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MANAGEMENT PLAN**DEMONSTRATION TESTING AND EVALUATION
OF IN SITU SOIL HEATING**

Contract Number DE-AC05-93OR22160
IITRI Project C06787

For

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

ATTN: Mr. Johnny Moore

By

Harsh Dev
IIT Research Institute
10 West 35th Street
Chicago, Illinois 60616

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FOREWORD

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

Respectfully Submitted
IIT Research Institute

Harsh Dev
Science Advisor
Energy and Environmental Sciences

Approved:

G. C. Sresty
Manager
Energy and Environmental Sciences

TABLE OF CONTENTS

Section	Title	Page
I	EXECUTIVE SUMMARY	1
II	INTRODUCTION AND BACKGROUND	3
	2.1 Problem Discussion	3
	2.2 Description of the Technology	4
III	PLANNED ACCOMPLISHMENTS	7
	3.1 Technical	7
	3.2 Work Breakdown Structure	7
	3.3 Milestone Schedule Plan	10
	3.4 Cost Plan	12
IV	MANAGEMENT SYSTEMS AND CONTROL DESCRIPTION	16
	4.1 Project Organization	16
	4.2 Management Controls	22
	4.2.1 Project Management	22
	4.2.2 Environmental Health and Safety Office	25
	4.2.3 Security	26
	4.2.4 Policies and Procedures	27

LIST OF FIGURES

Number	Title	Page
1	Artist's Sketch Illustrating the Electrode Array.	6
2	Project Milestone Schedule	11
3	Cost Plan, By Month	14
4	Cost Plan, Cumulative	15
5	Organization Chart for IIT Research Institute	17
6	Organization Chart for IITRI's Applied Sciences Group	18
7	Organization Chart for Electronics, Energy, and Environmental Systems Department	19
8	Organization Chart for Energy and Environmental Sciences Section	20
9	Project Organization Chart Showing Key Task Leaders . . .	21

LIST OF TABLES

Number	Title	Page
1	Milestone Log	10
2	Cost Plan	13
3	Summary of IITRI Project Management Controls	23

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It is planned to demonstrate the technology by heating approximately 400 tons of soil in the K-1070 Classified Burial Ground located at DOE's K-25 Site located in Oakridge, TN. It is estimated that the heating portion of the demonstration will take approximately 3 weeks at an average power input rate of 150 to 175 kW. IITRI expects to spend considerable time in the front end reviewing site characteristics, preparing detail design, developing Health and Safety Plans and other documents needed to obtain regulatory approval for the demonstration, arranging for site sampling, infrastructure development and document preparation. It is anticipated that site activities will begin in approximately 5 to 6 months.

This contract was signed on September 30, 1993. IITRI started work on it in October 1993. It is planned to complete the demonstration and submit approved final reports by September 30, 1994. This project has 12 tasks and four major milestones. The major milestones and their planned completion dates are shown below:

No.	Milestone	Planned Completion Date
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During the course of this project, under various tasks, the following documents will be submitted:

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

II. INTRODUCTION AND BACKGROUND

2.1 PROBLEM DISCUSSION

A number of DOE installations have soil contamination due, not only to the presence of hazardous waste materials, but also due to the co-presence of both organic, and inorganic hazardous waste as well as radioactive waste. At many installations, there is widespread contamination of soil over a large area but with low levels of both organic as well as radioactive waste. Many such sites are classified as low-level mixed-waste sites due to presence of both RCRA/CERCLA as well as NRC listed wastes. Soil containing mobile organic and inorganic contaminants acts as a contaminant source for the continued future contamination of ground water. Any ground water treatment system designed to protect public health and welfare must take into account the relatively large reservoir of contaminants present in the overlaying soil which can be released to the groundwater over a period of time thus defeating the purpose of ground water treatment systems.

At low-level mixed waste sites the presence of radioactive contaminants is sometimes so low that if an economical and effective method is developed to remove or destroy the organic waste component of the contamination then the site can be effectively regarded as rehabilitated and delisted. Nevertheless, removal of the organic waste or its destruction can often permit the reclassification of the site as a radioactive waste site thus reducing the regulatory burden on the waste-site management activities. Soil remediation can allow new, economical and income producing uses of the land which otherwise would have to be kept unproductive or under utilized.

