INEL 95/00466
CONF-960212--14

Site Remediation Session 44 - Wednesday, February 28, 1996

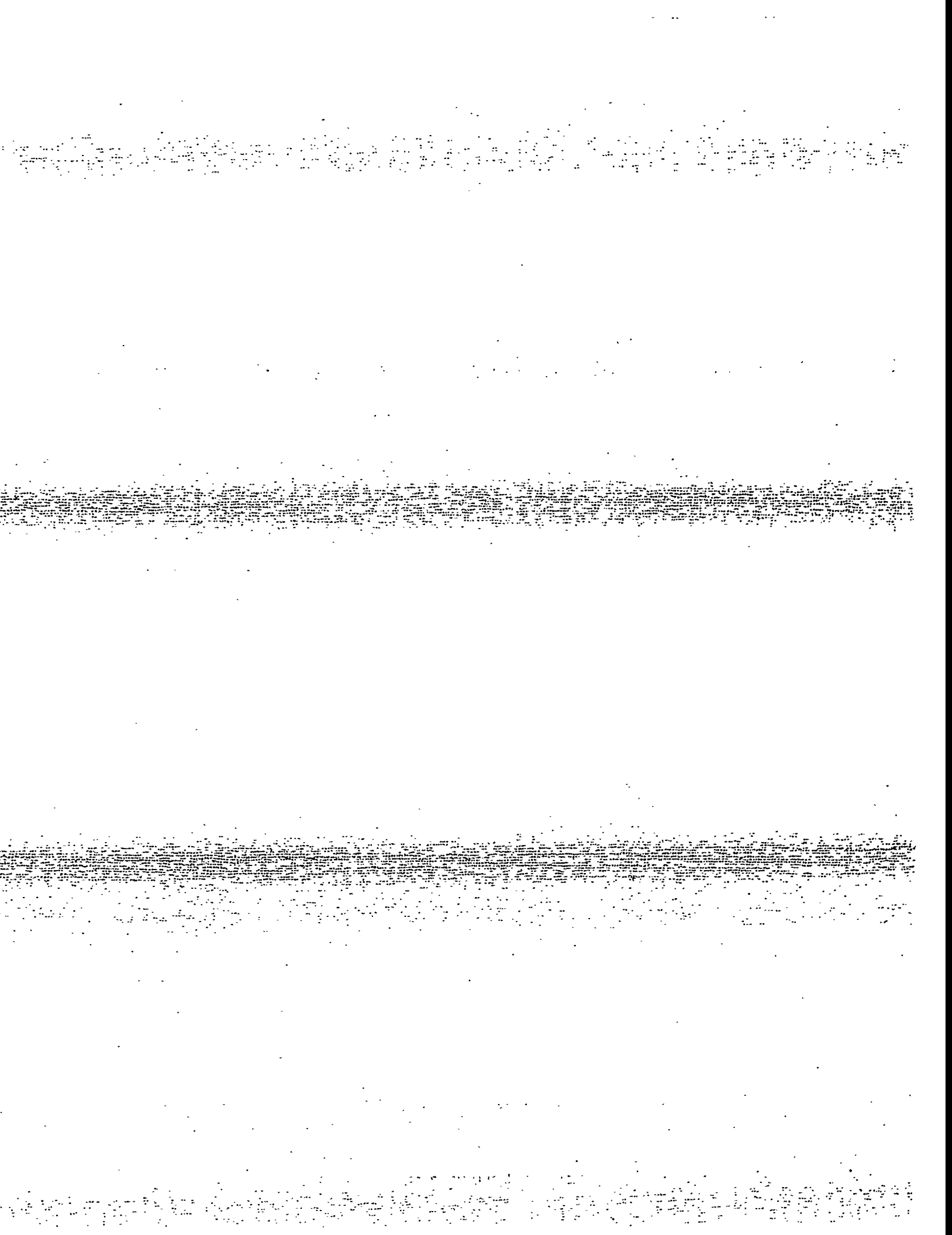
Remediating the INEL's Buried Mixed Waste Tanks

Douglass J. Kuhns, Lockheed Idaho Technologies Company
Gretchen E. Matthern, Lockheed Idaho Technologies Company
Craig L. Reese, Parsons Engineering Science, Inc.

