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United States Government

Department of Energy

memorandum

Ohio Field Office

DATE: NOV 05 1997

DOE-0112-98

REPLY TO ATTN OF: FEMP:R.J. Janke

SUBJECT: TRANSMITTAL OF THE DEPLOYMENT PLAN: AN INTEGRATED TECHNOLOGY SUITE FOR COST-EFFECTIVELY DELINEATING CONTAMINATION IN SOILS IN SUPPORT OF SOIL REMEDIAL ACTIONS AND FERNALD ENVIRONMENTAL MANAGEMENT PROJECT COMMITMENT TO ITS DEPLOYMENT

TO: J. M. Wilcynski, Manager, DOE-ID

The purpose of this letter is twofold, (1) transmit the Deployment Plan detailing the deployment of an Integrated Technology Suite for Cost-Effectively Delineating Contamination in Soils in Support of Soil Remedial Actions, and (2) commit the Department of Energy, Fernald Environmental Management Project (DOE-FEMP) to implement and deploy the technologies outlined in the subject plan. This Deployment Plan proposes to integrate, implement, and deploy four unique technologies to reduce DOE soil remediation costs by an estimated $36 million over Fiscal Year 1998 to 2006 at the FEMP, enabling the DOE accelerated remediation plan to be met. The DOE-FEMP will ensure that the FEMP dedicates the necessary resources needed to conduct the outlined implementation and deployment tasks, provided the DOE Office of Science and Technology funds the project as proposed.

The real-time field systems outlined in the Deployment Plan will replace the high-cost, and time/labor intensive soil sampling and analysis program originally envisioned in the baseline budget remediation plan for the FEMP, which was estimated to last 13-15 years. The current soils baseline remediation plan specifies the utilization of real-time technologies to collect the data needed to support excavation designs, ensure compliance with the established Waste Acceptance Criteria (WAC) developed for the On-Site Disposal Facility (OSDF), and perform certification readiness testing.

If you or your staff should have any questions, please contact Robert Janke at (513) 648-3124.

for Robert Folker
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U. S. Department of Energy

Fernald Environmental Management Project

Technology Deployment Initiative

Deployment Plan

DEPLOYMENT OF AN INTEGRATED TECHNOLOGY SUITE FOR COST-EFFECTIVELY DELINEATING CONTAMINATION IN SOILS IN SUPPORT OF SOIL REMEDIAL ACTIONS

by

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October 31, 1997
Revision 0.0

Technology Deployment Initiative Proposal

Title: Deployment of an Integrated Technology Suite for Cost-Effectively Delineating Contamination in Soils in Support of Soil Remedial Actions

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Executive Summary

The DOE is faced with the overwhelming task of remediating millions of cubic yards of contaminated soils throughout its nuclear weapons manufacturing complex. Cost-effective and timely identification and characterization of these contaminants is essential to meet remediation schedules and budgets. This TDI deployment plan proposes to integrate, implement and deploy four unique EM50 technologies to reduce DOE soil remediation costs by about $36M at the Fernald Environmental Management Project (FEMP) between FY98 and FY06, enabling the DOE's accelerated remediation plan to be met. Multiple deployments will be conducted at the Fernald site. Subsequent deployments are proposed at TDI-partner sites. The proposed TDI project will be conducted in FY98 through FY00 with TDI funding of $3.3M, yielding a Return On Investment (ROI) of about 11:1. Co-funding of about $11M will be provided by the DOE-FEMP project team over the 3 year life of the TDI work at Fernald.

The combined real-time field systems will replace and/or support the high-cost, and time/labor intensive soil sampling and analysis program described in the baseline remediation plan at Fernald, which was estimated to last 13-15 years. Following implementation, deployment is proposed at eight additional Fernald areas. Redeployment will also be pursued at partner sites.

Field technologies identified for implementation and deployment at the Fernald site include: a) the mobile Radiation Tracking (RTRAK) system, with sodium iodide detectors and Global Positioning System (GPS) to rapidly detect and locate gamma-emitting radionuclides in surface soils; b) portable high-purity Germanium (HPGe) sensors for *in situ* gamma spectrometry; c) INEEL's Warthog system for 3D real-time excavation screening support; and d) SitePlanner™ and Plume™ software packages to provide data analysis for decision support. Initial testing and demonstration of a partially integrated system is in progress; TDI funding is required to fully integrate and implement the real-time system. Savings to DOE will be specifically realized by: a) reducing high-cost, off-site lab analysis and delays; b) reducing operating expenses at the Fernald laboratory; c) reducing the number of physical samples required with resulting costs and time delays; d) reducing field operations delays and stand-by expenses; and e) enabling the accelerated remediation plan to be met.

As important as the individual technologies is the fact that, if successful, this TDI deployment will set precedents for the use of real-time technologies across the complex. As an example, although *in situ* HPGe systems have been available for more than a decade, they are still considered developmental by the regulatory community.

With a proven record of success in OST technology development projects, the FEMP will use its expert management and technical staff, its working relationships with regulators and designated partners, and demonstrations infrastructure to ensure successful deployment. The initial focus of this deployment effort is to implement and perform multiple applications at Fernald of an integrated, "adaptive sampling and analysis program" (ASAP) approach to data collection. This approach will be based on high-quality, real-time information and decision-making, eliminating the standard labor-intensive and time-consuming field procedures.

Subsequent and parallel deployments at DOE-partner sites during FY99 will be arranged in FY98. Quarterly status reports will be distributed through the DOE-Fernald Internet home page. As partner to this project, the Ohio Environmental Protection Agency (OEPA) will help ensure regulatory interface and compliance. Additional Federal partners in this deployment include: Argonne National Lab (ANL), developers of decision software packages; the DOE Environmental Measurements Laboratory (EML), developers of sensor technologies; Idaho National Engineering and Environmental Laboratory (INEEL), owners of the Warthog technology, and DOE-FEMP and its Site Technology Coordination Group (STCG) and area stakeholder groups. Information about the Fernald soils program, real-time data collection technologies, and this TDI project will be disseminated in part through a Web page dedicated for these purposes: www.ead.anl.gov/~fernald.

1.0 Introduction and Background

During operations extending from the 1950's to 1980's, multi-media contamination occurred at the FEMP facility in southwestern Ohio. Included in these media are an estimated 2.6M cubic yards of contaminated soils, spread over more than 1,000 acres. Primary contaminants of concern include uranium, thorium and radium; secondary contaminants include RCRA metals and organics. The selected remedy for the FEMP requires soil excavation, segregation and placement of most wastes in an engineered on-site disposal facility (OSDF). Materials exceeding the waste acceptance criteria (WAC) of 1030 ppm total U for the OSDF will be shipped to one or more approved off-site disposal facilities.

The most direct method for reducing soil remediation costs at DOE facilities is to ensure that remediation is confined only to those soils truly requiring attention, and that the process of discerning between contaminated and uncontaminated soils is as rapid, accurate and cost-effective as possible. The easiest means for accelerating soil remedial actions is to allow remedial-action decision-making to take place "on-the-fly". This TDI project exploits these opportunities by offering an alternative to the baseline procedure for identifying soil contamination levels before, during and after excavation. The FEMP baseline depends on the use of standard labor-intensive, time-consuming and high-cost field sample collection with laboratory analyses.

This TDI deployment plan presents a suite of proven EM-50 sponsored technologies that, taken together: (1) provide a turn-key solution to the problem of discerning between contaminated and uncontaminated soils in support of a soil remedial action involving radionuclides; and (2) allow this discernment to take place "on-the-fly" as part of an overall Adaptive Sampling and Analysis Program (ASAP) strategy. Each of the technologies included in the suite individually have proven track-records at other DOE facilities. A significant amount of qualification work at the FEMP has already taken place in FY96 and FY97 to satisfy stakeholder concerns. The FEMP is prepared to move into full implementation in FY98 to support planned Area 2 Phase I soil remediation activities. TDI funding will (1) allow the final integration of the proposed technologies to take place; (2) provide for the necessary technical support from non-FEMP personnel to guarantee project success; (3) establish the context for building stakeholder involvement; and (4) facilitate redeployment of the technologies both at the FEMP as part of other phases of the soil remediation work, and at other DOE facilities with similar problems.

This deployment plan has several significant deviations from the original TDI proposal submitted for consideration. A full explanation of these deviations can be found in Attachment D. Attachment E contains responses to specific concerns voiced by the TDI Selection Committee.

2.0 Project Objectives

The overall objective of this TDI project is the successful implementation and subsequent deployment of a suite of technologies to support the remediation of soils contaminated with

radionuclides. Objectives for this TDI project can be organized into five categories: technical performance, cost reductions, stakeholder/regulatory acceptance and involvement, redeployment and reinvestment. Listed below are general statements of these objectives for this TDI project. More detailed phase-specific objectives can be found in section 4.0, where each of the three phases (i.e., Qualification, Implementation and Deployment) are discussed.

Technical Performance Objectives

- Confidently identify via direct measurement techniques isotopic concentrations for Ra226, Th232 and total uranium so that:
  - general spatial patterns of contamination can be discerned;
  - excavation footprints can be developed;
  - "hot spots" and materials exceeding waste acceptance criteria can be identified;
  - excavations to significant depths can be guided;
  - remediated areas can be "precertified" as likely to pass certification;
  - certification unit layout can be designed;
  - the absence of these isotopes above remediation guidelines can be established with acceptable statistical significance.
- Provide the results from these data collection activities to technical staff and regulators in "real-time", where real time is loosely defined as soon enough to have an impact on the course of data collection/excavation activities.
- Provide real-time positioning capabilities that are accurate to within one foot of true coordinates.

Cost Performance Objectives

- Accomplish the technical objectives at a cost that is significantly less than would be required using base-line technologies.

Regulatory Performance Objectives

- Obtain necessary regulatory approval for the application of the technology suite to hot spot and identification of uranium-contaminated soils exceeding uranium WAC levels, and to support final certification, as represented by regulatory approval of various design documents required by the soils remediation program.

Deployment Performance Objectives

- Successfully integrate this technology suite into the baseline plan for the FEMP, implement this suite as part of the remediation process for Area 2 Phase I, and redeploy this technology suite for subsequent soil remediation activities planned for another seven areas over the next ten years at the FEMP;
- Successfully support the deployment of all or portions of the technology suite at additional DOE and non-DOE sites.

Reinvestment of Savings Objectives

- Reinvest cost savings from the application of this technology suite in cleanup

activities at the FEMP.

Since the FEMP is already on a very aggressive remediation schedule, and because the implementation of soils remedial actions must proceed in coordination with facility D&D activities at the site, this TDI deployment plan focuses on reducing overall remedial action costs rather than on accelerating the overall remediation schedule. However, it is expected that the use of real-time data collection technologies and ASAP decision-making will reduce schedules for individual soils projects at the site.

3.0 Site Management Commitment

The proposed implementation and subsequent redeployments will be fully integrated with planned EM-40 activities at the site and have the full support of both DOE-FEMP and Fluor Daniel Fernald, the contractor responsible for implementing the soil remedial action program at Fernald. Refer to Attachment A for a commitment letter from the FEMP in support of this deployment plan. As further evidence of this commitment, Attachment F contains a modified FEMP baseline adjusted to reflect the inclusion of the technologies described in this deployment plan. The work described in this Deployment Plan involves staff from DOE's Environmental Measurement's Laboratory, Argonne National Laboratory, Idaho National Engineering and Environmental Laboratory, and the Ohio Environmental Protection Agency. Attachment I contains letters from each of these organizations expressing their commitment to activities described in this deployment plan. Mr. Robert Janke (DOE-FEMP) will be the Deployment Project Manager. The associated EM-40 Headquarters line program point of contact will be Mr. N. Hallein (EM-42). Deployment project status will be reported regularly in the EM Quarterly Management Report.

4.0 Project Strategy

4.1 Site Need and Cleanup Effort

The FEMP site has an estimated 2.6M cubic yards of contaminated soils spread over more than 1,000 acres. Primary contaminants of concern are uranium, thorium-232 and radium-226. Secondary contaminants of concern include other radionuclides, RCRA metals and organics. The selected remedy for the FEMP requires soil excavation, segregation and disposal of most low-yield radionuclide wastes in an engineered on-site disposal facility (OSDF). Materials exceeding the waste acceptance criteria (WAC) of 1030 ppm total U for the OSDF will be shipped to one or more approved off-site disposal facilities. Clean-up standards for the FEMP are extremely restrictive compared to those for other DOE sites. For example, the FRL for Ra226 is 1.7 pCi/g. This is less than twice the naturally occurring level of Ra226 at the site, and is significantly less than the 5 pCi/g surface and 15 pCi/g subsurface (above background) rule used by the FUSRAP program.

Because of the size of the site, associated building D&D activities, and the staged nature

of the OSDF construction, soil remediation activities at the FEMP have been organized into eight distinct areas, some of which include multiple phases. Soils remediation work will continue beyond the year 2006. Figure 1 contains a map of the FEMP facility with each of the remediation areas demarcated. Soils remediation activities for a given area are broken into three distinct stages. The first stage includes predesign investigation data collection and culminates in the submittal of an Integrated Remedial Design Package (IRDP) that specifies the remediation strategy. The second stage is the actual remediation work. The product of this phase is a Certification Design Letter (CDL) that lays out the certification strategy for the area. The final stage is the certification work, which results in a Certification Report (CR). All three documents, the IRDP, CDL and CR, require regulatory approval.

The first soils remediation activity, Area 1 Phase I, was essentially completed in FY96-97. The principal soils activity in FY98 will be remediation work associated with Area 2 Phase I. However, FY98 will also include predesign investigation work for Area 1 Phase II and Area 3. Table 2 maps out the general schedule of soils remediation activities for the site, highlighting delivery dates for IRDPs, CDLs, and CRs.

To successfully implement planned soil remediation activities, the FEMP has several data needs.

