

## THE PINELLAS PLANT RCRA FACILITY INVESTIGATION COSTS AND SCHEDULES - A CASE STUDY

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### ABSTRACT

A Remedial Investigation of the potential waste release sites at the Pinellas Plant, Largo, Florida, was started in 1988. This effort was the precursor to the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) that began two years later. The Hazardous and Solid Waste Amendments (HSWA) permit was issued on 9 February 1990 by the United States Environmental Protection Agency (EPA) Region IV. The Pinellas Plant RFI for those solid waste management units (SWMUs) identified in the HSWA permit was divided into three major phases: (1) preparation of the RFI Plan, (2) implementation of RFI Field Work, and (3) preparation of the RFI Report. The entire effort took three years at a cost of approximately \$2 million.

This paper presents a cost, schedule, and regulatory overview of the RFI activities at the Pinellas Plant. The purpose of this is (1) to illustrate the impact of increased knowledge for refining the cost estimates and duration of planned tasks within the activities, and (2) to highlight the technical issues and changing regulatory requirements that affected the cost and schedule of the RFI activities. A summary of lessons learned and of fiscal approaches and project scheduling used are presented to provide insights for management of similar environmental restoration (ER) activities at other installations.

### INTRODUCTION

The Pinellas Plant Environmental Restoration Program was initiated to fulfill regulatory requirements and to protect the public health and the environment. The Pinellas Plant (Fig. 1), located in Largo, Florida is a government-owned contractor-operated (GOCO) facility. This installation is part of the nuclear weapons production complex operated by General Electric Neutron Devices Department (GEND) for the United States Department of Energy (DOE). The Pinellas Plant is administered by DOE's Albuquerque Operations (AL) Office. The Pinellas Plant Remedial Investigation (RI) and subsequently the RCRA Facility Investigation (RFI) were conducted by the AL Environmental Restoration Project Office (ERPO), the Los Alamos National Laboratory (LANL) Technical Support Office (TSO), their contractor Roy F. Weston, Inc., the DOE Pinellas Area Office (PAO), and GEND.

Originally the ER Program at the Pinellas Plant focused on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). The RCRA Hazardous and Solid Waste Amendment (HSWA) permit was issued in February 1990. At this time the CERCLA plans and efforts were converted to RCRA format with fifteen solid waste management units (SWMUs) to be investigated (Fig. 2).

Figure 3 shows the Pinellas Plant RFI costs and schedules by program phase for the SWMUs identified in the HSWA permit. The program is also referred to throughout this paper as the Pinellas Plant Miscellaneous Sites. The figure shows the chronology of the planning, implementation, and report preparation for the RFI culminating with the submission of the RFI Report to EPA Region IV. Each of the program phases will be discussed separately. The first event shown on Fig. 3 is the completion of the Program Implementation Plan (PIP) in March 1988. This early plan provided preliminary estimates of costs and schedules for an RI at the Pinellas Plant. No costs

are shown for the PIP since it was produced with management funds, not installation-specific program dollars.

### THE PLAN

During Fiscal Years (FY) 1988 and 1989 the RI itself was divided into two stages with separate remedial investigation