ABSTRACT

The Idaho National Engineering Laboratory (INEL), formerly the National Reactor Testing Station (NRTS), encompasses 890 square miles and is located in southeast Idaho. In 1949, the United States Atomic Energy Commission, now the Department of Energy (DOE), established the NRTS as a site for the building and testing of nuclear facilities. Wastes generated during the building and testing of these nuclear facilities were disposed within the boundaries of the site. These mixed wastes, containing radionuclides and hazardous materials, were often stored in underground tanks for future disposal.

The INEL has 11 buried mixed waste storage tanks regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) ranging in size from 400 to 50,000 gallons. These tanks are constructed of either stainless or carbon steel and are located at 3 distinct geographic locations across the INEL. These tanks have been grouped based on their similarities in an effort to save money and decrease the time required to complete the necessary remediation. Environmental Restoration and Technology Development personnel are teaming in an effort to address the remediation problem systematically.



Site Remediation Session 44 - Wednesday, February 28, 1996

Remediating the INEL's Buried Mixed Waste Tanks

Douglass J. Kuhns, Lockheed Idaho Technologies Company
Gretchen E. Matthern, Lockheed Idaho Technologies Company
Craig L. Reese, Parsons Engineering Science, Inc.

INEL BACKGROUND

The Idaho National Engineering Laboratory (INEL), formerly the National Reactor Testing Station (NRTS), encompasses 890 square miles and is located in southeast Idaho (Fig.1). In 1949, the United States Atomic Energy Commission, now the department of Energy (DOE), established the NRTS as a site for the building and testing nuclear facilities. Wastes generated during the building and testing of these nuclear facilities were disposed within the boundaries of the site. These mixed wastes, containing radionuclides and hazardous materials, were often stored in underground storage tanks for future disposal. At present, the INEL supports engineering and operations efforts for the DOE and other Federal agencies in areas of nuclear safety, research, reactor development, reactor operations and training and waste management technology development to name a few. The DOE Idaho Field Office (DOE-ID), having responsibility for the INEL, designates authority to operate the INEL to contractors. The primary contractor for the DOE-ID at the INEL is Lockheed Idaho Technologies Company (LITCO), which provides managing and operating services to the majority of INEL facilities. The remedial design/remedial action contractor for LITCO at the INEL is Parsons Engineering Science, Inc..

BURIED MIXED WASTE TANKS

The INEL has 11 buried mixed waste storage tanks regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) ranging in size from 400 to 50,000 gallons. These tanks are constructed of either stainless or carbon steel and are located at 3 distinct geographic locations across the INEL. These tanks have been grouped based on their similarities in an effort to save money and decrease the

time required to complete the necessary remediation. Environmental Restoration and Technology Development personnel are teaming in an effort to address the remediation problem systematically.

The radionuclide contamination associated with the majority of the tanks is present at levels which will require remote handling techniques. In addition, the contents in at least one of the tanks meets the definition of transuranic waste (i.e. greater than 100 nanocuries/gram). Other contaminants of concern include volatile organics, heavy metals, and poly-chlorinated biphenyls.