(1) The general spatial patterns of contamination along with the excavation footprint for each area must be determined with sufficient precision to support the development of a integrated remedial design package. At Fernald, these activities are part of the predesign investigation stage of remediation for a given area. The three principal contaminants of concern can be characterized with gamma spectroscopy (Ra226, Th232, and total uranium). General clean-up goals (FRLs in Fernald parlance) are 1.7 pCi/g, 1.5 pCi/g and 82 ppm, respectively. Note that more restrictive standards exist for portions of the site. Note too that these action levels are significantly lower than most other sites within the DOE complex and are challenging from a characterization perspective.

(2) In the event that significant uncertainty remains as to the true extent of contamination above area-specific remediation guidelines, additional data must be collected during excavation to determine when excavation can stop. This includes implementing any appropriate ALARA requirements during remediation. In addition, DOE-FEMP must be able to pre-certify areas as likely to pass the certification process before remediation activities can stop. At Fernald, these activities take place as part of the remediation stage of the remediation process for a given area. Precertification activities include establishing that concentration levels averaged over areas greater than 1 acre are below FRL standards, and that "hot spots" (see (3) below) do not exist.

(3) The clean-up guidelines include a never-to-exceed hot spot criteria for the three primary contaminants of concern. "Hot spots" are defined as material that has

concentrations greater than 3 times the FRL. DOE-FEMP is committed to ensuring that soils exceeding the hot spot criteria are not left in place, and that no soils exceeding uranium WAC are placed inside the OSDF. The WAC criteria for total uranium is 1030 ppm. Consequently, DOE-FEMP must be able to identify the locations of materials posing hot spot or uranium WAC concerns. At Fernald, these activities take place as part of both the pre-design investigation stage and the remediation stage of the remediation process for a given area.

(4) During post-remediation activities, DOE-FEMP must demonstrate to regulator satisfaction that soils that remain in place in a specific area do in fact meet all clean-up criteria specified for that area, including both area-averaged clean-up guidelines and never-to-exceed hot spot criteria. At the Fernald site this process is known as certification. Certification involves both defining certification units for a specific area, and certifying that all appropriate clean-up criteria have been met for each certification unit (spatially averaged FRL attainment and associated hot spot criteria). At Fernald, these activities take place as part of the certification stage of the remediation process for a given area.

Besides the need to establish that all pertinent clean-up requirements have been met for soils left in place, DOE-FEMP must also ensure that the volume of soil placed into the OSDF is kept to a minimum, i.e., that the placement of clean soils into the cell is avoided during the remediation process.

Although a significant number of soil samples was collected and analyzed as part of the remedial investigation/feasibility study for soils at the site, these data are not adequate for (1), have limited value for (2) and (3), and provide no information pertinent to (4). The baseline approach to these data needs is based on the collection and analysis of discrete samples. A reliance on discrete sampling and *ex situ* analyses to meet the FEMP's soils needs is problematic for the following reasons:

(1) Per sample collection and analytical costs for the three principal contaminants of concern are on the order of 100s of dollars per sample;
(2) Sample turn-around times for *ex situ* analyses are a minimum of several days to several weeks, making the use of discrete samples during excavation extremely difficult;
(3) The use of discrete samples for hot spot identification would force a tight gridded sampling approach. There is virtually no way DOE's uranium WAC commitments could be met with the use of discrete samples.

4.2 Technology Descriptions

This TDI deployment plan proposes a suite of technologies as a replacement for the baseline data collection program based on discrete samples. This suite is a blend of mobile gamma sensing equipment, direct *in situ* gamma spectroscopy, laser-based positioning systems, and ASAP data management/decision-support systems. Specifically, these technologies include:

1. The RTRAK, an enclosed agricultural tractor fitted with a sodium iodide (NaI) detector, global positioning system (GPS) capabilities and on-board computers. This system provides qualitative and quantitative rapid gamma surveying for the site. The RTRAK provides several distinct technical advantages over the baseline of hand-held walkover surveying and manual mapping. These advantages include real-time coordinate mapping with the GPS, the ability to survey large tracts quickly, and isotopic concentration estimation in addition to gross activity level measurements. The RTRAK has a sister system known as the Radiation Scanning System (RSS) which is configured on a hand-propelled cart for areas where tractor access is problematic. The RTRAK and RSS are not commercially available as presently configured; however their components are commercially available as is the expertise for configuring additional systems similar to the RTRAK and RSS. As such, there are no procurement obstacles preventing their deployment at sites other than Fernald.

2. Portable high-purity Germanium (HPGe) detectors that are tripod mounted and used to perform real-time, *in situ* isotopic spectrometry. HPGe systems can provide accurate quantitative estimates of contaminant concentrations for a wide range of gamma-emitting radionuclides. The HPGe has several advantages as compared to *ex situ* soil samples analysis. These include significant reductions in cost per measurement, real-time result turn-around, and a viewing window that is more directly comparable with spatially-averaged interpretations of clean-up guidelines. DOE's EML has been in the forefront in bringing HPGe technologies into EM40 clean-up activities. Note that *in situ* HPGe systems have been commercially available for a number of years, but have not been accepted as yet by the general regulatory community.

3. The Warthog, a sensor platform developed at INEEL that includes real-time 3D location tracking and sensor data reduction. The Warthog provides several distinct advantages over traditional surveying techniques, GPS, and traditional sensor data collection/reduction. The Warthog's positioning system is real-time with accuracy comparable to standard surveying requirements, and is especially suited for the deep excavation activities that will be conducted for portions of the site since the Warthog's positioning system is independent of the availability of satellites required for GPS. The radio-based data collection/reduction system incorporated in the Warthog eliminates data bottlenecks and facilitates communication between roving data collection systems such as the RTRAK and HPGe and project management offices. The Warthog is expected to become commercially available in FY98.

Note that for the purposes of this deployment plan, the Warthog, RTRAK and HPGe systems are complementary systems, each with distinct capabilities and a unique role to play at the FEMP as part of the soils remediation work. The primary distinction in the context of this deployment plan is that the RTRAK and HPGe have undergone extensive qualification work at the site already and the Warthog has not.

4. SitePlanner and Plume, computer software programs developed through ANL that are

designed to support ASAP data collection programs. These systems handle in-field data management, integration and display, and assist in the selection of new sampling locations such as HPGe shots based on available data. Cost savings are realized by reducing discrete sampling requirements and manual data plotting and documentation. SitePlanner and Plume have been demonstrated in characterization activities at Sandia, Joliet Army Ammunition Plant, and Kirtland Air Force Base. They have been deployed for characterization work at Argonne, Brookhaven, and as part of the FUSRAP program. SitePlanner, a PC version known as SiteView, and Plume are all currently commercially available from ConSolve, Inc.

The focus of this TDI deployment plan is the application of real-time measurement systems along with appropriate decision-support technologies to the design and implementation of soils remediation projects. The selection of these technologies is the result of consultations with experts in the field of direct measurement technologies. Fernald was host to the Uranium in Soils Integrated Demonstration (USID), an EM50 sponsored ID that demonstrated several different direct measurement techniques for identifying uranium contamination in soils. It is not the intent of this TDI deployment plan to claim that this mix of technologies will be optimal for all sites. Sites with other contaminants (such as Th230) or significant chemical contamination may opt for a different combination of sensors, direct measurement techniques, and/or field analytics to accomplish the same task. Better technologies may appear over time. Similar statements hold for the decision support software to be deployed by this TDI project. ***Just as important as the individual technologies contained in this TDI project, this TDI project will establish a DOE regulatory precedent for the use of real-time instrumentation in solving DOE's contaminated soils problems.*** It is the conviction of the participants in this TDI project that the use of these techniques will not only dramatically reduce soils remediation costs, but also significantly improve the overall effectiveness of the remedial effort.

4.3 Project Profile

The TDI program specifies three distinct phases: Qualification, Implementation and Deployment. In the case of Fernald with this particular suite of technologies, the majority of activities that would fall into the qualification phase have been already undertaken at the FEMP in previous fiscal years. Consequently there are limited qualification phase activities for the FEMP included in this proposal. Activities for FY98 primarily focus on the implementation of the proposed technology suite as part of the Area 2 Phase I soils remediation project planned for FY98. Unresolved qualification issues will be addressed in parallel with the implementation phase of this TDI project. Multiple deployments activities will also begin in FY98 as part of the predesign investigation work planned for Area 1 Phase II and Area 3. Table 1 provides a detailed schedule for all key activities for the Implementation Phase, with special emphasis on TDI work proposed for FY98. Table 2 provides an overview schedule for subsequent deployments in each of the remediation areas, focusing on the delivery dates for key area documents. Information about these activities are also organized below by project phase.

4.4 Qualification Strategy

Because an aggressive implementation strategy is scheduled for FY98 and because a significant amount of qualification work has already been undertaken in FY96 and FY97 using DOE-FEMP, ANL and EML funds, this TDI deployment plan contains only limited qualification phase activities. The emphasis in FY98 will be on implementation, with issues outstanding from the qualification work conducted to date addressed in parallel with the implementation work. Below is a list of performance objectives that would be expected to be satisfied by a formal qualification phase, along with a summary of progress to date for each objective. For those objectives that have not been completely met by qualification work conducted to date, a description of how these will be completed is included. ***Note that no implementation is scheduled for specific real-time technology applications still requiring additional qualification work until after that qualification work is expected to be completed.***

The goal of this TDI project is to make real-time technologies a fundamental component of each stage of the soils remediation process at Fernald. The Sitewide Excavation Plan (SEP), currently submitted for regulatory review and approval, incorporates real-time technologies as a fundamental component of the overall soils remediation strategy at Fernald. Regulatory approval of the three documents required for each area (IRDP, CDL and CR) will define the precise roles that real-time technologies play for each stage of each area, and is the ultimate measure of regulatory acceptance of the use of real-time technologies in each stage of the remediation process. The purpose of the qualification performance objectives below and qualification work at the site to date is to lay the groundwork for that acceptance.

Qualification Performance Objectives

1) Establish that the RTRAK is capable of defining lateral contamination footprints for Ra226, Th232 and total U at the prescribed action levels.

   Status: A 1996/97 comparability study found that RTRAK isotopic measurements, when averaged over 500 square meters, provided average contamination concentration estimates with a standard error of less than 10% for concentrations near the FRL. The conclusion is that the RTRAK is capable of producing excavation footprints.

2) Establish that the RTRAK is capable of identifying hot spot and uranium WAC material.

   Status: A 1996/97 comparability study found that the RTRAK can identify uranium WAC material with appropriate trigger levels using individual measurements collected at 1 mph and a 4 second acquisition time. The RTRAK can also identify hot spot material with appropriate trigger levels when RTRAK data are averaged over 30 square meters.

3) Establish that the HPGe is capable of producing data with quality comparable to discrete sample analyses over a broad range of concentrations.

Status: A 1996/97 comparability study found that the HPGe is capable of producing data with quality (i.e., accuracy, precision and reproducibility) comparable to discrete samples for total U and Th232. Ra226 results from the HPGe were systematically low, a result believed to be related to radon emission from soils. Work to resolve the Ra226 bias is ongoing and will continue as a qualification phase activity.

4) Establish that data from real-time systems such as the HPGe and RTRAK can be distributed in "real-time" to technical staff and stakeholders.

Status: In 1997, a Web-based data dissemination tool was implemented to facilitate access to real-time data by regulators and site technical staff (this can be seen at www.ead.anl.gov/~fernald). Bottlenecks still exist in data flow that limit routine turn-around times on RTRAK and HPGe data sets to a week. Ongoing work is attempting to reduce this to a couple of days.

Integration of Warthog data transfer capabilities is expected to reduce this to less than 24 hours. TDI funding will be used in FY98 to facilitate this integration, and to support a qualification of Warthog capabilities in FY99 during uranium WAC surveying activities planned for Area 2 Phase I. The outcome will be a go/no go decision on implementing a full Warthog-based system as part of the ongoing implementation activities planned for FY00.

5) Establish regulatory acceptance of real-time systems (RTRAK combined with HPGe) for uranium WAC and hot spot identification.

Status: Regulatory acceptance (in the form of acceptance of the Integrated Remedial Design Package (IRDP) for Area 2 Phase I) is expected before implementation begins in FY98.

6) Establish regulatory acceptance of the use of HPGe for post-remediation certification.

Status: Regulatory acceptance of the HPGe for certification is an outstanding issue. Comparability work is on-going as are discussions with regulators to address regulatory concerns. Work will continue within the context of the Area 2 Phase I implementation and the Area 8 certification program. The goal is to obtain regulatory acceptance of a Certification Design Letter that includes the use of real-time technologies for Area 2 Phase I. As these qualification activities are on-going, EM40 funding will be used to complete the work necessary to obtain regulatory approval for the use of real-time technologies in the certification stage of soils remediation. In the case of the Area 2 Phase I implementation, the Certification Letter (CL) is not scheduled to be submitted until FY99, leaving a significant amount of time to resolve outstanding issues associated with the use of

real-time technologies for certification.

7) Modify FEMP baseline to reflect the inclusion of the proposed technologies.

Status: The FEMP baseline has been modified to reflect the inclusion of the proposed technologies. The Sitewide Excavation Plan (SEP), currently being reviewed by site regulators, includes the proposed technologies as integral and fundamental components of the overall soils remediation strategy for the FEMP. The IRDP for Area 2 Phase I, with an end of October submittal date to regulators for comment, includes the proposed technologies as integral and fundamental components of the remediation strategy for that area, excluding certification activities. For Area 2 Phase I, certification activities will be addressed in a future Certification Design Letter.

8) Identify stakeholders and involve them in the technology qualification and implementation strategy.

Status: A real-time working group has been established for the site that meets at least monthly to discuss technology qualification and implementation issues. Working group members include site technical staff, Ohio EPA and US EPA regulators and their representatives and technical experts in the various technologies being fielded. A Web page has also been established for disseminating real-time technology experiences with the soils program at Fernald (www.ead.anl.gov/~fernald). The Site Technology Coordination Group for the FEMP includes both representatives from the regulatory agencies and from the local public. Attachments G and H provide a more detailed description of the strategies for involving stakeholders and regulators in the technology qualification and implementation process.

TDI Qualification Activities

Note that activities denoted with *** indicate activities important to the TDI program, but that are not supported with TDI funds. These are funded through DOE-FEMP.