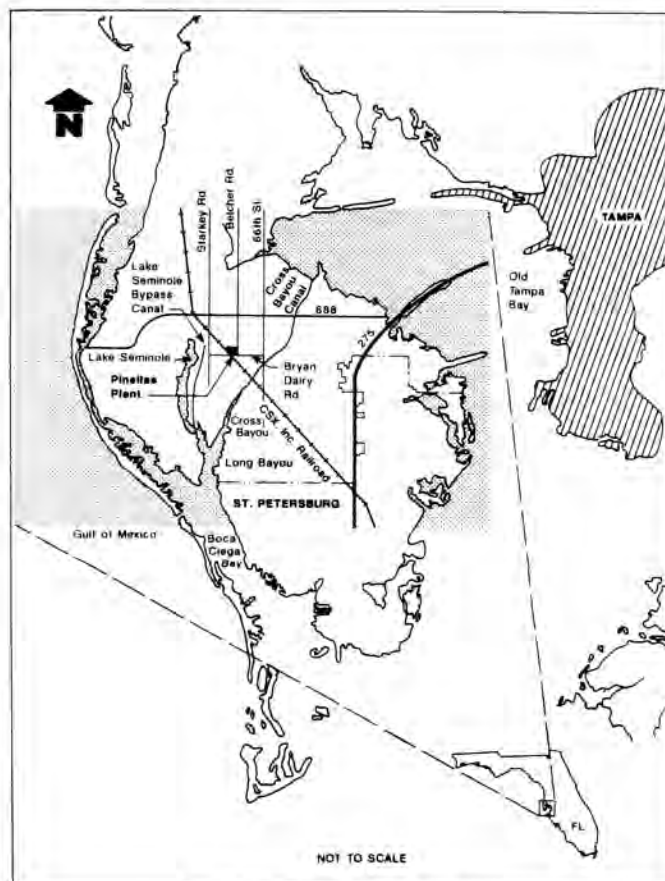


Fig. 1. Pinellas Plant location.