The fundamental goal of DOE's long term environmental program is to ensure that risks to human health and safety, and to the environment posed by DOE's past, present and future operations are eliminated or reduced to prescribed safe levels. In order to meet this goal DOE has set itself, as one of the objectives of long term environmental restoration, the challenging task of development of new, efficient and effective methods and technologies for the management of wastes currently being produced and the environmental restoration of contaminated sites.

In this project IITRI will demonstrate the EM Treatment Technology for the in situ remediation of soils containing organic wastes. This technology can help DOE in the following ways:

- For sites containing low-level mixed-wastes, reduce the regulatory burden by removing the hazardous organic wastes and thus change the site to a radioactive waste site.

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In this project IITRI will demonstrate the EM Treatment Technology for the in situ remediation of soils containing organic wastes. This technology can help DOE in the following ways:

- For sites containing low-level mixed-wastes, reduce the regulatory burden by removing the hazardous organic wastes and thus change the site to a radioactive waste site.

- Many DOE site are treated as contaminated due to the presence of the organic substances. At these site the radioactivity levels are so low that once the organic contaminants are removed by the EM technology the site may need no further remediation for the radioactive waste.
- For hazardous waste sites where organics are the primary contaminants of concern, the EM technology can be used for economic and effective remediation.
- The process is a true in situ process. Massive soil excavation need not be undertaken, thus preventing exposure of the general and the occupational population to fugitive emissions and dust.
- The soil is treated in situ. There is no solid residual (waste) stream that needs further disposal
- There is no on site or in situ combustion. This is expected to make permitting of the process easier than most other on site ex situ processes.
- The process can be used for rapid clean up of soils even when they contain contaminants trapped in clayey soil of low permeability--a challenging and intractable situation for in situ venting. Medium boilers such as those boiling in the temperature range of 110° to 130°C can be rapidly removed.

2.2 DESCRIPTION OF THE TECHNOLOGY

Over the last eight years IITRI has been developing and testing the in situ heating and soil decontamination process for the remediation of soils containing hazardous organic contaminants. In this process the soil is heated in situ using electrical energy. The contaminants are removed from the soil due to enhanced vaporization, steam distillation and stripping. The vaporized contaminants, water vapor and air are recovered from the heated zone by means of a vacuum manifold system which collects gases from below surface as well as from the soil surface. A vapor barrier is used to prevent fugitive emissions of the contaminants and to control air infiltration to minimize dilution of the contaminant gases and vapors. The recovered gases and vapors are conveyed to an on site vapor treatment system for the clean up of the vent gases.

Electrical energy is applied to the soil by forming an array of electrodes in the soil which are electrically interconnected and supplied with power. The electrodes are placed in drilled bore holes which are made through the contaminated zone. There are two versions of the in situ heating and soil treatment process: the first version is called the In Situ Radio Frequency (RF) Soil Decontamination Process and the second version is called the In Situ Electromagnetic (EM) Soil Decontamination Process. The first

version, the RF Process is capable of heating the soil in a temperature range of 100° to 400°C. The soil temperature in the second version, the EM Process, is limited to the boiling point of water under native conditions. Thus the soil will be heated to a temperature of about 90°C.

In this project IITRI will demonstrate the EM Process for in situ soil decontamination at Site K-25 due to the fact that most of the contaminants of concern are volatile organics which can be removed by heating the soil to a temperature range of 85° to 95°C.

Figure 1 is an artist's sketch illustrating the electrode array and the vapor barrier used for the implementation of the EM soil decontamination process. The electrode array is formed by drilling multiple rows of electrodes in the soil volume which is to be heated. The tubular electrodes are made from thin wall pipe or tubing fabricated from copper, steel or aluminum. The electrodes are dropped into bore holes and electrically connected at the surface to the power source. A vapor barrier is placed on the surface to prevent fugitive emissions of gases and vapors formed upon heating of the soil. The vapors and gases formed upon heating of the soil are recovered by means of a vacuum manifold system which collects gases and vapors from the surface of the heated zone as well as from gas collection wells which have perforations to assist in the collection of the gases and vapor formed in the heated soil volume.