Q.1) Perform qualification of the Warthog system as part of the uranium WAC material surveying planned for Area 2 Phase I in FY99. INEEL will be the lead. Scheduled for completion by the end of FY99. Performance measures are the ability of the Warthog to provide 3D locational control with an error of less than 1 foot and real-time wireless data transfer capabilities from Warthog-based sensors to project management computers. The outcome of this qualification activity is a go/no go decision on whether to fully implement a Warthog-based sensor platform as part of FY00 Area 2 Phase I excavation activities.

*** Q.2) Perform remaining qualification work for the use of real-time technologies such as

the HPGe and RTRAK in the certification process. Scheduled for completion by the end of FY99. This qualification activity includes three subactivities:

a) Develop quality control/quality assurance and documentation standards for the HPGe required for certification use. These include standardizing the use of control charts, calibration methods, inspection procedures and operator training.
b) Continue work on resolving Ra226 bias issues. This includes defining environmental condition constraints on the use of the HPGe and developing correction factors for Ra226 data generated by the HPGe to compensate for radon emissions.
c) Perform supplemental comparability work as part of the Area 8 certification program planned for FY98 (details to be established).

The performance measure for this activity is the acceptance of a certification design letter for Area 2 Phase I that incorporates real-time technologies into the certification process (see activity I.7 in section 4.5). FDF will have the lead with support from EML.

4.5 Implementation Strategy

The implementation of this technology suite will take place as part of the soils remediation activities planned for Area 2 Phase I in FY98. Figure 1 shows the location of Area 2 Phase I relative to the rest of the facility. Figure 2 shows a more detailed view of Area 2 Phase I. Area 2 Phase I contains an area of the site that was used as a solid waste landfill. Wastes placed in this area include construction debris place in the South Field and flyash placed in the Active and Inactive Flyash Piles. All of the waste fill areas within Area 2 Phase I are presumed contaminated and will be excavated, with most placed in the OSDF---a total of more than 300,000 cubic yards of material. Based on RI/FS sampling, there are known surface and subsurface locations within Area 2 Phase I that exceed the OSDF WAC criteria for uranium. The exact location and extent of this material must be identified so that it can be segregated from the bulk of the material destined for the OSDF. Because of the deep excavation that will be done in this area, and because of the proximity of waste to the underlying aquifer in this region of the site, FRLs for this area are even more restrictive than they are for the rest of the site. In this region, U238 is the presumed driver. The FRL for U238 is only 3.2 pCi/g.

Area 2 Phase I is complex. The overall schedule of activities, from the pre-design investigation stage on through to final certification of the entire area spans four years. Portions of the area will be certified already in FY00. Table 3 contains the schedule of soil remediation activities for Area 2 Phase I. Predesign investigation began in FY97 and continued into FY98. The culmination of the predesign work is the IRDP for Area 2 Phase I, submitted to regulators in October, 1997. Remediation activities are scheduled to begin the spring of 1998. FY98 remediation activities include the excavation and placement in the OSDF of an estimated 114K cubic yards of waste material from the Inactive Fly Ash Pile, as well as the removal of an

estimated 1.7K cubic yards of above uranium WAC material believed to be buried at the base of the Inactive Flyash Pile. FY99 activities include the excavation and placement in the OSDF of approximately 200K cubic yards of material from the South Field and Active Flyash Pile area. In FY00, excavation work in the Active Flyash Pile will be completed, and the Inactive Flyash Pile and South Field area submitted to the certification process. Final activities including some excavation and final certification for the balance of the area will be completed in FY01.

A detailed explanation of how the proposed technologies will be incorporated into the remediation work scheduled for Area 2 Phase I can be found in the Area 2 Phase I IRDP, submitted to site regulators in October, 1997. The TDI implementation phase will coincide with the Area 2 Phase I work, and will span three years. Because excavation footprints are not a crucial issue for Area 2 Phase I, the use of the proposed technologies in Area 2 Phase I will focus on the identification of uranium WAC materials, on precertification activities, and on certification work. In FY98 and FY99, precertification activities and excavation support for uranium WAC material identification/excavation will be the focus of the TDI technologies. In FY00, TDI technologies will be included in the certification process.

To support an evaluation of the impact of the technologies on the unit and overall costs of the soils remediation work in Area 2 Phase I, a process has been identified for tracking actual costs so an accurate comparison can be made. This process expands on cost control and cost tracking capabilities already in place as standard FDF project procedures. However, the process that will be in place to support the TDI project will track TDI costs independent of EM40 expenditures, and will document unit costs in much greater detail than standard project cost tracking requires. The final certification of Area 2 Phase I is not scheduled for completion until FY00. Final documentation regarding cost savings will not be available until certification is complete; however, to allow tracking of the cost effectiveness of the TDI project, interim estimates of projected total cost savings and per unit savings realized for specific portions of the work will be provided.

Implementation Performance Objectives

1) The RTRAK, combined with the HPGe, successfully identified and delineated uranium WAC materials in Area 2 Phase I.

2) Warthog position tracking and data transfer capabilities reduced data turn-around times to less than 24 hours in Area 2 Phase I.

3) The combined suite of technologies were successfully integrated with excavation work so that excavation schedules were achieved in Area 2 Phase I.

4) The projected rolled-up project cost savings ($4.3M) were obtained for Area 2 Phase I.

5) Real-time technologies were used to support certification work in Area 2 Phase I.

TDI Implementation Phase Activities

Note that activities denoted with *** indicate activities important to the TDI program, but that are not supported with TDI funds. These are funded through DOE-FEMP.

I.1) Integrate the TDI real-time technologies in the remediation strategy contained in the IRDP for Area 2 Phase I, and gain regulatory acceptance for this strategy. This strategy primarily focuses on the use of real-time technologies for precertification activities and for uranium WAC identification and delineation. FDF has the lead with support from EML and ANL. The performance measure for this activity is the acceptance of the IRDP. The IRDP for Area 2 Phase I was submitted for regulatory review in October, 1997.

I.2) Integrate real-time data transfer software from Warthog system with Fernald's RTRAK and HPGe systems. INEEL will be the lead. Scheduled for completion within five months from initiation of this TDI project. The performance measure is the ability of the system to provide 24 hour turn-around times for real-time data (HPGe and RTRAK).

I.3) If the results from the Warthog qualification work (Q.1) indicates an implementation "go", the Warthog will be modified to meet the soils remediation needs of the FEMP. These modification activities will take place in FY99 . The Warthog will be implemented in FY00 as an integral part of the soil excavation activities planned for that fiscal year in Area 2 Phase I. INEEL is the lead. The performance measure for this is a Warthog-based sensor platform implementation that provides real-time position control with errors of less than 1 foot and real-time wireless data transfer capabilities.

I.4) Expand and maintain the existing Web-based data integration and dissemination site. This activity will be coupled with the real-time data transfer capabilities and fully implemented for the Area 2 Phase I activities in FY98. The objective is a real-time window on the soils excavation work planned for Area 2 Phase I that is accessible via Netscape or Explorer by DOE-FEMP managers, on-site FDF technical staff, off-site TDI project staff, the regulatory community, stakeholders, and the broader DOE audience that the TDI is attempting to reach. ANL will have the lead, working with FDF and INEEL. The performance measure is ready access to data generated by real-time technologies within 24 hours of collection for Area 2 Phase I excavation work.

*** I.5) Implement the RTRAK and HPGe systems for uranium WAC identification and delineation during the FY98 Area 2 Phase I excavation work. The objective is to provide surficial screening capable of locating, quantifying and delineating potential uranium WAC-busting soils for each successive soil lift during

excavation. FDF will have the lead. The performance measure is the instruments will be able to identify areas of size 10 square meters or larger with average concentrations exceeding uranium WAC levels, and provide uranium WAC coverage at the rate of 1 acre per day.

I.6) Develop a lessons learned document from the FY98 Area 2 Phase I implementation activities. All will participate. This activity is intended to review the overall performance of the technologies during implementation in FY98 so that appropriate adjustments can be made in FY99 implementation and deployment activities. The performance measure is the ability of the TDI participants to identify areas requiring modification/improvement and to implement those recommendations in FY99 activities.

*** I.7) Develop a Certification Design Letter in FY99 for Area 2 Phase I that uses real-time technologies to support the certification process and that is accepted by regulators. Support is defined as performing precertification assessments of likely certification success, and determining the layout of certification units. FDF will have the lead. The performance measure is whether or not the CDL is accepted by regulators with real-time technologies included as an component.

*** I.8) Implement the RTRAK and HPGe systems in support of certification work for Area 2 Phase I in FY00. FDF will have the lead. The performance measure is submitting the Certification Report for Area 2 Phase I on time, and having it accepted by the site regulators.

4.6 Deployment Strategy

Redeployment of the technology suite as part of other area soil remediation programs at the FEMP site is a fundamental objective of this TDI project. Work to support redeployment of the technology suite at FEMP will begin in FY98. Table 2 contains the soils remediation schedule for the FEMP site. Specifically, the next two soils remediation activities planned at the FEMP site are Area 1 Phase II and Area 3. Predesign investigation activities for A1PII began late in FY97 and will to continue in FY98. Area 3 activities begin in FY98. The proposed technology suite have already been built into the Project Specific Plans (PSPs) used to define these predesign investigation activities. Among others, the goals of these predesign investigation activities include determination of the spatial patterns of contamination, delineation of excavation footprints and the identification of hot spot soils and materials that pose uranium WAC concerns. Note that predesign investigation activities do not require regulatory review and acceptance. However, the IRDPs, which are the product of the predesign investigation work, do require regulatory review and acceptance. Table 2 specifies the deliverable dates for IRDPs for each of the remaining areas.

Fernald's soils problems are not unique. The 1994 Integrated Database Report catalogued a total of 73M cubic yards of soils contaminated with radionuclides across the DOE

complex. As part of the TDI proposal process, letters of interest were obtained from INEEL, the FUSRAP program, and DOE's Chicago Operations Office. In addition to the multiple deployment goals at the FEMP site, this TDI project also has the broader objective of facilitating deployment of these technologies across the complex. To achieve this objective, participants in this TDI project will work with other sites to identify deployment issues that must resolved before intersite technology transfer can take place. Although this deployment plan does not specify the nature and timing of deployments at other facilities, the presumption is that as deployment opportunities mature, modifications can and will be made to the overall scope of this TDI project to allow these deployments to take place.

Deployment Performance Objectives

1) The IRDP submittal for each planned soil remediation activity at the FEMP is based around real-time measurement systems and an ASAP approach to data collection.

2) Each deployment at the FEMP operates within acceptable cost and schedule parameters.

3) Certification reports for deployment sites at the FEMP are approved on schedule.

4) Projected cost savings are realized for the FEMP soils remediation project as a whole.

5) Cost savings are reinvested in cleanup activities at the FEMP.

6) Stakeholders are actively involved in the deployment process, both at the FEMP and at other facilities.

7) Interstate regulatory issues associated with the complex-wide use of real-time technologies are addressed.

8) Multiple deployment opportunities at other facilities are identified and implemented.

TDI Deployment Activities

Note that activities denoted with *** indicate activities important to the TDI program, but that are not supported with TDI funds. These are funded through DOE-FEMP.

D.1) Adapt and integrate decision-support technology for discrete measurement location selection to delineate excavation footprints. ANL is lead. This is a capability that is not required by Area 2 Phase I, but most of the other deployment areas at Fernald involve the definition of excavation footprints. The purpose of

this activity is to integrate Plume's methodology for discrete measurement and sampling selection to define excavation footprints within the overall data collection strategy. The performance measure is that the use of Plume's methodology will reduce the number of measurement locations/samples while providing a more accurate footprint delineation as compared to a preplanned, gridded data collection program.

D.2) Identify and resolve unique instrumentation requirements for each of the remaining soils remediation areas at Fernald. All will participate. The expectation is that each soils remediation area may present unique challenges to the use of real-time technologies not found in Area 2 Phase I. Examples include shine interference from buildings containing quantities of contaminated materials, deep excavations in the production area, uneven terrain, etc. The objective is to identify and resolve as many of these potential complications as possible during the life of the TDI project. The performance measure is that there are no outstanding unresolved issues with the use of real-time technologies for any of the remaining areas by the end of the TDI project.

*** D.3) Prepare IRDPs, CDLs and CRs based on real-time technologies for each of the remaining soil remediation areas at Fernald. FDF is the lead. This will be an on-going activity that continues after TDI support at Fernald ceases. Note that the performance measure for every document submitted is the degree to which real-time technologies are used, and whether or not regulatory acceptance is obtained.

D.4) Participate in technology transfer workshops/conferences/meetings. All will participate in this activity. The goal is to make the broader DOE audience aware of this TDI project and the experience it generates. Appropriate venues include (but are not limited to) TIE workshops, DOE ER conferences, presentations at individual sites, etc. The performance measure for this activity is participation in workshops and conferences.

D.5) Develop qualification and implementation programs for real-time applications at other sites. Other potential sites have already been identified. The goal of this activity is to add to the list of potential sites, to assist in resolving outstanding technical and/or regulatory issues, and to assist in producing qualification and implementation programs customized for the needs of those sites. All will participate in this activity. The performance measure is whether or not sites other than Fernald have included these types of real-time technologies in their soils remediation strategy as a result of this TDI project.

D.6) Train for off-site deployment. Training modules in the form of short courses will be developed that can be used to facilitate the transfer of the technologies contained in this TDI project to other sites. All will participate in this activity. The performance measure for this activity is whether or not training sessions are

successfully held during the course of the TDI project.

4.7 General TDI-Supported Activities

There a number of activities that will be supported by TDI that cross-cut the Qualification, Implementation and Deployment Phases. They include activities that will span the life of the TDI project. These are described below:

G.1) Equipment Acquisition and Modification. A limited portion of TDI funding will be used to acquire additional real-time equipment to supplement DOE-FEMP's current capabilities in FY98, and to modify INEEL's Warthog in FY98/FY99 to make it more flexible in meeting Fernald's various soil remediation sensor data acquisition needs. FDF and INEEL will be principally involved in these activities. The performance measure for this task is the timely delivery of required instruments.