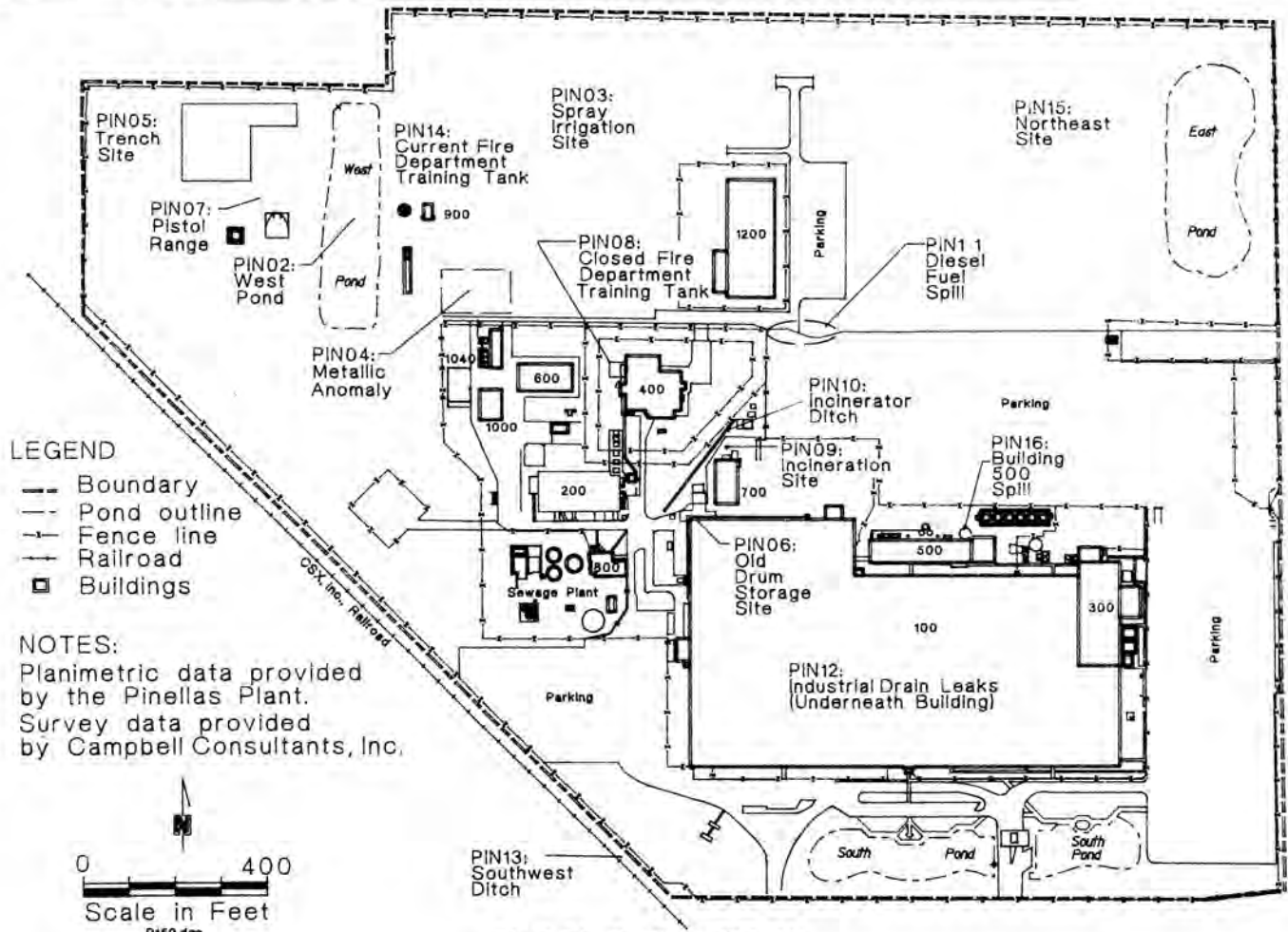


Fig. 2. Pinellas Plant SWMUs.

future investigations in the groundwater. Some preliminary field operations were associated with the planning phase. The total cost for this phase of the RI was \$78,540.

Beginning in FY 1989 the RI activities for the second stage of the Miscellaneous Sites investigation included preparation of scopes of work for subcontractors, geophysical surveys of the Metallic Anomaly, Trenches, and Spray Irrigation site, sampling of West Pond sediments and surface water, sampling of soils and groundwater at the Spray Irrigation site, installation of shallow groundwater monitoring wells at the Spray Irrigation site, as well as analysis of the samples and preparation of a Remedial Investigation/Feasibility Study/Remedial Design (RI/FS/RD) report for the Pistol Range site. These activities were scheduled for October 1988 through January 1989 and resulted in a total cost for the second phase of the RI of \$64,366.

In February 1989 a revised scope of work was approved for continuation of work at the Miscellaneous Sites as described above and additional activities encompassing seven of the potential release sites. In addition to the above activities, this scope included: (1) installation of shallow monitoring wells at the Pistol Range, Diesel Fuel Spill, West Pond, and Trench sites, (2) collection of groundwater samples from all new monitoring wells in addition to the two existing wells, and (3) collection of soil samples at the Diesel Fuel Spill site. At this time the total estimated cost for this phase of the RI was \$66,759.

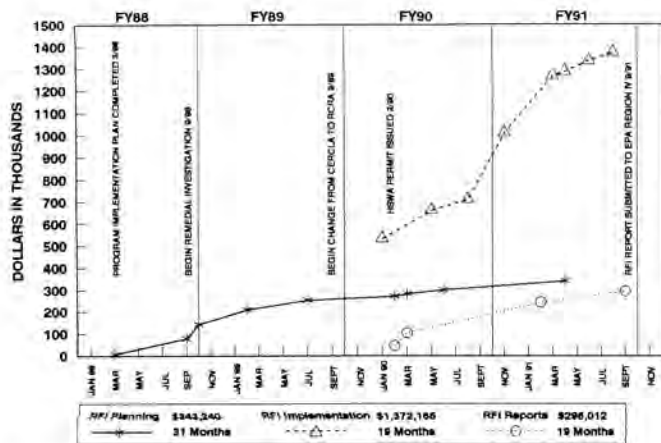


Fig. 3. Pinellas Plant RCRA Facility Investigation (RFI) costs and schedules for planning, implementation and report preparation.

plans (RIP) for each stage. The initial RIP for characterization of the vadose zone and the groundwater for the Miscellaneous Sites RI activities began mid-September 1988. The scope of work included performance and completion of surface geophysical surveys and vadose zone sampling to support