The treatment of the collected vapors depends on the nature and the concentration of the contaminants. A system based on condensation and cooling offers flexibility and has the advantage of avoiding on-site incineration. This system comprises of: an ambient air cooler for condensation of high boilers and moisture, a chiller for the removal of lower boiling materials and humidity adjustment, and finally carbon treatment of the gas stream prior to its discharge. The condensate produced in the heat exchangers is conveyed to oil/water separators designed for the separation of three phases: an aqueous phase and two organic phases. The aqueous phase will be treated on site via activated carbon. The treated water will be discharged to sanitary or storm sewers at the site, as per the permit requirements.

The condensed organic phases (the light as well as the dense) will be combined and stored in drums, pending ultimate destruction at a licensed incineration facility such as the new hazardous waste incinerator located at Oak Ridge Reservation (ORR).

IN SITU Radio Frequency Soil Decontamination Process

Figure 1. Artist's sketch illustrating the electrode array.

III. PLANNED ACCOMPLISHMENTS

3.1 TECHNICAL

The field demonstration of the EM Process will be performed by Heating a block of soil approximately 20 ft x 20 ft x 20 ft in size. The estimated weight of soil is 400 tons. It is proposed to perform an in situ demonstration at input power level of approximately 120 to 150 kW. The treatment portion of the demonstration project will take 3 weeks. Average soil processing rate will be in the range of 20 to 27 tons/day. The objective of the demonstration is to show that the residual concentration of the contaminants of concern can be reduced to the analytical methods detection limit or else show a removal of at least 95 percent. For most methods of contaminant analysis in soil the detection limit is estimated to be of the order of 50-100 ppb.

3.2 WORK BREAKDOWN STRUCTURE

A brief description of the work to be accomplished under each task is provided in this subsection.

Task 1 Develop/Modify Plans

At award of contract, specific permitting and documentation requirements will be determined through contract kickoff meeting, and several plans will be completed.

- 1.0 Documentation
 - 1.1 Project Management Plan
 - 1.2 Milestone Plan
 - 1.3 Cost Plan
 - 1.4 Work Plan
 - 1.5 Review/comment on proposed NEPA documentation

Task 2 Permitting

All additional documents not covered in Task 1, including a test plan will be submitted 75 days after award.

- 2.0 Permitting
 - 2.1 Determine permit needs
 - 2.2 Demonstration Test Plan
 - 2.3 Demonstration Design
 - 2.4 QA/QC Plan
 - 2.5 Health and Safety Plan
 - 2.6 Environmental Monitoring and Compliance Plan
 - 2.7 Waste Management Plan
 - 2.8 Submit Required Permit documents

Task 3 Subcontracts and Supplies

Put into place subcontracts and obtain consumable supplies

- 3.0 Subcontractors and Supplies
 - 3.1 Consumable supplies
 - 3.2 Drilling and sampling subcontract
 - 3.3 General contractor subcontract

Task 4 Equipment Testing and Shakedown

Test critical components before transporting to site, includes site visit by DOE and Energy Systems staff to verify compliance with requirements

- 4.0 Equipment Testing and Shakedown
 - 4.1 Effluent treatment and shakedown
 - 4.2 EM heating system
 - 4.3 Site inspection visit

Task 5 Site Preparation and Equipment Mobilization

Install power equipment, mobilize off gas equipment, and develop site support interfaces

- 5.0 Site Preparation and Equipment Mobilization
 - 5.1 AC power installation
 - 5.2 Equipment mobilization
 - 5.3 Site infrastructure

Task 6 Predemonstration Soil Sampling and Analysis

Mobilize drill rig, produce all boreholes, obtain soil samples, ship to laboratory for analysis.

- 6.0 Pre-demonstration Soil Sampling and Analysis
 - 6.1 Rig mobilization
 - 6.2 Conduct sampling
 - 6.3 Rig demobilization
 - 6.4 Soil analysis

Task 7 Install Treatment System

Install electrodes, gas collection wells, bus bars, gas collection system, connect cables to power source, conduct shakedown testing, fence off test area to mitigate potential for electrical shock.