G.2) Training. One measure of the effectiveness of this TDI project is the ability of the principal contractor, Fluor Daniel Fernald, to master and operate the technologies included in this deployment plan. Training will be a key activity over the life of the TDI project, and will include training in the use and interpretation of HPGe data by EML, training in the use of the decision-support technologies by ANL, and training in the use of the Warthog and related wireless data transfer capabilities by INEEL.

G.3) Cost Accounting. Detailed cost accounting is necessary to document the cost-effectiveness of these TDI technologies compared to base-line technologies. ANL will work with FDF to ensure that the proper cost-accounting procedures are in place to accomplish this task. The system must be maintained so that return on investment can be estimated, with key milestones being return on investment estimates at the completion of each of the planned Fernald soils remediation projects, beginning with Area 2 Phase I.

G.4) Cost-Benefit Analysis. Regulatory requirements for uranium WAC and hot spot identification and certification will demand a minimum investment in data collection activities. Additional investments in data acquisition (whether real-time or traditional soil sampling) must be balanced against expected savings in the form of reductions in soil volumes erroneously identified as exceeding hot spot or uranium WAC levels, or soil volumes otherwise erroneously identified as contaminated above FRLs and placed in the OSDF. An ongoing activity across the life of the TDI project will be implementing a methodology for determining the optimal investment in data collection beyond the minimum demanded by regulatory concerns, where optimal is defined as minimizing total remediation costs. ANL will take the lead.

G.5) Stakeholder Involvement. Stakeholder involvement is an overall objective of this TDI project. Attachments G and H describe in greater detail how stakeholders in general, and regulators in particular, will be included in this TDI project. Specific activities related to regulators for the site are included under the implementation and qualification phases of this TDI project. FDF will take the lead, with support from ANL, EML, and Ohio EPA.

G.6) Project Coordination. This TDI project represents a complex set of activities that requires significant integration among participants, as well as with the on-going remediation work planned for the FEMP. DOE-FEMP will take the lead with ANL support. Specific activities include document preparation and review, and schedule coordination.

G.7) Project Tracking. DOE-FEMP will take the lead with ANL support. Specific activities include monitoring project progress and results, and identifying issues and concerns and resolving those.

5.0 Project Control

A baseline that details key activities to be conducted as part of this TDI project and their schedules are described in section 4.3 and summarized in Table 1. Attachment B contains Project Tracking Tables for this TDI project. These tracking tables will be maintained over the life of the project and, along with the performance objectives upon which they are based, will serve as the basis for evaluating the success of the proposed work. The Deployment Project Manager will have the responsibility for maintaining the Project Tracking Tables associated with this TDI Deployment Plan.

6.0 Cost Data

Cost estimates for the baseline approach and the proposed set of TDI technologies can be found in Attachment C. In summary, the total baseline cost of soil characterization for multiple soil remedial actions at the Fernald site for the period FY98-FY06 has been estimated to be about $81M. The total cost of soil characterization for multiple soil remedial actions at the Fernald site using the proposed technologies over the same period has been estimated to be about $45M (including TDI support), resulting in a savings of $36M. The contribution of the TDI program over a period of three years to the soils remedial actions at the Fernald site would be $3.3M. The resulting ROI is estimated to be about 11:1. The ROI is expected to exceed this amount because it is expected that the use of real-time technologies will also minimize the unnecessary placement of clean soils in the OSDF. The TDI investment will leverage about $10M to be invested by the FEMP site in soils characterization over the 3 year life of the TDI work at Fernald. It leverages $200K in investments in implementation and deployment by ANL, $900K in investments in site support by EML, and $225K in investments in qualification, implementation and deployment by Ohio EPA. Ohio EPA's involvement will be funded from DOE-FEMP EM40 funds. Table 4 itemizes these leveraged contributions by organization and year. Note that Table 4 only

summarizes leveraged investments over the life of the TDI project. Table 5 gives the distribution of TDI funding by participant and year.

Baseline and TDI cost estimates contained in Attachment C of this deployment plan are best-estimates as of the submittal of this deployment plan. However, these costs estimates and the actual costs incurred/savings realized can and will change. Changes can be caused by changing regulatory requirements, modified schedules, and changing baseline/real-time technology costs. For many of the out-year deployments, detailed approaches to excavation have yet to be established (i.e., how many lifts, how much real-time screening for uranium WAC and hot spots will be required for each lift, the size of lift footprints, etc.).

In recognition of the fact that careful cost accounting is required to document the savings produced by this TDI project, DOE-FEMP with support from ANL and FDF will establish a cost accounting process tailored to the documentation requirements of the TDI program. In addition, detailed cost estimates for the baseline and TDI approaches will be developed. Both the cost accounting process and these detailed estimates with supporting documentation will be available for independent review six months from the initiation of this project.

7.0 ROI Reinvestment Strategy

This deployment plan is expected to result in a cumulative ROI of approximately 11, representing cost savings from eight different areas at the site (Table C3). The estimated cost savings for each of the eight sites are shown in Table C4. Total projected savings for the FEMP are estimated to be about $36M. The total remediation program at Fernald (2006 Plan) is very ambitious. Any savings that accrue as a result of deploying real-time instruments as part of the soils remediation effort will help achieve this plan. However, no overall schedule acceleration is expected because completion of soils remediation at the FEMP is constrained by the schedule for removal of buildings from the production area of the site.

Table 1 Schedule of Key TDI Activities

Activity	FY98				FY99				FY00			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Q.1 Qualification of the Warthog system as part of FY99 excavation planned for Area 2 Phase I.					|------>|						
Q.2 Additional qualification work targeting the use of real-time technologies in support of site certification.		|----------|									
I.1 Integrate TDI real-time technologies in remedation strategy for Area 2 Phase I in IRDP and gain regulatory acceptance.	|----------|										
I.2 Integrate real-time data transfer software from Warthog system with Fernald's RTRAK and HPGe systems		|----------| (schedule contingent on TDI funding date)										
I.3 Modification and implementation of Warthog for uranium WAC identification for Area 2 Phase I in FY00.						|----------|					
I.4 Expand and maintain Web-based data integration and dissemination site for Area 2 Phase I.	|----------|											
I.5 RTRAK/HPGe used for uranium WAC identification and delineation during FY98-99 work at Area 2 Phase I.			|----------|								
I.6 Develop a lessons learned document based on FY97 implementation work.					|----------|						
I.7 Develop a Certification Design Letter for Area 2 Phase I (IFP & SF) that integrates real-time technologies in the certification process.								|----------|			
I.8 Implement the RTRAK and HPGe systems in support of certification work for Area 2 Phase I in FY00.										|----------|	

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Activity	FY98				FY99				FY00			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
D.1 Adapt and integrate decision-support technology for discrete measurement location selection to delineate excavation footprints.						|---------->| (actual schedule to be determined)						
D.2 Identify and resolve unique instrumentation requirements for each of the remaining soils at Fernald.						--->						
D.3 Prepare IRDPs, CDLs, and CRs based on real-time techologies for each of the remaining soils remediation areas.			-->									
D.4 Participate in technology transfer workshops/conferences/meetings.						--->						
D.5 Develop qualification and implementation programs for real-time applications at other sites.							|--->|					
D.6 Train for off-site deployment.								|--->|					
G.1 Equipment acquisition and modification.	|----------------------------->|												
G.2 Training.	|--->|											
G.3 Cost Accounting.	|-->												
G.4 Cost-Benefit Analysis	|-->												
G.5 Stakeholder Involvement.	|-->												
G.6 Project Coordination.	|--->|											
G.7 Review of Progress and Results	|--->|											

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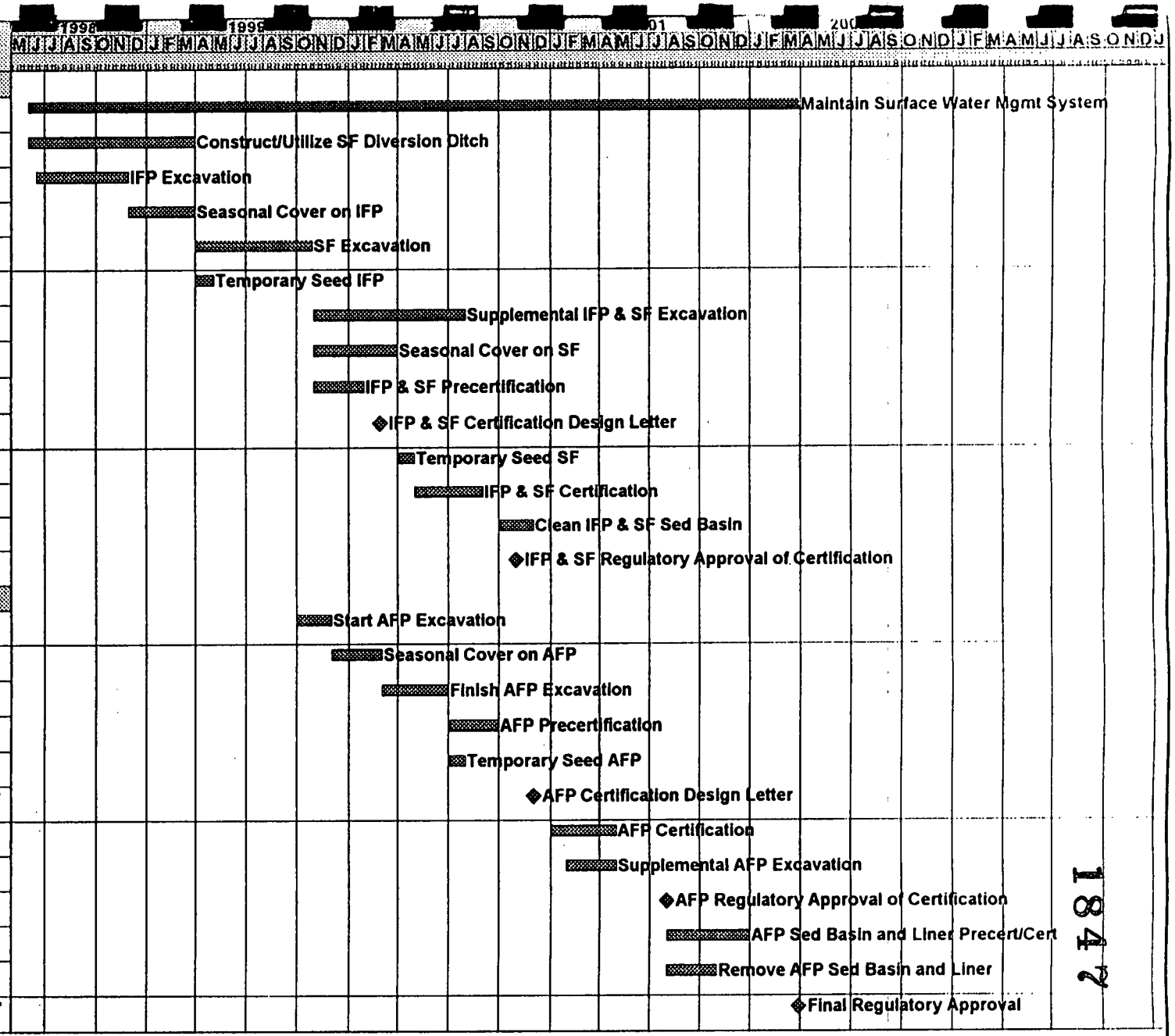
Table 2 Overall Schedule for Technology Deployments at Fernald

Remediation Area	Activity	Deliverable	Schedule
Area II Phase I	Pre-Design Investigation	IRDP	October 20, 1997
	Remediation	Certification Design Letter	IFP & SF: February 28, 2000 AFP: November 30, 2000
	Certification	Certification Report	IFP & SF: September 1, 2000 AFP: April 30, 2001
Area 1 Phase II	Pre-Design Investigation	IRDP	November 21, 1997
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 3	Pre-Design Investigation	IRDP	March 31, 2000
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 4	Pre-Design Investigation	IRDP	November 15, 2000
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 5	Pre-Design Investigation	IRDP	November 15, 2000
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 6	Pre-Design Investigation	IRDP	January 15, 2001
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 7	Pre-Design Investigation	IRDP	January 15, 2001
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 1 Phase III	Pre-Design Investigation	IRDP	January 15, 2001
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD

Area 2 Phase II	Pre-Design Investigation	IRDP	January 15, 2001
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Area 8	Pre-Design Investigation	IRDP	TBD
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD
Off-Property Area	Pre-Design Investigation	IRDP	TBD
	Remediation	Certification Design Letter	TBD
	Certification	Certification Report	TBD

Table 3 Overall Schedule for Area 2 Phase I Remediation Activities

Activity Description	Early start	Early finish
IFP & SF EXCAVATION & PRECERT/CERT		
Maintain Surface Water Mgmt	01JUN98*	29MAR02
Construct/Utilize SF Diversion	01JUN98	31MAR99
IFP Excavation	15JUN98*	30NOV98
Seasonal Cover on IFP	01DEC98	31MAR99
SF Excavation	01APR99*	29OCT99
Temporary Seed IFP	01APR99	03MAY99
Supplemental IFP & SF	01NOV99	01AUG00
Seasonal Cover on SF	01NOV99	31MAR00
IFP & SF Precertification	01NOV99	31JAN00
IFP & SF Certification Design		28FEB00*
Temporary Seed SF	03APR00	01MAY00
IFP & SF Certification	01MAY00*	01SEP00
Clean IFP & SF Sed Basin	02OCT00*	30NOV00
IFP & SF Regulatory Approval		31OCT00*
AFP EXCAVATION & PRECERT/CERT		
Start AFP Excavation	01OCT99*	30NOV99
Seasonal Cover on AFP	01DEC99	29FEB00
Finish AFP Excavation	01MAR00*	30JUN00
AFP Precertification	03JUL00*	29SEP00
Temporary Seed AFP	03JUL00	31JUL00
AFP Certification Design Letter		30NOV00*
AFP Certification	01JAN01*	30APR01
Supplemental AFP Excavation	01FEB01*	30APR01
AFP Regulatory Approval of		31JUL01*
AFP Sed Basin and Liner	01AUG01*	31DEC01
Remove AFP Sed Basin and	01AUG01*	31OCT01
Final Regulatory Approval		29MAR02*



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Project Start	02FEB96	Early Bar
Project Finish	29MAR02	Progress Bar
Data Date	02FEB96	Critical Activity
Plot Date	17SEP97	

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Sheet 1 of 1

FIGURE 6-2
A2P1 EXCAVATION/CERTIFICATION
IMPLEMENTATION PLAN

FERNALD
Environmental Management Project

Table 4 Summary of Funding by Organization and Year

The table below summarizes funds to be contributed by each participating organization during the life of this TDI project. Several points are important to note. First, DOE-FEMP's contribution represents EM40 total investments in characterization activities during these three years as part of the soils remediation project. Total EM40 investments in soils work over this time period are much greater. EM40 investments in technology qualification work associated with the technologies contained in this TDI deployment plan are much less. Note too that characterization investments will continue on past 2000 to the end of the soils project. ANL's investments are through ANL LDRD funding and are explicitly TDI-technology related. EML's investments represent their support of the Fernald soils project in general, of which the TDI technologies are a part. Ohio EPA's involvement is funded through DOE-FEMP.