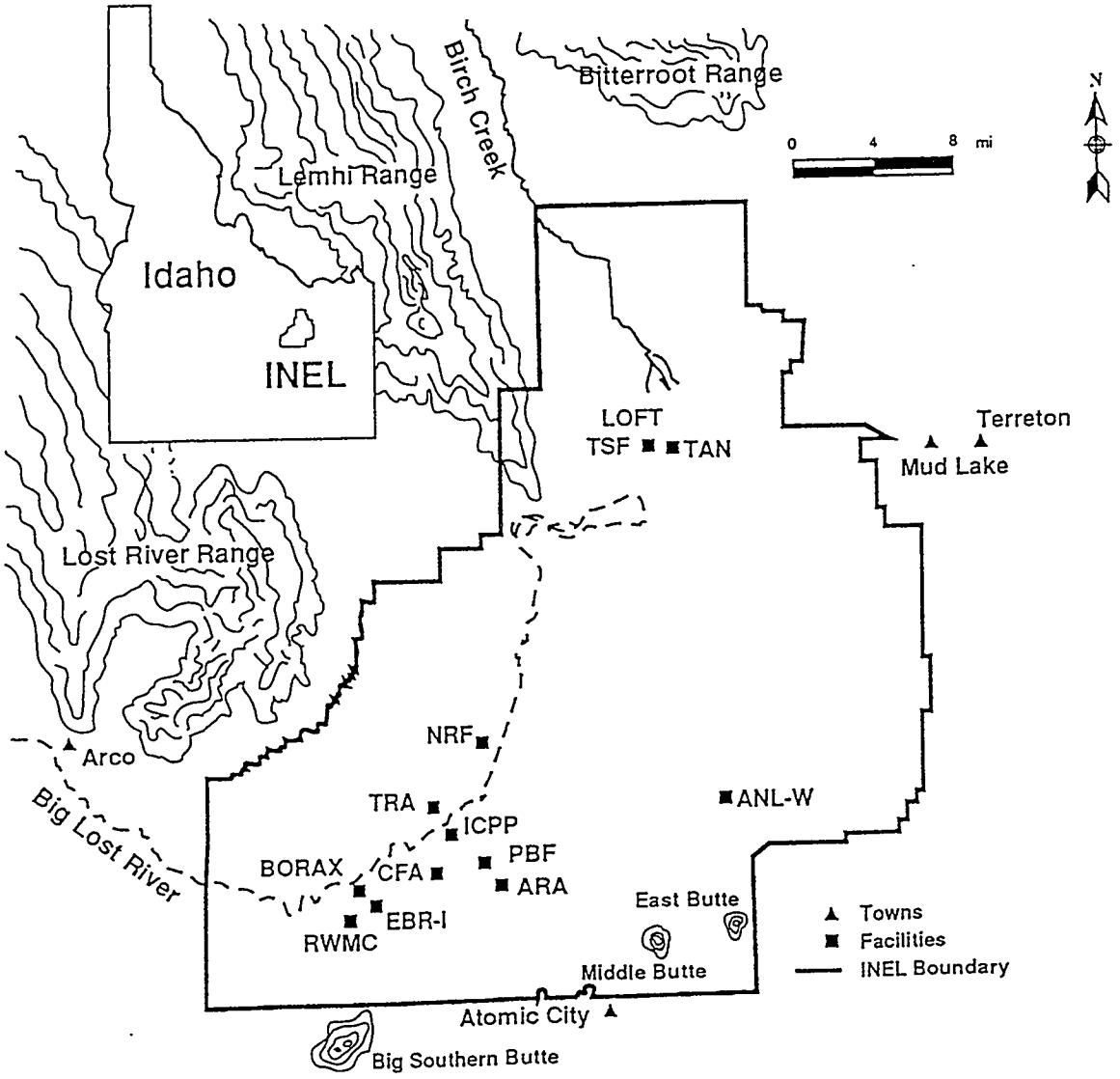
The physical form of the waste contained in the tanks is a mixture of solid, sludge, miscellaneous debris and liquid. Studies were recently conducted to determine the approximate waste volume and radiological reading in each tank. Visual inspection was also performed using remote control techniqes to determine relative tank integrity and impediments to tank pumping or mixing.

Work on the tank project is being performed in accordance with CERCLA. As such, project personnel must abide by regulations such as the CERCLA, Resource Conservation and Recovery Act, Toxic Substances Control Act, Clean Water Act, Clean Air Act, etc. In addition the tanks are a part of the INEL's Federal Facility Agreement and Consent Order where the DOE, Environmental Protection Agency and state of Idaho jointly work to solve remediation problems at the INEL. These three parties are kept apprised of the status of activities concerning the tank project and they will concur with any actions taken to remediate them.

The successful remediation of the INEL tanks will have benefits nationwide (and possibly worldwide) since many other areas with similar problems have not yet begun dealing with this challenge. The general strategy being applied to the tank project is to investigate the tanks in stages where each stage is completed at a specific decision point. The goal is to take advantage of the decision points to defensibily select a solution for each tank and implement that solution. A systems engineering approach is being used to reach a decision for each tank.

(Place Fig. 1 here.)

Fig. 1
Map of the Idaho National Engineering Laboratory



*ILLUSMISC0714-1112\INEL FACILITIES MAP.EPS

ANL-W	Argonne National Laboratory-West
ARA	Auxiliary Reactor Area
BORAX	Boiling Water Reactor Experiment
CFA	Central Facilities Area
EBR-I	Experimental Breeder Reactor-I
ICPP	Idaho Checmial Processing
LOFT	Loss-of-Fluid Test Facility
PBF	Power Burst Facility
RWMC	Radioactive Waste Management Complex
TAN	Test Area North
TSF	Technical Support Faiclity
TRA	Test Reactor Area

Figure 1

Fig. 2 depicts the decision process flow diagram.