In July 1989 a second revision of the Miscellaneous Sites task at the Pinellas Plant was developed in order to comply with EPA Region IV requirements. These new activities included: (1) rewriting the draft RIP to conform to the outline provided by the EPA for an RFI plan, (2) entering chemical "hits" for analysis of the environmental survey data via Weston's TIMS (Technical Information Management System) database, (3) surveying all wells, geophysical grids, and soil sampling locations identified based on an installation-wide grid system, and (4) collecting two sediment samples from each of the West and East Ponds on-site and the Spray Irrigation Area to determine extraction procedure (EP) toxicity. The total cost for the initial phase of the RFI was \$43,629.

There were three revisions made to the Working Draft RFI Plan during FY 1990. The first in February increased the work release or total authorized amount to Weston's contract for this phase by \$17,978. The second added \$11,005 in March as a result of including DOE Headquarters in the review cycle. Following the issuance of the HSWA permit in February 1990, the CERCLA RI was converted to an RFI. A draft RFI Work Plan was issued in May 1990. June saw an increase of \$17,930 to the estimated costs as additional modifications were required. January through April 1991 was spent rewriting this document at a cost of \$43,033 to incorporate regulatory comments. With the Final Draft RFI Work Plan approved by EPA Region IV on 16 April 1991 the planning phase ended with total costs of \$343,240 for this 31-month effort.

### IMPLEMENTATION

RFI implementation involved the actual accomplishment of field investigations. From the original compilation of potential hazardous waste release sites, fourteen release sites were identified to make up the Miscellaneous Sites RFI. These included the West Pond, Spray Irrigation site, Trenches, Old Drum Storage site, Pistol Range, Metallic Anomaly, Incineration site, Industrial Drain Leaks, Southwest Ditch, Incinerator Ditch, Closed Fire Department Training Tank, Diesel Fuel Spill site, Current Fire Department Training Tank, and the Northwest site including the East Pond. The Miscellaneous Sites are located throughout the 100-acre facility.

The FY 1990 preliminary field work on fourteen of the Miscellaneous Sites began in January and continued through September 1990 at an original estimated cost of \$533,013. This estimate was adjusted upward by \$127,359 in May as a result of increased subcontractor and analytical costs as well as the additional cost of waste disposal. The ceiling was again increased by \$50,765 in August and the schedule extended through the end of November due to inclement weather and some delays in getting sampling crews inside the plant. The revised scope included creating an areal photograph and topographic map for the entire Pinellas Plant, and conducting sampling activities on a new SWMU, the Building 500 Spill site, which brought the number of the Miscellaneous Sites being investigated under the HSWA permit to fifteen.

The FY 1991 planned field work was estimated to begin in October 1990 and be completed by April 1991 with total estimated costs of \$299,707. A major revision of the scope of work for field activities occurred in March for \$256,955. This scope change was the result of comments received from EPA Region IV, GEND, and the DOE on the draft RFI Work Plan.

This new work comprised the following activities to be completed by the end of September:

- A soil gas survey and a land survey conforming to the Florida State Plane Coordinate System at the Northeast site to locate any remaining soil contaminated areas. A total of approximately 125 soil gas samples were to be collected with up to 12 samples analyzed in the laboratory for volatile organic compounds, semi-volatile organic compounds and metals.
- On-site sampling of the West Pond, the Northeast Pond, and the South Pond with three water samples being collected at each station to cover the entire depth profile. A total of 27 field surface water samples to be collected and nine sediment samples all to be analyzed for volatile organic compounds, semi-volatile organic compounds, total contaminant level (TLC) metals, pesticides, and polychlorinated biphenyls (PCBs).
- Additional soil sampling at the Old Drum Storage site to define the extent of dieldrin soil contamination. A total of nine soil samples collected west of the former drum pad at depths of 0.3, 0.6, and 0.9 meters and analyzed for pesticides and PCBs.
- Six soil samples to be taken at the Southwest Ditch to define any soil contamination to be analyzed for volatile organic compounds, semi-volatile organic compounds, and TLC metals.
- Three lithologic boreholes to be drilled and sampled to provide a permanent record of lithology from ground surface to the top of the Hawthorn Formation to further characterize this formation for permeability and other geotechnical parameters, and to evaluate the retardation (adsorption) potential of organic compounds for predicting future plume behavior and position.
- A fourth round of water sampling to be conducted of existing wells and analyzed for both total and filtered metals.