Organization	Fiscal Year			Totals:
	FY98	FY99	FY00	
TDI	$1,645K	$805K	$825K	$3,275K
DOE FEMP	$1,417K	$5,153K	$3,436K	$10,006K
ANL	$200K	$0K	$0K	$200K
EML	$300K	$300K	$300K	$900K
INEEL	$0K	$0K	$0K	$0K
Ohio EPA	$75K	$75K	$75K	$225K
Total:	$3,637K	$6,333K	$4,636K	$14,606K

Table 5 Distribution of TDI Funding by Participant and Year

Organization	FY98	FY99	FY00	Total
Fluor Daniel Fernald Equipment:	$700K	$0K	$0K	
Staff:	$225K	$200K	$200K	$1,325K
Argonne National Lab.	$350K	$325K	$325K	$1,000K
Idaho National Eng. & Env. Laboratory	$170K	$180K	$200K	$550K
DOE EML	$200K	$100K	$100K	$400K
Ohio EPA	$0	$0	$0	$0K
Total:	$1,645K	$805K	$825K	$3,275K

Figure 1 The FEMP Site with Soils Remediation Areas

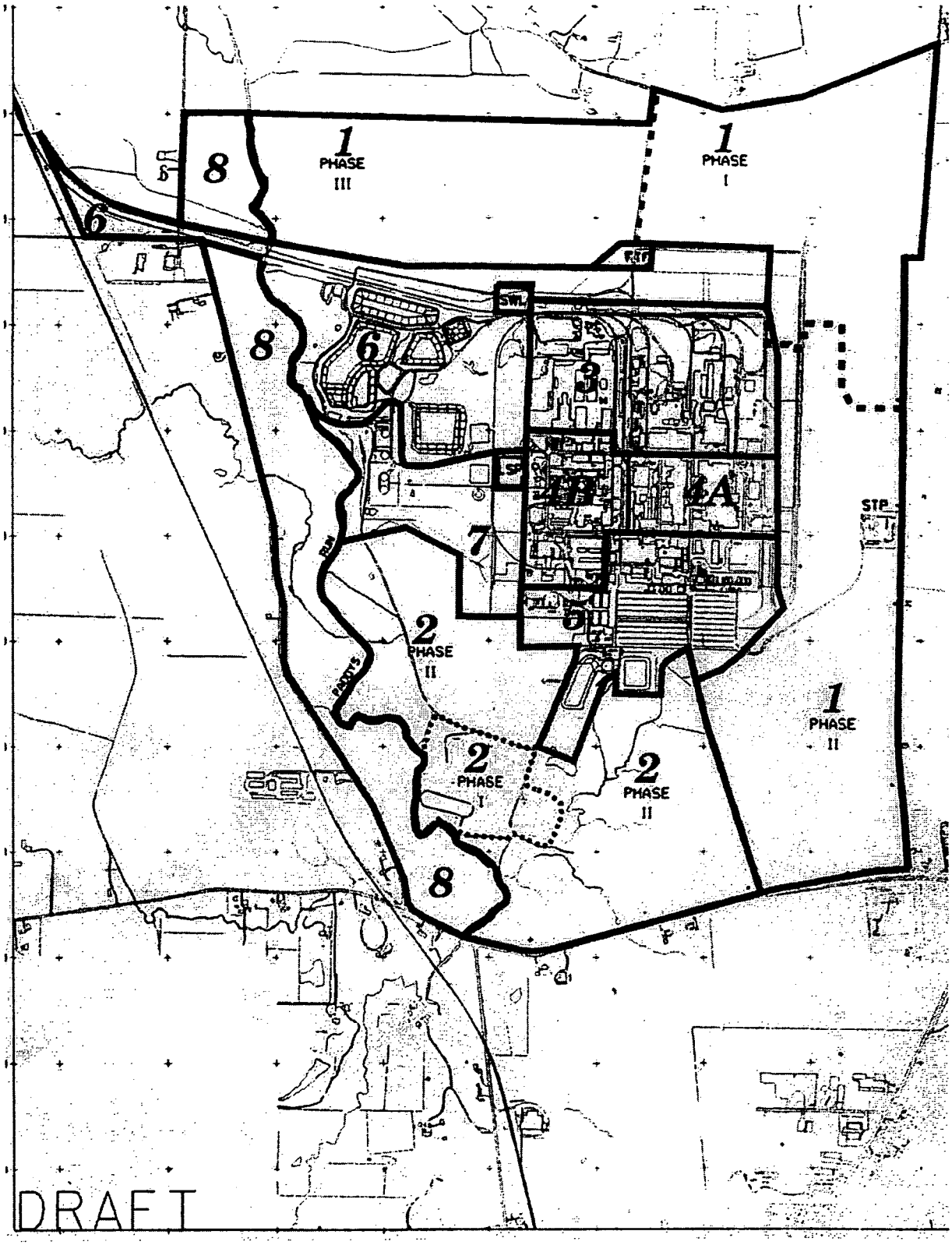
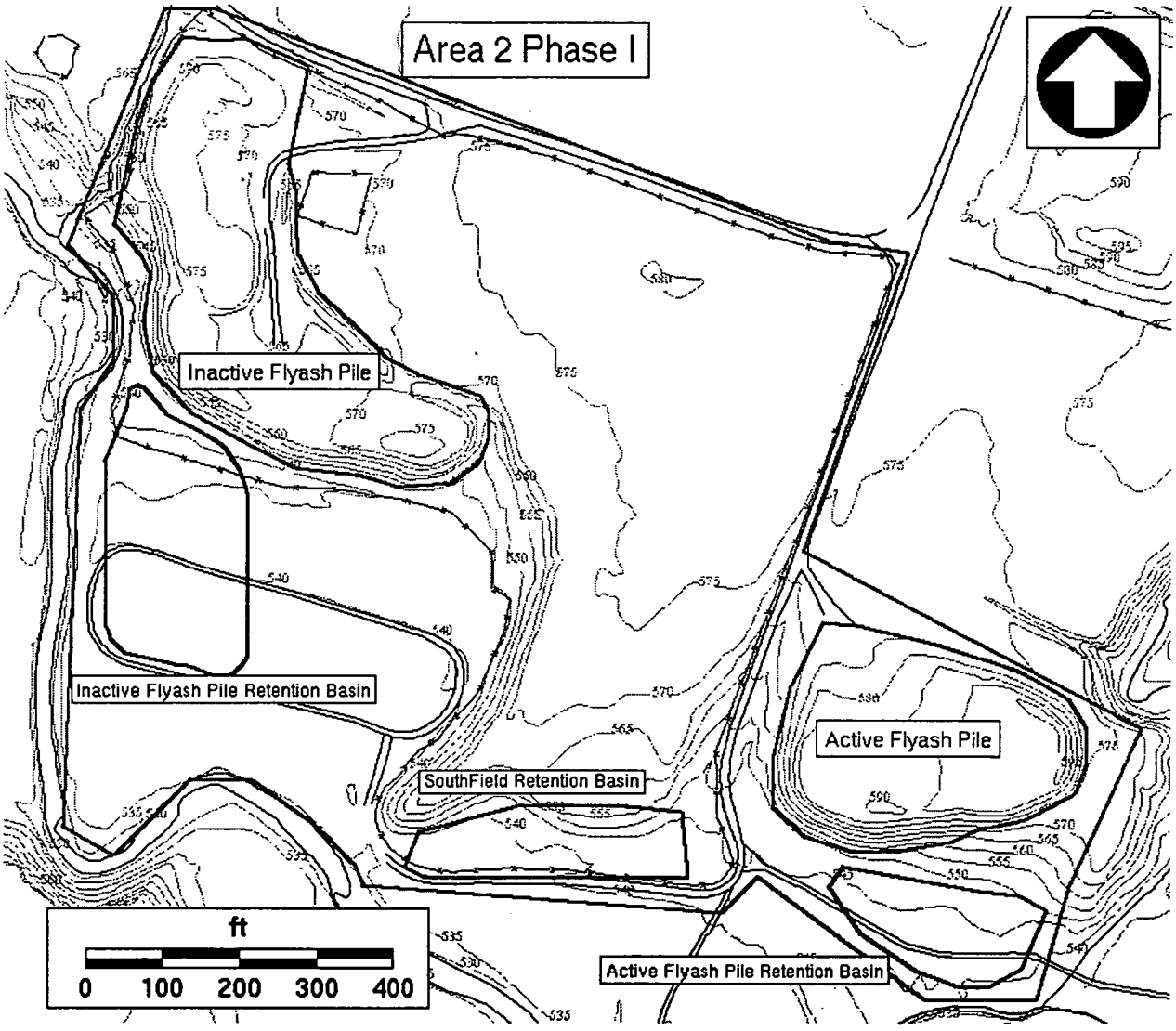


Figure 2 Map of Area 2 Phase I



Attachment A
Deployment Commitment Letter from DOE-FEMP

1847

United States Government

Department of Energy

memorandum

Ohio Field Office

NOV 0 5 1997

DATE: DOE-0112-98

REPLY TO ATTN OF: FEMP:R.J. Janke

SUBJECT: TRANSMITTAL OF THE DEPLOYMENT PLAN: AN INTEGRATED TECHNOLOGY SUITE FOR COST-EFFECTIVELY DELINEATING CONTAMINATION IN SOILS IN SUPPORT OF SOIL REMEDIAL ACTIONS AND FERNALD ENVIRONMENTAL MANAGEMENT PROJECT COMMITMENT TO ITS DEPLOYMENT

TO: J. M. Wilcynski, Manager, DOE-ID

The purpose of this letter is twofold, (1) transmit the Deployment Plan detailing the deployment of an Integrated Technology Suite for Cost-Effectively Delineating Contamination in Soils in Support of Soil Remedial Actions, and (2) commit the Department of Energy, Fernald Environmental Management Project (DOE-FEMP) to implement and deploy the technologies outlined in the subject plan. This Deployment Plan proposes to integrate, implement, and deploy four unique technologies to reduce DOE soil remediation costs by an estimated $36 million over Fiscal Year 1998 to 2006 at the FEMP, enabling the DOE accelerated remediation plan to be met. The DOE-FEMP will ensure that the FEMP dedicates the necessary resources needed to conduct the outlined implementation and deployment tasks, provided the DOE Office of Science and Technology funds the project as proposed.

The real-time field systems outlined in the Deployment Plan will replace the high-cost, and time/labor intensive soil sampling and analysis program originally envisioned in the baseline budget remediation plan for the FEMP, which was estimated to last 13-15 years. The current soils baseline remediation plan specifies the utilization of real-time technologies to collect the data needed to support excavation designs, ensure compliance with the established Waste Acceptance Criteria (WAC) developed for the On-Site Disposal Facility (OSDF), and perform certification readiness testing.

If you or your staff should have any questions, please contact Robert Janke at (513) 648-3124.

for Robert Folker
Acting Manager

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cc:

N. Hallein, EM-42, CLOV
A. Tanner, DOE-FEMP
J. Reising, DOE-FEMP
A. Armstrong, DOE-ID
J. Conner, DOE-ID
J. L. Lyle, DOE-ID
M. Erickson, DOE-EML
K. Miller, DOE-EML
R. Warner, DOE-FEMP
T. Schneider, OEPA
M. Davis, ANL
J. Ditmar, ANL
R. Johnson, ANL
K. Picel, ANL
M. Carpenter, INEEL
L. Roybal, INEEL
J. Bradburne, FDF/1
D. J. Carr, FDF/9
J. D. Chiou, FDF/52-5
C. Sutton, FDF/35
P. Pettit, FDF/50
J. White, FDF/52-5
AR Coordinator, FDF/78

Attachment B
Project Tracking Tables

Task and Activity	Status	Performance Expected	Due Date	Actual Performance	Actual Date Completed	Reference and Comments
Q.1 Qualification of the Warthog system as part of the FY99 excavation planned for Area 2 Phase I.	0%	-3D positional control comparable to standard surveying methods; -real-time wireless data transfer; -operational costs comparable to RTRAK.	Dec. 30, 1998			
Q.2 Additional qualification work targeting the use of real-time technologies in support of site certification.	0%	- RTRAK data can be used to design certification unit layout for primary COCs; - HPGe is used for certification.	Feb 28, 2000			
I.1 Integrate TDI real-time technologies in remedation strategy for Area 2 Phase I in IRDP and gain regulatory acceptance.	50%	Regulatory acceptance of IRDP for Area 2 Phase I	May 31, 1998			
I.2 Integrate real-time data transfer software from Warthog system with Fernald's RTRAK and HPGe systems.	0%	24 hour turn-around for sensor and positional information to project staff.	May 31, 1998 (contingent on project start date)			
I.3 Modification and implementation of Warthog for uranium WAC identification for Area 2 Phase I in FY99.	0%	-Warthog-based system provides 3D positional control comparable to standard surveying methods; -real-time data transfer; -surveying speeds of at least 1 acre per day.	Mar. 31, 2000			
I.4 Expand and maintain Web-based data integration and dissemination site for Area 2 Phase I.	0%	-Web access to real-time data within 24 hours of its collection.	June 30, 1998			Note that this activity will continue as an integral part of TDI after performance measure has been achieved.
I.5 RTRAK/HPGe used for uranium WAC identification and delineation during FY98 work at Area 2 Phase I.	0%	-Two instruments successfully identify areas of 10 square meters that have total uranium concentrations exceeding on average 1,030 ppm - Two instruments providing uranium WAC surveys at 1 acre per day	Dec. 31, 1998			