- 7.0 Install Treatment System
 - 7.1 Develop electrical array in boreholes

- 7.2 Install EM heating system
- 7.3 Install effluent treatment system
- 7.4 Conduct system checkout

Task 8 Conduct demonstration

Heat soils within test area allowing three weeks to conduct test, one week to cool down soil prior to post demonstration sampling. The site may be manned round the clock during the soil heating period, with off gas systems collecting emissions and test staff ensuring no fugitive emissions through operation of off-gas system.

- 8.0 Conduct Demonstration
 - 8.1 Heating and treatment
 - 8.2 Cool down

Task 9 Post Demonstration, Soil Sampling and Analysis

The first two weeks of this task will involve mobilization of the drill rig. Then drilling of at least 20 boreholes, demobilizing the rig and analysis of the samples will occur.

- 9.0 Post Demonstration Soil Sampling and Analysis
 - 9.1 Rig mobilization
 - 9.2 Conduct sampling
 - 9.3 Rig Demobilized
 - 9.4 Soil analysis

Task 10 Equipment Removal, Decontamination, and Demobilization

Complete removal of all equipment, conducting wipe tests for organics, and sampling for radionuclides to ensure equipment is clean. Any decontamination of equipment will be coordinated with DOE and site staff.

Task 11 Data Review and Economic Analysis

Soil analysis data obtained prior to the demonstration will be compared to data obtained after the demonstration. A model will be used to predict the pre/post concentrations in the test area. The efficiency of the system will be determined and compared to the success criteria, and a cost projection will be made for scale up of the system for a larger site, and a commercialization plan will be prepared.

Task 12 Reports

Monthly, weekly, and other routine reports will be prepared. The draft test report will be completed during week 48 and provided

to DOE for comment with the final report incorporating DOE comments prepared by week 52. Monthly reports are to be supplied to the DOE by the 10th working day following the reporting period.

- 12.0 Reports (Excluding Other Reports Covered Elsewhere)
 - 12.1 Status (monthly)
 - 12.2 Summary (monthly)
 - 12.3 Milestone schedule (monthly)
 - 12.4 Costs (monthly)
 - 12.5 Draft technical report
 - 12.6 Final technical report

Other Deliverables not Described Above

- 1) A weekly highlight report will be faxed to the DOE project monitor when significant progress is made on tasks

3.3 MILESTONE SCHEDULE PLAN

Figure 2 depicts the project schedule along with the planned completion dates for the four major milestones. The figure also shows the estimated start and end dates for the various tasks. Table 1 is a milestone log summarizing the planned completion dates of the four major milestones.

Table 1. Milestone Log

No.	Milestone	Planned Completion Date
2.8	Submit All Documents	12/17/93
	All Permits Received	3/23/94
7.4	Shakedown Completed	6/8/94
12.6	Final Report Submitted	9/30/94

11/22/93
10:17:02

IIT Research Institute
Project Gantt Chart Report
DT&E OF IN SITU SOIL HEATING

Frame: 1
Page: 1

Symbol legend		Project: DT&E OF IN SITU SOIL HEATING Leader: G. Sresty Date: 11/22/93 10:17:02 Notes:
[Solid bar]	CRITICAL TASK	
[Dashed bar]	Non-critical task	
[Dotted line]	Float time	
[Solid square]	Completed task	
[Open circle]	Non-completed milestone	
[Solid square]	Completed milestone	
[T]	Today's date	

Figure 2. Project milestone schedule.

3.4 COST PLAN

The cost plan is shown in Table 2. The estimated rate of project expenditures was calculated in the following manner: For each task the required monthly rate of completion was estimated in order to assure compliance with the milestone plan. Then the monthly cost of each active task was estimated by multiplying the required percentage completion and the estimate of the Task's total cost as prepared in the proposal. The monthly project cost was found by adding up the monthly cost of each active task. Figures 3 and 4 show the planned rate of monthly and cumulative expenditure.

