the disposal cells among these pits has been selected as the candidate demonstration site. A horizontal borehole drilled beneath the 60's pits provided soil samples with chromium concentrations as high as 16,000 ppm at a depth of 20 ft below the demo site. The surface dimensions of the cell is approximately 6 ft wide and 15 ft long. The pit is presently buried, but can be roughly outlined by geophysical data and engineering drawings.

The visit ended with a meeting that served to define major activities and issues associated with the demonstration. The three areas discussed included regulatory, technology development, and site preparation and characterization issues that need to be addressed during FY94. The attached letter (Attachment 1) identifies specific issues or activities associated with these areas. Actions assigned at the meeting were as follows:

- SNL will meet with the New Mexico Environmental Division to identify any regulatory barriers related to the field demo
- WHC will prepare a FY94 research plan that will address the issues related to technology development
- SNL will drill a single vertical borehole through the disposal cell to obtain samples for detailed geotechnical and chemical characterization of the site.

Mr. Phelan also provided a substantial package of information related to site characterization activities that have been conducted at the Chemical Waste Landfill. This material should be valuable in defining the basic configuration and requirements of the treatment system.

4.0 CONCLUSIONS

Further laboratory and field testing activities will be directed towards completion of a field demonstration of the in situ chemical treatment approach at the MWLID Chemical Waste Landfill. This decision is based on the favorable site characteristics associated with a specific waste site located within the landfill. A significant amount of characterization data is also available for the Chemical Waste Landfill and data exist that indicates that soils beneath the disposal cell are contaminated with chromium. Staff associated with MWLID have indicated their intention to host the demonstration and to provide necessary site support.

The major FY94 activities related to support of the demonstration include initiation of discussions with regulators, performance of technology development activities, and acquisition of site characterization data. Progress in these areas will be presented in a milestone report due at the end of FY94 as indicated in TTP# RL431001. This document, referred to as the demonstration plan, will continue to be modified and expanded during FY95 as issues related to the demonstration are clarified, and required lab and field data are obtained.

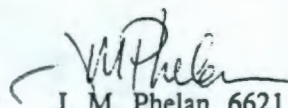
Attachment 1

Sandia National Laboratories

Albuquerque, New Mexico 87185

date: December 6, 1993

to: J. E. Nelson, 6621

from: 
J. M. Phelan, 6621

subject: Preparations for FY95 Implementation of the Westinghouse Hanford Company Gaseous Reduction of Chromium Project

The In-Situ Remediation Integrated Program (ISRIP) has invested in the subject project in FY93 and FY94 to bring the technology up to the field demonstration stage. The results of FY93 (Thornton, E., et.al., 1993) show very promising results; with chromium (VI) treatment efficiencies greater than 90% in lab scale experiments. The effort in FY94 will include additional lab and bench scale experiments to better understand the applicability and limitations of the technology. The target year for field demonstration at a contaminated site is FY95.

On December 2-3, 1993, Ed Thornton, Rand Miller and Ron Jackson of Westinghouse Hanford Company came to Sandia to discuss the needed preparations for the FY95 field demonstration. Attached is the agenda. The meeting concluded with a summary of issues that need to be resolved in FY94 in order to be prepared for the FY95 field demonstration. The following summarizes these issues:

1.0 REGULATORY ACCEPTANCE/PERFORMANCE CRITERIA FOR H₂S GAS INJECTION INTO THE TREATMENT ZONE

- 1.1 Will the gas injection/extraction system cause the subsurface contamination of any hazardous constituents (e.g. chromium, other metals, VOC's) to become worse (e.g. more mobile, greater volume) or preclude future remediation methods?
- 1.2 What is an acceptable level of residual treatment gas (H₂S) that can be left in the subsurface after completion of the project?

Action - SNL will take the lead to meet with the NMED (coordinated through DOE/KAO) to assess regulatory barriers to a field demonstration. WHC will come to NM to describe the technology to NMED.

Schedule - Completion by February, 1994

2.0 TECHNOLOGY DEVELOPMENT ISSUES

- 2.1 What is the lowest concentration vs. time combination that will produce efficient chromium reduction?
- 2.2 Are the treatment efficiencies affected by the chromate phase and/or species?
- 2.3 What type of H₂S waste gas management/recovery/recycle system is needed?