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Task and Activity	Status	Performance Expected	Due Date	Actual Performance	Actual Date Completed	Reference and Comments
I.6 Develop a lessons learned document based on FY97 implementation work.	0%	TDI participants identified areas requiring modification/improvement and implemented those recommendations in FY99 activities.	Mar. 31, 1999			
I.7 Develop a Certification Design Letter for Area 2 Phase I that integrates real-time technologies in the certification process.	0%	The performance measure is whether or not the CDL is accepted by regulators with real-time technologies included as a component.	Feb. 28, 2000			
I.8 Implement the RTRAK and HPGe systems in support of certification work for Area 2 Phase I in FY00.	0%	The performance measure is submitting a certification report with supporting real-time results for Area 2 Phase I on time, and having it accepted by regulators.	Sept. 30, 2000			
D.1 Adapt and integrate decision-support technology for discrete measurement location selection to delineate excavation footprints.	0%	Plume reduces the number of measurement locations/samples while providing a more accurate footprint of contamination extent.	TBD			Will be scheduled for next area with predesign activities---at this point TBD but most likely in FY99.
D.2 Identify and resolve unique instrumentation requirements for each of the remaining soils at Fernald.	0%	No outstanding unresolved issues with the use of real-time technologies for any of the remaining areas by the end of the TDI.	Mar. 31, 2000			
D.3 Prepare IRDPs, CDLs, and CRs based on real-time techologies for each of the remaining soils remediation areas.	0%	For every document submitted, are real-time technologies proposed for use, and is regulatory acceptance obtained.	TBD			Each IRDP, CDL and CR represents a unique deliverable. Many of these dates are TBD.
D.4 Participate in technology transfer workshops, conferences, and meetings.	0%	Participation in technology transfer workshops/conferences/meetings.	Dec. 31, 1999			
D.5 Develop qualification and implementation programs for real-time applications at other sites.	0%	Sites other than Fernald include these types of technologies in their soil remediation strategies as a result of this TDI.	June 30, 2000			

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Task and Activity	Status	Performance Expected	Due Date	Actual Performance	Actual Date Completed	Reference and Comments
D.6 Train for off-site deployment.	0%	Training sessions are successfully held during the course of the TDI.	Sept. 30, 2000			
G.1 Equipment acquisition and modification.	0%	Purchases/modifications done within schedule and within budget.	Sept. 30, 1998			
G.2 Training.	0%	NA	NA			On-going activity over life of TDI
G.3 Cost Accounting.	0%	NA	NA			On-going activity over life of TDI
G.4 Cost-Benefit Analysis	0%	NA	NA			On-going activity over life of TDI
G.5 Stakeholder Involvement.	0%	NA	NA			On-going activity over life of TDI
G.6 Project Coordination.	0%	NA	NA			On-going activity over life of TDI
G.7 Review of Progress and Results	0%	NA	NA			On-going activity over life of TDI

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Attachment C

Table C1 Baseline Approach Estimated Costs ($ in Thousands)

Task	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
A1PI Characterization	51	0	0	0	0	0	0	0	0	51
A1PII Characterization	473	3693	1109	469	362	0	0	0	0	6106
A2PI Characterization	2546	2204	1881	0	0	0	0	0	0	6631
A2PII Characterization	0	0	0	651	1854	1912	2043	2012	0	8472
A3 Characterization	137	3841	3954	4784	4929	2452	0	0	0	20096
A4 Characterization	0	0	0	0	949	2976	3079	3156	1341	11500
A5 Characterization	0	0	0	0	0	0	456	7374	4952	12782
A6 Characterization	0	0	0	0	0	0	254	7332	7381	14967
FY TOTALS	3207	9738	6944	5904	8093	7340	5833	19873	13674	80605

NOTES:
1. Estimate for Baseline Approach based on original 10-Year Baseline submitted in February 1996.
2. Estimates include overhead costs applied at 30% of direct costs.
3. Area 7 will be remediated after FY06; therefore, it is not included. Area 1, Phase III included with Area 6.
4. A1PI = Area 1 Phase I, etc.

Table C2 TDI Approach Estimated Costs ($ in Thousands)

Task	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
A1PI Characterization	157	0	0	0	0	0	0	0	0	157
A1PII Characterization	304	2378	715	302	233	0	0	0	0	3931
A2PI Characterization	884	766	653	0	0	0	0	0	0	2302
A2PII Characterization	0	0	0	144	410	422	452	445	0	1873
A3 Characterization	72	2010	2068	2502	2579	1283	0	0	0	10514
A4 Characterization	0	0	0	0	438	1374	1421	1457	619	5309
A5 Characterization	0	0	0	0	0	0	179	2895	1944	5018
A6 Characterization	0	0	0	0	0	0	214	6205	6246	12666
TDI Investment	1645	805	825	0	0	0	0	0	0	3275
FY TOTALS	3062	5959	4261	2948	3660	3080	2267	11002	8809	45047

NOTES:
1. Estimate for Technology Deployment Approach based on 10/22/97 projections.
2. Estimates include overhead costs applied at 30% of direct costs.
3. Area 7 will be remediated after FY06. Area 1, Phase III included with Area 6.
4. A1PI = Area 1 Phase I, etc.

Table C3 ROI Table ($ in Thousands)

Description	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
A. Baseline Cost	3207	9738	6944	5904	8093	7340	5833	19873	13674	47059
B. TDI Approach Cost	2692	6153	4436	2948	3660	3080	2267	11002	8809	45047
Cost Savings (A-B)	515	3585	2508	2956	4433	4261	3565	8871	4865	38357
Cumulative Cost Savings	515	4099	6607	9563	13996	18257	21822	30694	35559	35559
TDI Portion of Proposed Cost	1645	805	825	0	0	0	0	0	0	3275
C. Cumulative TDI Portion	1645	2450	3275	3275	3275	3275	3275	3275	3275	3275
Return on Investment	0.31	1.67	2.02	2.92	4.27	5.57	6.66	9.37	10.86	10.86
NOTE: Return on investment = (Cumulative Cost Savings)/C										

Table C4 Estimated Cost Savings by Area

Area	Estimated Cost Savings ($ in Thousands)
Area 1 Phase I	0
Area 1 Phase II	275
Area 2 Phase I	4329
Area 2 Phase II	6599
Area 3	9522
Area 4	6191
Area 5	7764
Area 6	2301

NOTES:
1. Cost savings are the difference between Baseline and TDI Approach costs by area. These costs are given in Tables C1 and C2. Savings are for the period FY98-FY06.
2. Work in Area 1 Phase I was essentially completed in FY97. No cost savings are expected for this area.

Attachment D
Deviations from Original TDI Proposal

This TDI deployment plan differs from the original proposal in several significant ways:

(1) The original proposal spanned two years. The deployment plan is for three years. There are two reasons we prefer the increased duration. First, a three year scope more closely matches the requirements of Fernald's initial implementation in Area 2 Phase I. Implementation is scheduled to begin in FY98, but the final certification report will not be issued until FY00. The use of real-time methods for certification and closure is a significant component of the overall deployment plan. A three year TDI project allows the TDI program to capture the certification portion of Area 2 Phase I activities. The second reason is that one objective of this TDI deployment plan is redeployment at multiple sites. Activities in FY98 are focused on Fernald. A three year TDI project schedule will allow more time to meet the multiple site deployment objective. This deployment plan is not requesting additional funds to cover the third year.

(2) The RTAL has been dropped from the TDI deployment plan. Any mobile field laboratory needs will be addressed by DOE-FEMP. This removes a significant capital equipment expense from the original proposal. The savings from removing the RTAL from the TDI deployment plan will be used to spread TDI support over three years, and also to partially fund INEEL's involvement in the TDI deployment. The exclusion of the RTAL from the TDI scope also allows the TDI portion of the work to better focus on real-time technologies and decision-making, which is the core of the proposal.

(3) INEEL has been included in the deployment plan as a partner. INEEL brings the Warthog to the overall technology package. The Warthog, a real-time sensor platform, brings several key capabilities to the overall suite of technologies proposed, including real-time sensor data transfer and real-time 3D positioning capabilities. These capabilities complement capabilities provided by the RTRAK and HPGe systems already at the site. The following paragraphs describe the history of the Warthog and its capabilities, and also provide biographical information for Mike Carpenter, the INEEL representative for this deployment plan.

The Warthog is an information system used by waste site managers to improve the process of hazardous and radioactive waste characterization and protect site workers. Insufficient information about waste retrieval heightens the level of risk to worker safety and poses potential downstream waste and storage problems by unnecessary mixing and spreading hazardous materials. Minimal setup is required to deploy the Warthog system. The Warthog monitors changing waste site conditions to compensate for the inherent lack of knowledge of conditions during an excavation. By continually updating information at the dig-face as waste retrieval proceeds, the Warthog system provides waste site managers with a rapid means to make well informed decisions throughout the remediation process. This approach accelerates the process by reducing the time spent

with ponderous setup and preparation of sheet piling and sophisticated gantry structures, reducing physical field sampling, reducing waste volumes, removing a sizable portion of health risk issues, and allowing on-site managers to adjust rapidly to changing conditions during the remediation. Two key components of the Warthog system are a laser-based 3D positioning system that allows 3D position tracking in real-time, and wireless real-time data transfer capabilities. In the case of the FEMP, the Warthog's principal applications would be supporting deep excavation survey work where uranium WAC identification and removal was an issue. This is the case for Area 2 Phase I and for most of the former production area.

The dig-face characterization (DFC) concept began development in 1992 through the DOE EM-50 program at INEEL. In August of 1995, a prototype was deployed at the Mound Plant Area 7 Removal Action Site at Miamisburg, Ohio. The system successfully characterized three successive excavated levels and provided site managers with spatial distribution maps of the contamination present. The maps guided the excavation crew to an actinium-227 plume which was then excavated. Thorium-232 was also detected and its distribution pattern was shown by the DFC system to migrate with depth outside the immediate excavation area. Based on the performance of DFC at the Mound Plant, a commercial version of the system that adapts to changing waste site conditions was fabricated at INEEL. This version is known as the Warthog.

Michael Carpenter has been closely involved in the multi-year development of the WEMS system and development of the integration of real-time data subsystems. He holds a BS in Environmental Business Management from Idaho State University, located in Pocatello, Idaho. Mike coordinated all project tasks for the Dig-face Characterization project for the DOE sponsored Landfill Stabilization Focus Area (LFSA). He identified, analyzed and determined which resources are used to carry out development and deployment of the DFC system. Mike managed site selection process for determining appropriate sites to deploy DFC, negotiated the terms of the deployment with facility and waste program managers at selected sites and managed activities at the deployment sites at Mound Plant (two deployments) and Savannah River site. The DFC project was a four year program to identify system development and deploy innovative waste site characterization technology for commercial use at waste clean-up sites. Mike now provides project management for efforts to promote the use of WEMS and related technologies at sites throughout the DOE complex and is responsible for managing project tasks related to WEMS based technology.

Attachment E
Responses to Specific Conditions Identified by Selection Committee

Condition

1) The exact amount of funding requested of the program must be clarified.

Response: The funding requested from the TDI program over the life of the TDI project at FEMP is $3.3M. The $5.2M identified on page 20 of the original TDI proposal was incorrect.

2) The specific scope associated with the funding request must also be clarified. It is the intent of the Selection Committee to minimize the purchase of capital equipment.

Response: In recognition of the Selection Committee's desire to minimize the purchase of capital equipment that will be retained by the FEMP, this deployment plan eliminates the request for capital equipment expenditures on the RTAL, for a savings of $1.6M. This amount will be redirected to funding INEEL's involvement in the TDI deployment plan, expanding the TDI to three years, and to strengthening deployment support activities both at the Fernald site and at other DOE facilities.

3) An optimal suite of technologies must be identified and justified, taking into consideration the current state of the practice and new DOE developed technologies across the complex.

Response: The basic thrust of the TDI proposal is that the application of real-time measurement systems along with appropriate decision-support technologies can have a dramatic impact on the overall cost of soil remedial actions that involve radionuclide contamination. The most appropriate mix of sensing, direct measurement and decision-support technologies will be dependent on the specific needs of a particular site, and will change as technologies continue to evolve and improve. Establishing regulatory acceptance of real-time techniques for site remediation, and particularly for site closure, is a non-trivial issue in and of itself. For the COCs of concern at Fernald, the combination of a mobile NaI system such as the RTRAK and *in situ* gamma spectrometry based on the HPGe is believed to be optimal at this time. Position tracking and data transfer capabilities of the RTRAK and HPGe systems will be enhanced with Warthog technologies from INEEL. DOE's EML, the Department of Energy's premier radiological measurements facility, have been involved with this TDI project with the explicit objective of ensuring that the mix of technologies proposed for Fernald do in fact reflect the state of the art. Fernald was also the host of the Uranium in Soils Integrated Demonstration project, which hosted a demonstration of several different sensing and direct measurement systems for characterizing uranium contamination in soils.

It is not the intent of this TDI project, however, to claim that the proposed mix are in fact

the only and absolute solution to addressing the real-time data needs of soil remediation. Sites with other radionuclides (such as an alpha emitter like Th230) or significant chemical contamination may opt for a different combination of sensors, direct measurement techniques, and/or field analytics to accomplish the same task. Better technologies may appear over time. Similar statements hold for the decision support software that will be used for this project. This TDI project will break ground for DOE in establishing a cradle to grave precedent for the use of real-time instrumentation in solving DOE's contaminated soils problems. It is the conviction of the participants in this TDI project that such an approach will not only dramatically reduce soils remediation costs, but also significantly improve the overall effectiveness of the remedial effort.

4) The proposer must also address the availability (commercial or otherwise) of the system to other sites across the complex.