Table 2. Cost Plan

TITLE Demonstration, Testing and Evaluation of Insitu Heating of Soil																	IDENTIFICATION NO. DE-AC05-93OR22160		
PARTICIPANT NAME & ADDRESS IIT Research Institute 10 W. 35th Street Chicago, IL 60616			COST PLAN DATE: 10/29/93														START DATE: 9/30/93 COMPLETION DATE: 9/30/94		
ELEMENT REPORTING CODE	ELEMENT	Plan Prior Fiscal Years	Actual Prior Fiscal Years	CURRENT FISCAL YEAR													Future Fiscal Years	Subsequent Fiscal Years	Total
				Oct.	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total			
1	DT&E of Insitu Heating of Soil	\$0	\$0	\$8,150	\$40,700	\$41,540	\$68,810	\$72,370	\$57,110	\$127,860	\$100,720	\$151,530	\$125,450	\$62,630	\$6,895	\$863,765	0	0	863765
Total		\$0	\$0	\$8,150	\$40,700	\$41,540	\$68,810	\$72,370	\$57,110	\$127,860	\$100,720	\$151,530	\$125,450	\$62,630	\$6,895	\$863,765	\$0	\$0	\$863,765
DOLLARS EXPRESSED IN: Rounded to nearest ten dollar				SIGNATURE OF PARTICIPANTS PROJECT MANAGER AND DATE <i>[Signature]</i> 11/30/93									SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE & DATE <i>[Signature]</i> 11/30/93

Figure 3. Cost plan, by month

COST PLAN, CUMULATIVE

(October 29, 1993)

Figure 4. Cost plan, cumulative

IV MANAGEMENT SYSTEMS AND CONTROL DESCRIPTION

4.1 PROJECT ORGANIZATION

The proposed program will be conducted within the Applied Sciences Group of IITRI. An overall IITRI organization chart showing the five operating groups is given in Figure 5. The organization of the Applied Sciences Group is shown in Figure 6. This project will be done by the Electronics, Energy and Environmental Systems Department which has five sections as shown in Figure 7. The project will be managed by the Energy and Environmental Systems Sciences which is broken into three groups: Technology Development, Chemical and Biological Defense, and Aerospace Materials and Coatings Laboratory. Figure 8 is an organization chart for the Energy and Environmental Sciences Section.

The project requires the expertise of a number of scientific disciplines and these will be provided from various portions of the Applied Sciences Group. Energy and Environmental Sciences Section will manage the proposed project and will serve as the primary focus with K-25 Site Project Coordinator. The Electromagnetic and Electronic Systems Section (Figure 7) will provide the expertise required for in situ heating of the soil.

Mr. Guggilam Sresty, Manager of the Energy and Environmental Sciences Section, will serve as Project Manager. He has broad technical and administrative skills to assure successful demonstration and implementation of the EM treatment technology to remediate subsurface soils at DOE facilities. He is one of the inventors of the volumetric heating technologies, and participated in commercialization of two of its applications. He managed the infectious waste treatment technology project that advanced from laboratory to commercial scale in 14 months. He was also one of the two principal investigators in the program that developed the commercial EM heating technologies for production of oil. As the section manager Mr. Sresty has full access to the resources of the entire section to adequately staff the project. He has worked well in the past with the entire project team in field demonstration of related technologies and is familiar with all aspects of the development, demonstration, and commercial implementation of environmental technologies. He will be assisted by a group of experienced IITRI staff that will provide the required technical and administrative support in the proposed program.

Management and administrative support will be provided by Dr. Anthony Valentino, Vice President, Applied Sciences Group, Mr. John English, Director, Electronics, Energy and Environmental Systems Department, and Mr. Ted Plonis, Manager of Contracts. Messrs Dev, and Kloempken, will provide key input to the project,

Figure 5. Organization Chart for IIT Research Institute

Applied Sciences Group

Figure 6. Organization Chart for IITRI's Applied Sciences Group

Applied Sciences Group
Electronics, Energy and Environmental Systems Department

Figure 7. Organization Chart for Electronics, Energy and Environmental Systems Department

Energy and Environmental Sciences

Figure 8. Organization Chart for Energy and Environmental Sciences Section.

Figure 9. Project organization chart showing key task leaders.

serving as Task leaders. Figure 9 is a project organization chart showing key task leaders. Additional IITRI support services such as Purchasing, Quality Assurance (QA), Environmental Health and Safety, will be available to the program as required.