- 2.4 What is the best design for a subsurface flow cell that minimizes fugitive releases from the cell?
- 2.5 What are the purge times in lab scale experiments to remove the residual H₂S gas from soil?
- 2.6 What engineering measures are necessary for adaptation of the injection/collection system for field scale use?
- 2.7 What are the regulatory treatment objectives that this technology could meet (TCLP leach and hazardous waste identification criteria, CWA standards for pore liquids through a water leach, RCRA Subpart S standards for soil)?
- 2.8 What are the field safety measures necessary for use of H₂S?

Action - WHC will prepare an FY94 research plan that will address the above issues. SNL will provide input during preparation and review to insure technology is prepared for the FY95 field demonstration.

Schedule - Completion by February 1994.

3.0 SITE PREPARATION ISSUES

- 3.1 What is the size and concentration of the chromium plume at the Chemical Waste Landfill, 60's Pits?
- 3.2 What are the other co-contaminants (e.g. other metals, VOC's) that are present in the subsurface of the 60's pits?
- 3.3 What are the geochemical phases and species present in the subsurface of the 60's pits?
- 3.4 What is the chromate distribution on soil particle size fractions?
- 3.5 What are the soil physical properties in the treatment zone (air permeability, water content, texture, etc.)?

Action - SNL will take the lead to drill a single borehole through the disposal cell of the 60's pits and obtain samples necessary to answer the above questions. WHC will provide input and review of the sampling and analysis plans.

Schedule - Drilling completed by March 1994.
Analyses completed by July 1994.

4.0 FY95 IMPLEMENTATION ASSIGNMENTS

- 4.1 What will be the distribution of work between SNL and WHC for the FY95 field demonstration?

Action - Continued discussions between SNL and WHC will take place to identify the most practical work assignments.

Schedule - Completed by February 1994 (when FY95 TTPs are due).

References:

Thornton, E.C., M. A. Baechler, M. A. Beck, and J. E. Amonette, 1993. Laboratory Evaluation of the Hydrogen Sulfide Gas Treatment Approach for Remediation of Chromate, Uranium (VI), and Nitrate-Contaminated Soils. Westinghouse Hanford Company, Richland, Washington. September 23, 1993 (draft).

The project team to get prepared for this technology demonstration may include the following MWLID principals: Floran and Helgesen (Landfill Characterization and Monitoring System), Phelan and Stein (Geochemical Controls on Chromium Mobility), Phelan (Remedial Options Study), Olsen (Adsorptive Stripping Voltammetry); and, members of the Chemical Waste Landfill Environmental Restoration Program project (Ardito, Reaber). I will initiate discussions with each potential team member in order to determine the best arrangement to complete these preparations.

Copy to:

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6621 GRC File

In-Situ Gaseous Reduction of Chromate and Uranium Ed Thornton, Westinghouse Hanford Company

**Technology Development
with the In-Situ Remediation Integrated Program (FY93/94)**

**Technology Demonstration
with the Mixed Waste Landfill Integrated Demonstration (FY95)**

for more info, call Jim Phelan (6621) at 845-9892

Thursday - December 2, 1993 Building 823/Room 3081

- 1:00 pm Review objectives of the site visit
- 1:30 pm Seminar - Laboratory Evaluation of the Hydrogen Sulfide Gas Treatment Approach for Remediation of Chromate, Uranium (VI), and Nitrate-Contaminated Soils
- 2:30 pm Chemical Waste Landfill
 Chromate contamination - Unlined Chromic Acid Pit, 60's Pits
 Site soil physical properties
 Site Facilities - power, water, MWLID field engineering staff
 Regulatory Requirements (RCRA Interim Status Landfill undergoing Closure)
 SNL Site ES&H Requirements
- 3:30 pm Site Visit - Chemical Waste Landfill
- 5:00 pm Adjourn

Friday - December 3, 1993 Building 823/Room 3081

- 8:00 am Technology Demonstration Issues to be Resolved in FY94
 Technology system requirements
 Site assessments needs
 Regulatory strategies
 Health and safety issues
- 10:00 am Adjourn