Response: The RTRAK and RSS systems, while not directly commercially available in their present incarnations, are composed of commercially available components that can be assembled to replicate these systems. The *in situ* HPGe systems proposed for use at the FEMP site are currently commercially available. The position tracking capabilities of the Warthog system are currently in the process of commercialization. Plume and SitePlanner are commercially available software packages.

5) Multiple deployment sites with strong levels of commitment must be identified.

Response: Besides the implementation site, Area 2 Phase I, the FEMP has another eight sites that will deploy this technology suite over the next 10 years. DOE-FEMPs commitment to the real-time technologies included in this deployment plan is evident in the Sitewide Excavation Plan (SEP), a facility-wide planning document prepared in FY97 and currently under comment from regulators that makes the use of real-time instrumentation the core element in its approach to supporting the needs of the various soil remediation projects at the FEMP. It is also evident in the Integrated Remedial Design Package (IRDP) that is under preparation for the Area 2 Phase I activities that will serve as the initial implementation of the proposed technologies at the site, and in the individual Project Specific Plans that are guiding various FY98 pre-design investigation activities in Area 1Phase II and Area 3. Letters of interest have been obtained from the FUSRAP program, INEEL, and DOE Chicago Operations Office. DOE's Fossil Energy Program has expressed interest in the application of these technologies to characterization and remediation of privately held NORM-contaminated sites. However, this deployment plan focuses on a successful implementation at Fernald for FY98. The identification of redeployment issues at other sites, the development of deployment strategies for those sites, and finalizing commitments is one objective for FY98.

6) Required performance requirements of the system must be fully addressed.

Response: Please refer to the performance objectives and performance measures specified

in this Deployment Plan for a complete enumeration of the technical performance requirements of the proposed systems.

Attachment F
Modification of FEMP's Baseline Incorporating Proposed Activity

SOILS CHARACTERIZATION AND EXCAVATION PROJECT: DOCUMENTATION OF REAL-TIME TECHNOLOGIES IN THE BASELINE

Introduction:

The Soils Characterization and Excavation Project (SCEP), consisting of the Work Breakdown Structure (WBS) element code 2.1.2.E, covers the Remedial Design and Remedial Excavation and Restoration activities associated with at and below grade impacted materials site-wide. This includes soil within Operable Unit 1 boundaries (after the removal of the Waste Pits), the Operable Unit (OU) 2 Waste Units, and at and below grade OU 3 debris, soil within the OU 4 boundaries (excepting Silo Contents and silo berms) and soil in OU 5. Attachment 1 provides a list of the defined technical content of the SCEP as well as the five subordinate elements under the SCEP, which defines the Scope of Work. As shown in Attachment 1, the elements of cost used in the development of the budget estimates consist of (1) labor, (2) materials, (3) subcontracts, and (4) other direct costs.

Currently the Phase III Change Proposal or Replan, covering fiscal years (FY) 1997 and 1998, represents the approved baseline budget and schedule for the Fernald Environmental Management Project (FEMP). The FEMP is currently working on developing the FY 1999 Replan and out-year planning packages which will, when approved by DOE-FEMP (DOE-FEMP review and approval scheduled for December/January, 1998 time frame), constitute the approved baseline budget and schedule for FY 1999 and out-years.

Area-Specific Remediation: Baseline Budgets and Schedules:

For the detailed years (FY 1998 and 1999), baseline budgets and schedules are developed on an area by area basis. For the out-years, baseline budgets and schedules are developed through the use of "planning packages". Planning packages are developed for work scopes which are uncertain and not scheduled to begin in the near future or for which detail cannot be determined. Planning packages are budgeted, scheduled, described at an appropriate summary level. For all other work scopes, Work Packages are developed.

For the area-specific costs provided in this Deployment Plan, detailed Work Scopes have been developed. The Baseline budgets and schedules developed for each remediation area generally include three principle tasks or activities (represented in the Baseline as *Control Accounts*): design, characterization, and excavation. Under each Control Account, there are associated Charge Numbers which accrue costs for the various sub-activities under the particular *Control Account* category (design, characterization and excavation). Work scopes represent natural divisions under the control account. Work scopes are essentially charge number-specific and represent the level at which all detailed planning is generated and performance is measured. Sub-activities under each control account in the SCEP include such items, as work plan development, title I and II design, and Safety Analysis.

Example: Area 2, Phase I Remediation:

As detailed in the Deployment Plan, Area 2, Phase I (or OU 2 Southern Waste Units) represents the first step or Implementation Phase for the TDI deployment of the real-time technologies. The attached pages illustrate the incorporation of the real-time technologies into the Baseline Remediation Plan for the SCEP for Area 2, Phase I (note similar documentation exists for the remaining areas). Note the control account, 2FM1, is described by the characterization of the OU2 Southern Waste Units. Under "Scope of Work" radiological surface scanning and real-time measurements are the noted activities to supplement design efforts, achieve WAC attainment and perform certification readiness testing.

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U.S. DEPARTMENT OF ENERGY
WORK BREAKDOWN STRUCTURE DICTIONARY
PART II - ELEMENT DEFINITION

1. PROJECT TITLE/PARTICIPANT	2. DATE	3. IDENTIFICATION NUMBER
(MSA)	01/31/97	
4. WBS ELEMENT CODE	5. WBS ELEMENT TITLE	
2.1.2.E	Soil Characterization & Excavation Project	
6. INDEX LINE NO.	7. REVISION NO. AND AUTHORIZATION	8. DATE
56	Rev. 0, FY97-9000-0002-00	01/31/97
9. APPROVED CHANGES		
New per FY97-9000-0002-00		
10. SYSTEM DESIGN DESCRIPTION	11. BUDGET AND REPORTING NUMBER	
CERCLA/ACA	EW2010101, EW2010102	

12. ELEMENT TASK DESCRIPTION

a. **ELEMENTS OF COST:**

Labor
Materials
Subcontracts
Other Direct Costs (ODCs)

b. **TECHNICAL CONTENT:**

This WBS element covers the Remedial Design and Remedial Excavation and Restoration activities associated with at and below grade impacted materials sitewide. This includes soil within the Operable Unit 1 boundaries, the five Operable Unit (OU) 2 Waste Units, at and below grade Operable Unit 3 debris, soil within the Operable Unit 4 boundaries (except the silo berms), and soil in Operable Unit 5.

Specifically, the following work scope is covered site-wide for at and below grade excavation:

- Title I & II Design
- Title III Services
- Remedial Action Work Plans
- Geotechnical investigations
- Bid & award of all subcontracts required for design and excavation of impacted material
- Precertification, certification that excavated areas achieve FRLs, and excavation control sampling for the above work, as well as characterization support for various "Ad-Hoc" excavations which will be performed accross the site by other projects
- Excavation of impacted material, including at- and below-grade D&D of utilities and structures
- Transportation of all above WAC soil and below-grade debris to a que area designated by the WPRAP project
- Transportation of all above FRL soils and below-grade debris to the On-site Disposal Facility or to a designated que area
- Final grading and seeding
- Maintenance of the RA-17 Soils Stockpiles until remediation and placement in the On-site Disposal Facility
- Local air and radon monitoring
- Postremediation monitoring and maintenance
- Cultural and natural resources management
- Natural resources restoration
- Postclosure documentation
- Regulatory documentation, including safety analysis and readiness assessment
- Soils Characterization and Excavation Management

In addition, the following specific OU2 work scope is covered:

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U.S. DEPARTMENT OF ENERGY
WORK BREAKDOWN STRUCTURE DICTIONARY
PART II - ELEMENT DEFINITION

1. PROJECT TITLE/PARTICIPANT	2. DATE	3. IDENTIFICATION NUMBER
FEMP (MSA)	01/31/97	
4. WBS ELEMENT CODE	5. WBS ELEMENT TITLE	
2.1.2.E	Soil Characterization & Excavation Project	
6. INDEX LINE NO.	7. REVISION NO. AND AUTHORIZATION	8. DATE
56	Rev. 0, FY97-9000-0002-00	01/31/97
9. APPROVED CHANGES		
New per FY97-9000-0002-00		
10. SYSTEM DESIGN DESCRIPTION	11. BUDGET AND REPORTING NUMBER	
CERCLA/ACA	EW2010101, EW2010102	

12. ELEMENT TASK DESCRIPTION

- OU2 Removal Actions at the Active Flyash Pile, Paddy's Run and the South field Seepage Control Project. Also includes maintenance of these removal actions until remediation of the Southern Waste Units is complete.
- Historical cost for preparation of the OU2 RI/FS and Record of Decision. These documents cover the OU2 Waste Units as well as the On-site Disposal Facility and related projects.
- Historical cost for preparation of the OU2 Remedial Design Work Plans. These documents cover the Waste Units as well as the On-site Disposal Facility and related projects.

c. **SCOPE OF WORK:**

This scope of work is further defined in the following subordinate elements:

2.1.2.E.A Special Projects
2.1.2.E.B Engineering & Design
2.1.2.E.C Construction
2.1.2.E.D Characterization
2.1.2.E.H SCEP Management

d. WORK SPECIFICALLY EXCLUDED:

- Placement of above FRL soils and below grade debris in the On-site Disposal Facility
- Treatment and shipment of above WAC soils and below grade debris to an off-site disposal facility
- Excavation and transportation of OU1 Waste Pits material
- Excavation of OU4 berm soils
- Remediation of the OU4 below grade silo structures and the K-65 trench
- Handling and transportation of sludge material from the sewage treatment plant(s), biosurge lagoon, stormwater retention basin or any other on-site process operations
- Implementation of sitewide air and radon monitoring program

WORK SCOPE DEFINITION
(Control Account)

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1. PROJECT TITLE FEMP (MSA)	2. DATE 06/06/97	Page 1
3. WBS ELEMENT CODE # 2.1.2.E.D (PH3)	4. WBS ELEMENT TITLE/NAME Soil Characterization	
5. PERFORMING ORG/DEPARTMENT CODE 3405	6. ORIGINATOR NAME/PHONE K. A. Nelson/648-5270	7. WBS ELEMENT MANAGER K. A. Nelson
8. BUDGET AND REPORTING NUMBER EW2010102	9. BUDGET TITLE CERCLA Cleanup	
10. ORIGINAL SCOPE? / CHANGE TO WORK SCOPE? / NEW SCOPE? Change per FY97-9000-0009-00		11. ESTIMATED START / COMPLETION DATE ~~06/97~~ 07/97 - 08/00
12. TASK IDENTIFICATION (CONTROL ACCOUNT) 2FM1	13. TASK DESCRIPTION (ONE LINE) OU2 Southern Waste Units Characterization	

14. ELEMENT TASK DESCRIPTION:

a. **ELEMENTS OF COST:**

Labor
Materials
Subcontracts
Other Direct Costs (ODCs)

b. **TECHNICAL CONTENT:**

The scope of this document is limited to the sampling and analytical work performed by the Soil Characterization and Excavation Project (SCEP) within the remediation area defined as the OU2 Southern Waste Units. Drivers of this work are CERCLA, RCRA, the EPA Amended Consent Agreement (ACA), and the signed Records of Decision (RODs) for Operable Units 2 and 5. Characterization sampling and analytical testing is a summary for area-specific characterization and support activities that will be conducted in the OU2 Southern Waste Units to perform characterization for purposes of: pre-design investigations (PDIs), waste acceptance criteria (WAC) testing, and corrective actions. The overall purpose of SCEP characterization activities is to provide necessary information in the form of analytical data for engineering design and construction, and demonstrate compliance with the Final Remediation Limits (FRLs) for soil published in the OU2 and OU5 RODs.

c. **SCOPE OF WORK:**

The scope of characterization sampling and analytical testing is to perform soil sampling, analytical testing and real-time data collection in the OU2 Southern Waste Units for the following purposes:

- Pre-design investigations include sampling and analytical testing that is conducted to supplement existing characterization information for the purposes of engineering design and/or construction. In many instances exisiting characterization information is insufficient to use as the basis for remedial design, and acquisiton of supplemental media characterization information will result in cost savings and minimize schedule delays.

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Project Manager	Control Account Manager	Control Team Manager
Arlen Hunt	Arlen Hunt	[illegible]

WORK SCOPE DEFINITION
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1. PROJECT TITLE FEMP (MSA)	2. DATE 06/06/97	Page 2
3. WBS ELEMENT CODE # 2.1.2.E.D (PH3)	4. WBS ELEMENT TITLE/NAME Soil Characterization	
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14. ELEMENT TASK DESCRIPTION

- Radiological surface scanning and real-time measurements are conducted using sodium iodide (NaI), high purity germanium (HPGe), and similar non-intrusive static and mobile field instruments to record the radiological emanation from the surface and near subsurface of soil undergoing investigation. This information is recorded and used to identify radiological anomalies and hot spots that may be present in an area. This information is of value in determining which focused areas need further investigation, including physical sampling for FRL compliance and WAC attainment purposes.

- Waste Acceptance Criteria (WAC) attainment sampling and testing is performed on all soil that is stockpiled pending placement or placed directly into the OSDF. The WAC levels ar concentrations of contaminants specified in the OU5 Record of decision (ROD) that can not be exceeded in material placed into the OSDF. WAC sampling and analytical testing will insure that these concentrations are not exceeded to specified confidence level.

- Certification readiness testing (CRT) is performed for the purpose of demonstrating that an area or certification unit (CU) is sufficiently below the FRL(s) of the assigned ASCOC(s) to successfully pass certification if sampling and analytical testing are conducted. CRT will include real-time measurements, field portable instruments such as XRF, field test kits, and conventional physical sampling and laboratory analysis.

- Certification sampling and analytical testing is performed as the final step in the certification process. A specified number of samples is obtained from a designated certification unit using a systematic random method. The physical samples are subjected to laboratory analytical testing, and the results must meet specified statistical confidence limits. Provided these limits are met when compared to the FRLs, the certification unit subjected to certification is declared certified and will be entered into the final land use plan once concurrence of status is given by the Regulatory Agencies.