4.2 MANAGEMENT CONTROLS

The management controls that will be used for maintaining internal control over the project requirements, schedule, cost, and QA are based on an existing IITRI Management Information System (IMIS) for managing inter-disciplinary and multi-task programs. The IITRI schedule and cost control method achieves control through the means of a proven system that includes responsible personnel, management directives, and automated tools and capabilities. It provides established procedures for reporting schedules and cost through the IMIS. Various task tracking aspects of the IMIS system that help the Project Manager control the cost, schedule, and quality of tasks are shown in Table 3. The Project Manager, with the help of task leaders, will identify any problems at an early stage and will find a resolution.

4.2.1 Project Management

IITRI's Management Approach

IITRI bases the technical management and administration of its efforts on a clearly defined axiom: that the objective of project management is to implement technical and financial controls on each project so that it results in the highest quality product attainable within budget and on schedule.

At IITRI, every project begins with:

- Thorough planning of the work to be performed to complete the project
- Realistic estimates of time, labor, and costs
- Clear communication of the scope of the required tasks
- Disciplined budgeting and authorization of expenditures
- Periodic correlation of schedules, costs, and technical projects.

Before the beginning of the research effort, a detailed work plan assigns technical milestones and time and financial deadlines, and identifies areas that might disrupt the time schedule. This permits evaluation of the project performance against set financial constraints, time schedules, and deadlines.

IITRI provides various management tools and supervisory support to help the project staff meet a program's technical and

TABLE 3. SUMMARY OF IITRI PROJECT MANAGEMENT CONTROLS

Area	Identification	Resolution
Cost	IMIS warning flags identify potential cost problems for projects on weekly basis	At weekly staff meetings, review IMIS reports and make staffing adjustment if necessary
Schedule	IMIS-Time line displays deliverable due date for task managers	At weekly staff meetings, review status of deliverables and assign necessary priorities for assignment of resources
Interface/ Communication	Government-IITRI staff meeting verifies proper interface compliance	These meetings will also be used to determine needed adjustments or new actions
IMIS Data Integrity	Embedded data accuracy checking via IMIS code and weekly integrity checks by administration supervisor	IMIS data change form submitted to administrative supervisor
Technical Quality	Technical project reviews by Section Manager and reviews with Government COTR	Modification based on comments of reviews

financial objectives. The project manager is responsible for technical progress on the project as well as meeting fiscal plans.

The Project Manager is a professional whose expertise is most directly applicable to the work assignment, and who has successfully demonstrated the ability to organize and carry out various research projects. He is responsible for:

- preparing project plans
- ordering equipment, supplies, and services
- supervising or performing individual tasks or experiments

- documentation of results in logbooks
- monitoring technical progress and comparing progress with the project work plan
- advising task leaders and clients of unexpected problems or results
- safety of project staff
- preparation of reports
- communication with the client.

Technical and Financial Controls. IITRI provides its Project Managers with a set of planning and management tools for controlling the technical and financial aspects of any project. These include:

- a work plan summary
- a project plan
- an accounting system
- periodic internal and external program review meetings

The work plan summary contains a logic diagram for the project structure and a modified Gantt chart showing work assignments, milestones, and critical paths. Both expenditures and technical progress are monitored and guided by the plan.

Each project is given a unique number in IITRI's cost accounting system. Weekly updates of the cost sheets are available via computer terminal to the project manager and the contract administrator. Cost sheets give information on costs incurred during the previous month and cumulative costs.

Problems: Identification and Resolution. Problems may be identified during the planning, execution, review, and reporting phases of the project. They can often be avoided by thoroughly planning the work, realistically budgeting time, labor, and costs, and, most importantly, clearly communicating and then monitoring the scope of the required work.

Nonetheless, technical problems do occur. They are frequently identified during initial planning phases, beginning even before the proposal is written. These are addressed in the work plan. Other problems may arise once the work has begun. Such problems are most often identified by project staff as they work on the process, both in paper studies and in the laboratory. They may range from practical problems with experimental equipment to conceptual problems relating to steps in the process and their interrelations.

Many of these problems can be solved on the spot by the staff members involved, for example, by changing the type of experimental equipment used, or modifying the process steps or conditions.

Problems that cannot be solved in this way are brought to the attention of the project manager and other staff members, immediately if warranted or at the weekly project meetings. The Project Manager then decides how best to resolve the problem.