Three additional change orders, (1) for time in the field and time needed to update the chemical data base and (2) for additional costs of geotechnical testing, equipment rental, and surveying of additional well locations, required resources to be added in April for \$18,172, in June for \$49,006, and in August for \$37,188. (NOTE: In order to save the cost of remobilizing and going through the process of subcontracting for a driller, nine additional wells were drilled as part of the installation generic assessment and the 4.5 acre site assessment). For the RFI Implementation Phase, the cost was \$1,372,165 for this nineteen-month effort.

### THE REPORT

The FY 1990 RFI Report preparation began in February 1990 for an initial cost estimate of \$45,638. The scope of work supported analysis of data collected during the RI process. Work continued through the end of the year with analysis of slug test data, correlation of borehole core logs, evaluation of potentiometric data, and evaluation of sinkhole potential in the vicinity of the plant. Potential action limits for determining alternative corrective measures were included as part of this activity. A change order for an additional \$58,801 was

approved in March to develop RFI outlines. Due to EPA comment delays, this activity was extended through October 1990 when a preliminary draft RFI Report was reviewed by the DOE PAO and GEND.

From February through September 1991 revisions were made to the preliminary draft to incorporate installation comments and new sampling data before submission of the Draft RFI Report to DOE Headquarters. This work was originally estimated at \$140,227 in February, but was increased by \$51,346 in June 1991. Figure 3 shows these costs in September since the effort was completed with the Draft RFI Report submission to EPA Region IV on 1 September 1991. For the RFI Report, the cost was \$296,012 during the nineteen-month effort.

### COST AND SCHEDULING ACTIVITIES

Cost and scheduling activities at the Pinellas Plant evolved over time. Cost plans were established prior to the beginning of each fiscal year. Prioritization of efforts was an iterative process that incorporated changes required by the HSWA permit, EPA negotiations, and new information as it became available. The first planning tool, the PIP, was drafted in March 1988 to be replaced with the five-year planning process one year later. The PIP estimates for the Miscellaneous Sites RI activities were approximately \$200 thousand to be expended over a one year period.

The information obtained during the execution of the PIP indicated that an additional \$500 thousand and two years of effort would be required. These estimates were reflected in the cost plans, activity data sheets, and baseline schedules which formed the basis for the DOE Environmental Restoration/Waste Management Five-Year Plan (June 1989). The information evaluated at the end of FY 1989 indicated that an additional \$400 thousand would be required and these costs were reflected in the FY 1990 Five-Year Plan.

At the end of FY 1990 the progress of the RFI was reviewed by EPA Region IV, GEND and the DOE. This review resulted in the major scope change discussed earlier and increased the total project estimate to \$2 million over a period of three years.

### LESSONS LEARNED

The lessons learned during these three years at the Pinellas Plant provide valuable information for conducting RFI activities at other installations. Our initial cost and scheduling estimates were based on a limited understanding of the site. As the RFI process progressed additional assessment activities were required to evaluate the site. Regulatory requirements dictated a shift from CERCLA to RCRA in the midst of the investigation of the Miscellaneous Sites. Developing programs will always have technical and regulatory uncertainties similar to those that occurred during the RFI activities at the Pinellas Plant.