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- Corrective actions are performed if results obtained in certification sampling fail attainment of one or more FRLs for assigned ASCOCs. In these instances, the mechanism for failure will be investigated and an appropriate corrective action plan drafted and presented to the Regulators for concurrence. Once the plan is approved, sampling and analytical testing will be perfomed to: delineate the contamination, specify the horizontal and vertical extent of contaminated soil that needs to be removed, and verify the additional soil removal has been sufficient to attain the FRLs in the CU or portion of CU in question.

- Ad Hoc testing will be performed when required in order to characterize miscellaneous media and other

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3. WBS ELEMENT CODE #: 2.1.2.E.D (PH3)	4. WBS ELEMENT TITLE/NAME: Soil Characterization	
5. PERFORMING DIV/DEPARTMENT CODE: 3405	6. ORIGINATOR NAME/PHONE: K. A. Nelson/648-5270	7. WBS ELEMENT MANAGER: K. A. Nelson
8. BUDGET AND REPORTING NUMBER: EW2010102	9. BUDGET TITLE: CERCLA Cleanup	
10. ORIGINAL SCOPE? / CHANGE TO WORK SCOPE? / NEW SCOPE?: Change per FY97-9000-0009-00		11. ESTIMATED START / COMPLETION DATE: ~~06/97~~ 07/97 - 08/00
12. TASK IDENTIFICATION (CONTROL ACCOUNT): 2FM1	13. TASK DESCRIPTION (ONE LINE): OU2 Southern Waste Units Characterization	

14. ELEMENT TASK DESCRIPTION:

materials of interest. This may include vegetation, water fertilizers, slag, fill material or other materials introduced to the site that has potential to impact the status of certification.

In addition to the described sampling and analytical testing, the following work scope will be performed to support the OU2 Waste Unit characterization sampling and analytical effort.

- Acquisition an assembly of equipment to conduct radiological scanning and real-time measurements in the OU2 Waste Units.
- Development, procurement, implementation, and monitoring of contracts with consultants and technical resources as needed to provide technical expertise to design, assemble, operate, and make field ready specialized radiological detection intrumentation, supporting electronic equipment, and software.
- Development of Data Quality Objectives (DQOs). Project Specific Plans (PSPs), and necessary procedures in order to comply with the site SCQ and other quality assurance guidance and site requirements. These documents will insure sampling an analytical testing and other characterization related activities are performed appropriately and meet the needs of the project.
- Field activities including manpower, instrumentation, transportation, repair and maintenance, equipment, expendable supplies, and training.
- Data managment, data validation, data mapping, and modeling to optimize the use of both existing and newly acquired characterization data.
- Assimilation of acquired information into certification reports that will be submitted to the regulatory agencies.

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- Participation of team members in relevant training, cross-training, and professional development to enhance productivity and improve quality of work performed under this scope.
- Discussions with and coordination with on-site and off-site professionals that are working on similar sites or situations whose work may be of practical value to the project. This includes employees of the DOE National Laboratories and employees located at other facilities with the DOE system.

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1. PROJECT TITLE FEMP (MSA)	2. DATE 06/06/97	Page 4
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12. TASK IDENTIFICATION (CONTROL ACCOUNT) 2FM1	13. TASK DESCRIPTION (ONE LINE) OU2 Southern Waste Units Characterization	

14. ELEMENT TASK DESCRIPTION

d. **WORK SPECIFICALLY EXCLUDED:**

- Engineering plans, drawings, or specifications
- Construction and remediation costs
- Waste tracking and disposition
- Characterization work in areas other that Area 2, Phase I
- Field sampling

Attachment G
Regulatory Compliance Strategy

This TDI project recognizes that regulatory approval is absolutely critical to the deployment of real-time technologies to soil remedial actions. Regulatory concerns vary with the particular application of real-time technologies. For example, the use of real-time technologies for post-remediation certification and site closure poses more of a regulatory challenge than using real-time technologies to guide soil excavation. In the case of the Fernald site, a significant amount of resources have already been invested by the partners in this proposal to address regulatory concerns by Ohio EPA and EPA Region V. The strategy used to date at Fernald has included several key components:

- DOE-FEMP has used experts on real-time technologies (such as DOE's Environmental Measurements Laboratory) to educate both regulators and site contractors about the uses and limitations of real-time technologies for soils contaminated with radionuclides;

- DOE-FEMP has designed and implemented targeted comparability studies that document the technical performance of real-time technologies as compared to their more traditional baseline alternatives. In the case of Fernald, comparability studies for both the RTRAK and HPGe systems have been completed. These comparability studies are not considered final documents. Issues unresolved by the first round of comparability data have been further pursued, and addendums summarizing knowlege to date are periodically released.

- DOE-FEMP has organized a "real-time working group" that is comprised of representatives from the Ohio EPA and Region V, site contractor staff, DOE-FEMP, and technical experts to monitor and discuss the results from real-time qualification work. The purpose of this working group is to provide a forum for presenting and explaining real-time qualification work, and for eliciting feedback from the regulatory community.

- DOE-FEMP has established a Web-page that serves as a means for disseminating information regarding the application of real-time technologies as part of the Fernald soils remediation project.

- Ohio EPA, at its discretion, will conduct in-field QA/QC checks to verify that data of acceptable quality are in fact being produced by the real-time technologies. This QA/QC process may include lab audits, split sampling, submittal of blind standards, re-calculation of activity levels, and modeling replication.

These activities would continue as a means for addressing regulatory concerns for the Fernald site as part of the TDI deployment of real-time technologies at Fernald. In addition, the partners in this project would also address the regulatory issues associated with deployment of these technologies at other facilities.

- As potential deployment sites are identified, representatives from the sites and their

regulatory agencies would be encouraged to form their own real-time working groups and to send representatives to participate in Fernald's group.

- Regulatory representatives from other potential deployment sites would be included in the email distribution list associated with Fernald's Soils Remediation Web page.

- Technical concerns that are associated with the use of these real-time technologies at other sites will be identified, and to the extent possible addressed within the planned implementation and deployment activities at the Fernald site.

- TDI deployment participants will work within established stakeholder and regulatory forums to disseminate information about Fernald's experience with real-time technology deployment. An example is Ohio EPA's participation in the DOE Office of Science and Technology's Community Leaders Network (CLN).

The specific roles proposed for real-time technologies as part of the soils remediation effort at Fernald are:

1) to determine the general spatial patterns of contamination and support the definition of remediation footprints during pre-design investigative work;

2) to implement ALARA principles during remediation;

3) to identify small, isolated areas of highly elevated contamination that might pose hot spot or uranium WAC concerns;

4) to assist in the design of certification units after remediation and evaluate their probability of passing certification;

5) as a replacement for discrete sample collection and analysis for specific isotopes during the post-remediation certification phase of work.

Regulatory acceptance is crucial for (3) and (5). The IRDP for Area 2 Phase I, the TDI Implementation site, has been submitted for regulatory comment and approval. Real-time technologies for uranium WAC identification are an integral component of this IRDP. Qualification work for regulatory acceptance for (5) is in process.

Attachment H
Stakeholder Involvement Strategy

The stakeholder involvement strategy for this TDI proposal builds on the overall stakeholder strategy for Fernald, and leverages specific activities already initiated to involve regulators in the introduction of real-time technologies to Fernald's soils remediation program. Stakeholders for the Fernald site include regulatory agencies and their representatives, local citizens, local government, and Native American tribes and organizations.

Regulatory involvement is discussed in detail in Attachment G.

Local citizen and government participation will be solicited in a variety of ways that include:

(1) regular briefings of the local citizens environmental interest group (Fernald Residents for Environmental Safety and Health, or FRESH);
(2) person-to-person communication sponsored through the Fernald Envoy Program;
(3) occasional workshops designed to provide information and solicit stakeholder's concerns;
(4) presentations to the Fernald Citizens Task Force;
(5) fact sheets describing this TDI project that are disseminated throughout the local community;
(6) inclusion of descriptive materials in the Fernald Report, a monthly community newsletter and in the Fernald Progress, a bi-monthly newsletter;
(7) documentation that is accessible through Fernald's Public Environmental Information Center;
(8) briefings of the Site Technology Coordination Group (STCG), a group that has been established for Fernald to identify, review and comment on new and innovative technologies that have might application at the site, and that includes representatives from the local community;
(9) a Web page dedicated to the soils remediation project at Fernald, which will include a link to related TDI information.

The soils remediation project at Fernald may unearth significant prehistoric artifacts including Native American human remains. This is a problem that has precedent at Fernald. There currently exists an agreement with the Ohio Historic Preservation Office, recorded in a Memorandum of Agreement, that documents the process for removal and reburial of Native American artifacts and human remains on site. These issues are associated with the soils remediation program at Fernald in general, and are not directly linked to the technologies proposed for deployment in this TDI deployment plan.

Attachment I
Letters of Commitment from EML, ANL, INEEL and Ohio EPA

Idaho National Engineering Laboratory

LOCKHEED MARTIN

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Lockheed Martin Idaho Technologies Company
P. O. Box 1625 Idaho Falls, ID 83415

October 30, 1997

Mr. Jack Craig
Director Fernald Area Office
U.S. Department of Energy
P.O. Box 538705
Cincinnati, Ohio 45253-8705

INEEL LETTER OF COMMITMENT OF SUPPORT FOR FEMP DEPLOYMENT PLAN – GJS-34-97

Dear Mr. Craig:

I would like to take this opportunity to express a commitment of Idaho National Engineering and Environmental Laboratory (INEEL) resources to support the Fernald Environmental Management Project (FEMP) Technology Deployment Initiative plan. The INEEL will use its expertise to integrate automated real-time acquisition, display, transfer, and data archiving functions with FEMP's Radiation Tracking System (RTRAK) and High Purity Germanium (HPGe) characterization systems. The INEEL looks forward to combining aspects of its successful Warthog Excavation Monitoring System with FEMP's experienced characterization effort. This cooperative approach will soon make available features long sought after in the realm of site characterization/remediation monitoring that can be used in a variety of applications at Fernald and other Department of Energy sites. The INEEL will make every effort to produce the highest quality "product" possible.

Sincerely,

Gregory J. Stormberg
Department Manager
Integrated Earth Sciences

mws

cc: G. J. Stormberg, LMITCO, MS 2107

Department of Energy
Environmental Measurements Laboratory

201 Varick Street, 5th Floor
New York, NY 10014-4811

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April 8, 1997

Robert J. Janke, Fernald Area Office, FN

TDI SUPPORT

As a DOE facility that has within the past year been incorporated into programs under Environmental Management, we fully support the efforts of our staff in teaming with sites under the recently announced Technology Deployment Initiative within the Office of Science and Technology.

In the case of the Fernald Environmental Management Project, the technical guidance, training and quality assurance aspects that EML can provide in field measurement methods and related laboratory-based metrology represents an ideal match of our expertise to the needs of the site. Based on the draft proposal that you have been working on with Kevin Miller of my staff, and pending its acceptance, we commit ourselves to this partnership and the implementation and deployment objectives.

Frank L. Berk for

Mitchell D. Erickson, Director
Environmental Measurements Laboratory

Printed with soy ink on recycled paper

Letter of Commitment from DOE-FEMP
RE: OU5 SOILS TDI PROPOSAL

April 15, 1997

Mr. Jack Craig, Director
U.S. DOE FEMP
P.O. Box 38705
Cincinnati, OH 45253-8705

Dear Mr. Craig:

Ohio EPA is providing you this letter to document our support for the Technology Deployment Initiative proposal, "Deployment of an Integrated Technology Suite for Cost-Effectively Delineating Contamination in Soils in Support of Soil Remedial Actions" currently being developed. Ohio EPA is pleased to be a participant in this proposal at the request of DOE. It provides a unique opportunity for partnering between Ohio EPA, DOE (Fernald, ANL, EML) and Flour Daniel Fernald to achieve deployment of new technologies while improving the cleanup of the The FEMP site.

It is Ohio EPA's belief that if this deployment is successful, the new technologies will result in a cleanup that is more protective and effective. The cleanup would be more protective in that ALARA would be readily achieved and the probability of missed hot-spots would be greatly reduced or eliminated. The cleanup would be more effective in that it takes less time and money. Additionally, the quicker cleanup certification is achieved the sooner restoration can begin, resulting in reductions in erosion and fugitive dusts.

Ohio EPA looks forward to the opportunities presented by this project for achieving cooperation and improved remediation. It is important that we provide information to the public on the proposal at the earliest possible date. Additional detail on Ohio EPA's role in this partnership and our expectations from DOE are included as an attachment. If you have any questions concerning this letter or Ohio EPA's participation in the project, please contact Tom Schneider at (937) 285-6466.

Sincerely,

Graham E. Mitchell
Chief
Office of Federal Facilities Oversight

cc: Bob Johnson, DOE-ANL
Rob Janke, DOE-Fernald
Pat Campbell, DERR/CO
Lisa Crawford, FRESH

ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE, BUILDING 900, ARGONNE, ILLINOIS 60439-4832

TELEPHONE (630) 252-5953
FAX (630) 252-4611

May 6, 1997

1847

Mr. Jack R. Craig, Jr.
Director, Fernald Environmental
Management Project
U.S. Department of Energy
P.O. Box 38705
Cincinnati, OH 45253-8705

Re: Support for Technology Deployment Initiative

Dear Mr. Craig:

This letter is in reference to a Technology Deployment Initiative (TDI) proposal being submitted by your office entitled "Deployment of an Integrated Technology Suite for Cost-Effectively Delineating Contamination in Soils in Support of Soil Remedial Actions." Argonne National Laboratory (ANL) is pleased to be a participant in this proposal and supports your efforts in this important area.

We contribute expertise in the area of Adaptive Sampling and Analyses Program (ASAP) decision support for characterization. This is an area in which we have had a significant amount of experience and success. We are eager to see application of this approach to remedial action design and implementation. We believe that the deployment of the ANL technologies referenced in the proposal will result in a significant savings for the soil remedial actions planned for Fernald and the FUSRAP program.

Argonne is fully committed to the deployment objectives of the TDI program, and we will do our best to extend the expected successes of this TDI to other Department of Energy sites.

Sincerely,

John D. Ditmars

John D. Ditmars, Ph.D.
Manager, Environmental Sciences and Engineering
Environmental Assessment Division

JDD:sv

cc: R. Johnson

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