Problems encountered and steps taken to solve them are an important subject of the monthly progress reports to DoE and of periodic review meetings and telephone discussions with DoE's COTR.

Schedule. The responsibility for the timeliness of deliverables and overall task schedule is delegated to the task leaders. Project Manager and the task leaders will use PC-based software to develop detailed task schedules, Gantt charts, and other task network information. The task leader, with the help of the above information, will be able to track the progress of the task and take corrective action when appropriate. The Project Manager and IITRI management also review the progress information with task leaders and provide any required assistance in assuring that timeliness of deliverables is achieved.

Cost. IITRI uses effective cost control procedures. Detailed and updated cost records on each task are provided to support IITRI's cost control procedures. These cost records contain all direct charges such as labor, purchase materials and services, computer charges, subcontractor charges, service labor such as reproduction, editing, instruments, etc. Indirect charges such as overheads are based on percentage of direct charges. Weekly comparison of these costs with the task plan will alert the task leaders and the Project Manager to the need for corrective action. Detailed description of IITRI's cost accounting system can be provided if desired.

Quality Assurance. The QA/QC Officer, Mr. Ron Boyne, will be responsible for verification of the accuracy and validity of the data obtained under the program. He will work with the Project Manager, Mr. Sresty, to schedule audits and will suggest any required corrective actions. The QA department will also provide required audit samples as appropriate for the program. Various senior IITRI staff, including some of the key project staff, will provide a quality control over technical work conducted in the program. Messrs Dev, Kloempken, and Stangel will review the work conducted by various project staff to ensure its adequacy, accuracy, and quality. A monthly project review meeting will be held with all the project staff to review the status of project tasks and the quality of their work.

4.2.2 Environmental Health and Safety Office

The IITRI Environmental Health and Safety Office's foremost concern is maintaining a safe and healthy work environment for

IITRI staff. The Office can be divided into two subunits: (1) Occupational Health and Safety and (2) Hazardous Waste Management. Both of these areas are extensively regulated by various governmental agencies. Therefore, the Environmental Health and Safety Office is not only founded on ethical considerations but it is also based on legalities.

Occupational Health and Safety. The Occupational Health and Safety Unit is responsible for the following:

- Maintaining and recommending proper health and safety procedures to IITRI staff
- Advising and recommending proper health and safety procedures to IITRI staff
- Periodically inspecting various IITRI facilities to determine any present or potential health and safety hazards
- Developing and/or approving standard operating procedures relevant to the health and safety of IITRI staff
- Maintaining a respiratory protection program
- Maintaining compliance with OSHA regulations
- Conducting pertinent training sessions.

Hazardous Waste Management. The Hazardous Waste Management Unit is responsible for the following:

- Ensuring the IITRI Hazardous Waste Management Program is running effectively and efficiently
- Ensuring that all technical staff are aware of the Hazardous Waste Management Program
- Developing and/or approving standard operating procedures pertinent to the Hazardous Waste Management Program
- Maintaining compliance with EPA regulations
- Conducting pertinent training sessions.

4.2.3 Security

IIT Research Institute, granted a Top Secret Facility Clearance and storage capability by the Department of Defense (DoD) on April 20, 1956, conducts classified research for various agencies of the U.S. government. Our objectives have always been to ensure uncompromised performance on contracts requiring special security consideration. This has been accomplished by a careful assessment of contract requirements and the subsequent development of procedures to ensure strict compliance. IITRI staff are accustomed to working with government contracts demanding special security requirements that affect national security, as well as with industrial programs requiring access to and generation of documentation of a proprietary, invention disclosure, or patentable

nature involving trade secret information. The IITRI Security Manual covers all such procedural matters in detail.

IITRI employs its own guard force of 15 persons, which provides 24-hour armed protection. All guards are cleared to the level of DoD Secret and hold Special Police Commissions with the City of Chicago. Our complex is equipped with electronic alarms on all perimeter doors and closed circuit television at selected entrances to supplement our guard force. Our guard force is backed by armed IIT campus police on a 24-hour basis. IITRI is a closed facility, and all employees are required to show their company identification card for entry. For control purposes, special badges are issued to all visitors and all non-staff (vendors, contractor, and service personnel), who must register and be escorted in the building.