This combination of contaminants, regulatory environment, physical location, and tank construction poses an interesting problem for the remediation engineer.

TANK V-9

The remaineder of this paper focusses on the remediation of one specific tank (referred to as "V-9"), the schedule, and finally conclusions reached to date.

The capacity of V-9, a sand filter tank, is 400 gallons; it is constructed of stainless steel and it has never been sampled. Based on historical records this tank was used for one day 40 years ago and then usage was discontinued because the sand filter clogged. Consequently project personnel are unaware of the level of contamination associated with the tank.

Tank V-9 is to be remediated through a cooperative arrangement between the DOE's Environmental Restoration (ER) Program and the Office of Technology Development (TD) with a carefully integrated scope, schedule and budget. ER and TD personnel have recognized the opportunity presented by the technical challenges of remediating mixed waste tanks and are using the expertise of each group to produce a technical and cost effective solution for Tank V-9. ER is contributing their expertise in preparing health and safety, CERCLA, and regulatory documentation and in coordinating and managing complex field operations and full scale systems. TD is contributing its expertise in field scale demonstrations of innovative techniques and in the application of commercial technology to new areas. This team approach provides the optimal solutions for the tank project and it will facilitate the transfer of the selected technologies to other sites.

(Place FIG. 2 here)

Fig. 2
Decision process flow diagram for remediating tanks.