**RFI Phases** - The planning, implementation, and report preparation phases overlapped throughout the RFI process. It was difficult to plan a project whose objectives never reached stasis. In one sense, we were always in a "planning" mode at the same time we were in the "implementation" mode since many of the planned activities had not changed. The management and tracking of the RFI process will be easier and produce more useful information when the work release system divides the program into three distinct phases: plan-

ning, implementation, and report preparation. Organizing the program in this manner would assure that three distinct stand-alone products will be generated with minimal expenditure of time and money. It is important that these distinct phases be interpreted similarly by everyone involved in the program.

The phasing of RFI activities should be in terms of their technical execution and not by artificial fiscal year divisions. Sub-phases within planning, implementation, and report presentation may be necessary to define the steps required to accomplish the data quality objectives (DQO). Work releases should be organized by functional tasks or activities. Fiscal year divisions are arbitrary and should not be confused with functional phasing. Work releases should be awarded for the accomplishment of a specific task and defined at the level at which the activity will be tracked. Work releases should not be used as a convenient means by which contractors are funded to perform miscellaneous activities. Approving all DQO before beginning the implementation phase will preclude the addition of those activities that are outside the scope of the work release. Vadose zone sampling could be one work release, but the objectives of this task should fit into the DQO decision framework. This should be stated explicitly in the scope of the work release.

Based upon the Pinellas Plant experiences, the following phase definitions will result in a well-focused program that does not "over characterize" the site.

- **Planning** - This process or phase should produce two documents. The first is a list of (DQO) and the second is a sampling and analysis plan (SAP). The DQO document should be concise; it is designed to answer three questions. (1) What decisions must be made concerning the site? (2) What data must be collected in order to make the decision? (3) To what precision must the measurements be made in order to make the decision? It is impossible to develop a meaningful sampling and analysis plan without first answering these questions.

The SAP presents the strategy to be used to obtain all the data required in the DQO to the precision demanded. It must be in sufficient detail that a person experienced in the chosen methods could independently implement the plan and collect data to the precision listed in the DQO document. It is important that the procedures and results be independently verifiable to insure that the data are defensible. Without defensible data a decision regarding the final disposition of the site cannot be made. The planning phase ends with the production of the sampling and analysis plan. The DQO document should be embedded in the SAP and provide the independent reviewer with a clear picture of the intended use of the data. Without the DQO there is no performance standard for the SAP.

- **Implementation** - This phase refers to the implementation of the full SAP including all analyses required to meet the DQO. During the implementation phase any additional information necessary for independent verification of the process should be provided. A well designed SAP facilitates this phase. Good documentation of the processing and analysis of data is essential for independent verification. The

implementation phase ends when all the data are documented and stored, the analyses are completed, and the required information obtained to make the decision according to the DQO.

- **Report** - The final report is a formal presentation of the decision made and the process used to arrive at that decision. The information upon which the decision is based should be formally presented within the report as well.

**Cost Estimates** - As we worked through the RFI process we continued to learn how to better estimate costs and schedules over time. The only accurate estimate of cost, however, was that for the current fiscal year. Annual reviews of the RFI data always resulted in unanticipated changes to the scope of work as well as added costs, and extended schedules.

Estimates can only be prepared after the functional activities are defined. Initial cost estimates relied upon vendor

quotes based on scheduling information and resource tables based on contractor's experience in the performance measurement of similar deliverables. As the RFI process developed, the vendor quotes and resource table information were updated with actual performance data which was incorporated into the fiscal year funding cycle and reflected in the annual cost plan.

**Regulatory Interactions** - In order to meet the regulatory deadlines imposed by the Pinellas Plant HSWA Permit, the preliminary work activities were executed in advance of formal regulatory approvals. This concept was initiated with the concurrence of DOE and EPA. Even with significant regulatory changes and multiple changes in scopes of work, the RFI process at the Pinellas Plant was completed in 36 months at a total cost of \$2,011,417.

NOTE: This paper is based on research performed under the auspices of the United States Department of Energy.