Within the building, separate alarmed areas are set up for some classified projects. Typically, these closed areas have only one entry point, have no exterior walls, and are alarmed and locked. Entry is limited to those with the appropriate security clearance and the "need to know." Classified documents are secured in GSA-approved security containers or in locked containers within the secure areas. All incoming and outgoing documents are processed into the control system in our central document control station. Tempest approved data processing equipment and secure data terminals are placed within an approved secure area and are subject to additional security requirements.

Procedures have been established to cover contingencies such as natural disasters, dissident actions, civil disturbances, and bomb threats, and include the destruction of the security materials if security compromise seems imminent.

4.2.4 Policies and Procedures

Our experience in government contracting has resulted in the development of a body of procedures and policies fully compatible with government procurement regulations. The cognizant Government Administrative Contracting Office has approved IITRI's policies with respect to purchasing, patents, accounting, and travel.

Accounting. IITRI's fiscal year runs from October 1 through September 30 and consists of 13 accounting periods of four weeks each. Actual overhead rates are negotiated annually for each fiscal year based on government audit. Provisional overhead rates for bidding and billing purposes can be verified by DCMAO (Chicago) Ms. Patricia M. Ardovitch (Contact Ms. Andrea Barnett, 312/825-5224).

Billing Procedure. Billing procedure will be based on our defined four-week accounting periods. With the exception of the first and last billings, costs will be submitted every four weeks to cover expenditures during that period of time. Because project start and end dates are unlikely to coincide with our accounting periods, the first and last billings will cover the starting and ending portions, respectively.

Cost Application. Direct labor charges are based on an eight-hour work day, five days per week. This provides for an average IITRI accounting period of 160 man hours. In our approved accounting system, fringe benefits, including employee life insurance, major medical insurance, retirement annuity, Social Security, worker's compensation insurance, tuition assistance, vacation, sick leave, holidays, and other excused absences are recognized as costs related to total salary costs, and are reimbursed at the rates indicated in our cost estimate. See Cost or Pricing Information/Disclosure regarding elimination of separate costing of salary-related costs. Our accounting procedures provide for direct charging of long distance communications and shipping charges. Cost allowability on IITRI's cost reimbursement contracts will be determined in accordance with those provisions of FAR, DoD FAR Supplement, and Cost Accounting Standards applicable to commercial organizations.

Unit or Job Cost. IITRI produces detailed and up-to-date summary cost records on each individual research program job. These cost records contain all direct charges, such as engineering labor (including salary-related costs), purchased expendable materials, purchased computer services, purchased special equipment, charges from subcontractors and/or consultants (including a material handling charge), travel, telephone and telegraph, report reproduction, service labor, and any other direct charges incurred during the performance of the research program.

Cognizant Government Offices. The following offices have been assigned cognizance of IITRI's activities:

Administrative

Defense Logistics Agency
DCMAO (Chicago)
O'Hare International Airport
Post Office Box 66911
Chicago, Illinois 60666-0911

Attention: DCMDC-GCAC/AK/Ms. Patricia M. Ardovitch
Administrative Contract Officer
(Ms. Andrea Barnett)
Telephone: 312/825-5224

Audit

Defense Contract Audit Agency
c/o IIT Research Institute
10 West 35th Street
Chicago, Illinois 60616-3799

Attention: Raymond Barnes or Audit Supervisor
(Mr. Gene E. Cleeton)
Telephone: 312/567-4149

Audit (Chicago Branch Office)

Defense Contract Audit Agency
635 Butterfield Road, Suite 210A
Oak Brook Terrace, Illinois 60181-4041

Attention: Mark S. Dostal, Manager
Telephone: 708/268-8590

Property

Defense Logistics Agency
DCMAO Chicago
O'Hare International Airport
Post Office Box 66911
Chicago, Illinois 60666-0911

Attention: CHI-GCAM
Property Administrator
Telephone: 312/825-6870

Security

Defense Investigative Service
Director of Industrial Security
Mid-Western Region (S3210)
610 South Canal Street
Chicago, Illinois 60607-4577

Telephone: 312/886-5244, 5243, or 6462

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