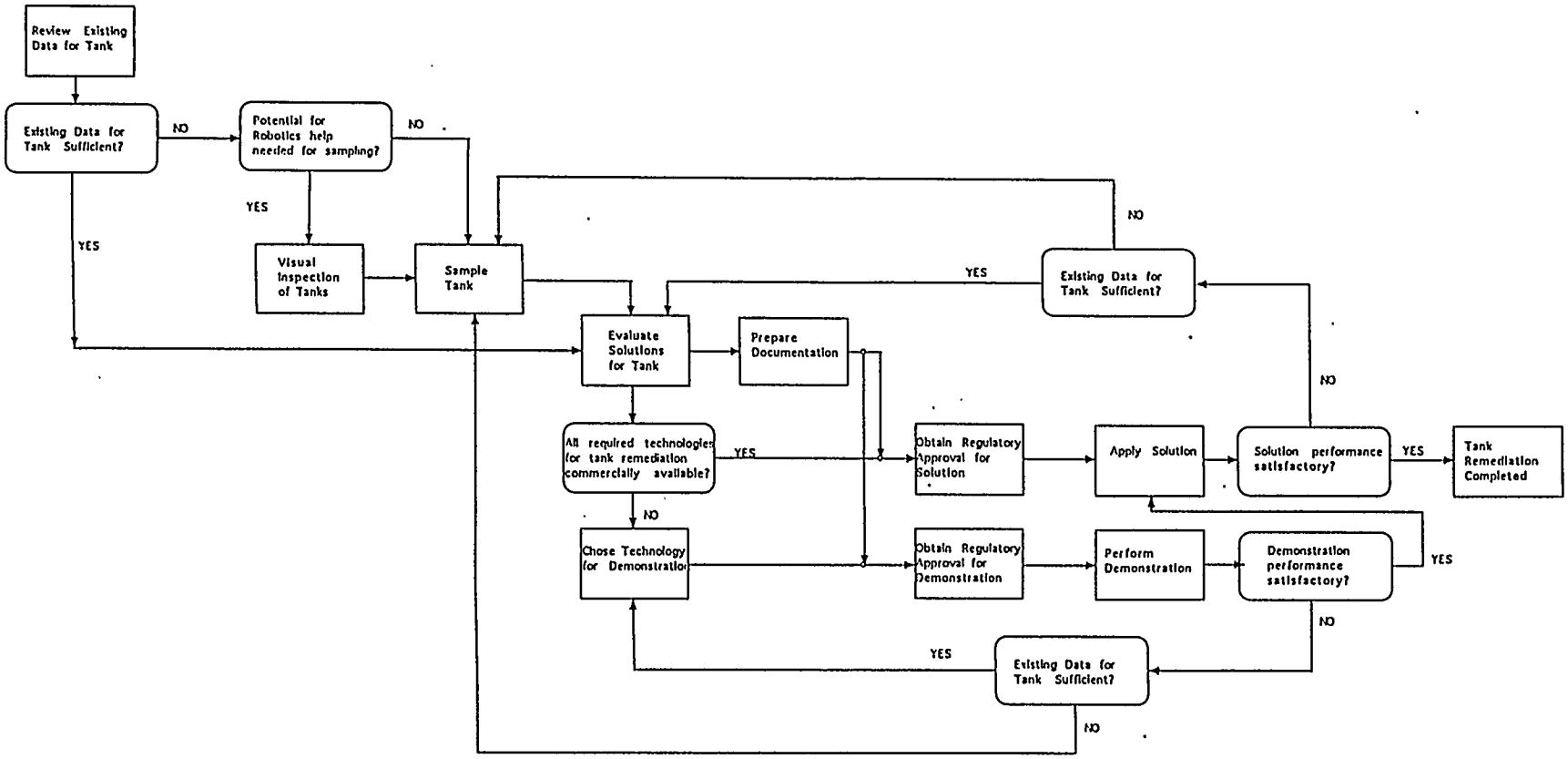

Review Existing Data for Tank
Existing Data for Tank Sufficient?
NO
Potential for Robotics help needed for sampling?
NO
YES
YES
Visual Inspection of Tanks
Sample Tank
NO
YES
Existing Data for Tank Sufficient?
Evaluate Solutions for Tank
Prepare Documentation
NO
All required technologies for tank remediation commercially available?
YES
Obtain Regulatory Approval for Solution
Apply Solution
Solution performance satisfactory?
YES
Tank Remediation Completed
NO
Chose Technology for Demonstration
Obtain Regulatory Approval for Demonstration
Perform Demonstration
Demonstration performance satisfactory?
YES
NO
YES
Existing Data for Tank Sufficient?
NO

Figure 2

THE PROBLEM

The goal of the INEL buried mixed waste tank project is to answer the following questions and implement the results for each tank or set of tanks while keeping in mind all regulatory, technical, and management factors. Answering these questions provides the criteria which serve as the foundation upon which work is being conducted to remediate tank V-9 this year:

- What is the preferred alternative for the tank using the CERCLA evaluation criteria?
- Will the contents of the tank be removed?
- If the contents are not removed, what are the requirements for monitoring and/or stabilization and how will they be implemented?
- After removal, where and how will the contents of the tanks be treated and stored or disposed?
- What requirements must be met for the contents to be stored or disposed?
- What requirements must be met for the contents to be treated?
- How can ER and TD team to solve the problem?
- What technologies are available to minimize personnel exposure for all activities ranging from sampling to grouting to removal and disposal?

The INEL has begun the implementation phase of the tank project in order to answer these questions through the remediation of tank V-9.

The Plan

As previously stated this particular type of work has not yet been performed within the DOE system. Significant interest exists within the DOE as well as in the private sector to see how this project progresses. The tank project at the INEL will provide useful baseline information for mixed waste tank remediation world-wide. Key aspects and the associated schedule of the remediation plan for V-9 include:

- Compilation of all existing data - complete
- Characterization of tank contents to gather data to support risk assessments and treatability studies - summer, 1996
- Grouting of the tank - summer, 1996
- Monitoring of the grouted tank - summer, 1996 to spring, 1997
- Preparation of documentation (sampling plan, health and safety plan, safety analysis documentation, environmental documentation, etc.) - spring, 1996 through spring, 1997
- Removal, evaluation, and disposal of the tank and its contents (summer 1997)

In the case of V-9 the INEL buried mixed waste tank project is moving ahead with a treatment demonstration to grout the contents in a manner such that they can be easily retrieved, analyzed and retreated if necessary. The plan includes the sampling and grouting of the tank contents followed by monitoring using tracer tests for six (6) months. Removal of the tank and its contents is scheduled for the summer of 1997. During this removal, the grouted material will be sampled and analyzed to determine the success of the grouting demonstration. Final disposal of the waste form will also take place in 1997.

Conclusions

This paper discusses the work completed to date as well as future efforts (sampling, grouting, monitoring, removal, and disposal) for tank V-9. The results from this important activity will directly impact future decisions regarding grouting work at the INEL and elsewhere. Consequently, lessons learned from this project will be applicable to other government agencies as well as the private sector in remediating mixed waste tanks. Periodic status reports regarding the progress of this project are available from the authors. The results of this work will also be discussed in future publications.