42720

SOLAR POND CLEANOUT

PROJECT MANAGEMENT

PLAN

November 13, 1990

EG&G Rocky Flats Plant
Golden, Colorado

"REVIEWED FOR CLASSIFICATION
By B.B. Bauma
Date 11/15/90 (u) "

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1.0 MISSION NEED AND OBJECTIVE

An Agreement-in-Principle (AIP) between the U.S. DOE and State of Colorado was entered into on June 28, 1989. Attachment B of the AIP requires accelerated cleanup of past environmental contamination sites at the Rocky Flats Plant which pose higher risk for spread of contaminants into surface water, ground water and the soil. The solar evaporator ponds are identified as a past storage and treatment site requiring accelerated cleanup. The Agreement mandates the removal of all water and sludge from the pond, treatment of the water, solidification and stabilization of the sludge, and shipment of all solidified sludge (pondcrete) to the Nevada Test Site (NTS) by October 31, 1991.

1.1 Measurable Objectives of Project

The significant measurable objectives of the solar pond cleanout project are summarized as follows:

1. All pond water will be removed, treated, and reused to the extent possible in the plant raw water systems.

2. All pond sludge will be removed, solidified with cement, and packaged for offsite disposal.

3. The current inventory of unacceptable pondcrete waste will be resolidified with cement and packaged for offsite disposal.

4. Runoff and ground water collected in the interceptor Trench French Drain System will be temporarily contained for treatment and utilization in the plant raw water system.

5. The solar ponds will be protected to prevent further accumulation of water and sediment.

6. All solidified pondcrete will be shipped to NTS for disposal.

7. All objectives will be completed by October 31, 1991.

8. All actions necessary to meet these objectives will be performed in full compliance with all corporate policies; and DOE, State and Federal environmental and transportation regulations.

2.0 TECHNICAL PLAN

This project plan defines the major issues and technical constraints for solar pond cleanout and pondcrete resolidification, describes the activities and schedules necessary to achieve the overall objectives, and summarizes the team organization and management guidelines necessary to comply with the accelerated cleanup date of October 31, 1991 in the AIP.

The project plan is a working document and will be revised as the needs and resources of the project dictate. This plan is not intended to modify contract provisions or existing policies/procedures in any way.

2.1 Summary of Major Issues and Technical Constraints

Major issues for resolution that will impact the AIP completion date for solar pond cleanout are:

1. Water management.
2. Sludge management.
3. Regulatory Agency concurrence.
4. Operational systems requirements.
5. NTS disposal site availability.

Each of these major issues and technical constraints are addressed in this project plan. Specific, coordinated, technical approaches are planned for resolving these issues and meeting the objectives of the project.

2.2 Description of Project Phases

The solar pond cleanout project involves accomplishing significant elements of work within a very compressed time schedule. Work breakdown structures have been developed to show the significant tasks and activities that must be completed to satisfy the major issues/technical constraints and permit cleanout of the solar ponds and shipment of all solidified Pondcrete to NTS by the AIP date. These work breakdown structures are product oriented and present the elements of work down to level three. The work breakdown structures are attached as Figures 1 through 5.

A logic and flow diagram which illustrates the interdependent relationships of the major project work elements is attached as Figure 6. This flow diagram permits a determination of the non-critical/critical work activities and contains the critical path of the project which must be driven to completion under a very tight schedule.

2.2.1 Enhanced Solar Evaporation of Pond Water

Total capacity of the solar evaporation ponds is about 11,300,000 gallons of water. Based on current levels, an estimated 8,000,000 gallons of water must be removed and treated to meet the AIP commitment.

An integrated water balance has been tabulated for the solar evaporation ponds which considers precipitation and interceptor trench pump house (ITPH) inflows, and evaporative outflows. The results indicate that the 207B ponds will be subject to a net liquid accumulation (due to the ITPH inflow) of approximately 2 million gallons while the 207A Pond will experience a net loss of approximately 3 million gallons. Between August 1990 and October 1991, the overall pond system will lose approximately 1 million gallons of liquid by solar evaporation.

Monthly precipitation rates correspond tc data gathered by the National Oceanic and Atmospheric Administration (NOAA) for the Denver area. Inflow from the ITPH has been estimated in previous investigations to be approximately 4 million gallons per year. Evaporation rates are estimated from pan evaporation data collected between 1959 and 1977 at Cherry Creek Reservoir.

Therefore, increasing the natural evaporation rate of solar pond water is desirable and will be accomplished by the following actions:

1. Dyeing the water dark blue to reduce reflective heat loss.

2. Installing floating spray aerators in the ponds.

3. Installing heater/soaker pipes to wet pond perimeter areas, thus increasing surface area exposure.

4. Direct heating of the solar pond water; this measure will only be employed if forced evaporation measures fail to operate.

Brief technical justification, equipment descriptions and installation locations are summarized for each of these four activities.

<u>Dyeing the Water Dark Blue</u>

Use of a dye is an industry accepted practice for enhancing the evaporation rate of solar ponds. Approximately six 55-gallon drums of blue lace-321 dye will be added to Pond 207A, and approximately two 55-gallon drums of dye will be added to each of the three 207B series ponds. No dye will be added to Pond 207C. This pond has a high total dissolved solids content and the solution is highly basic. Enhancements to solar evaporation are not considered feasible under these circumstances. Blue lace dye is not a RCRA regulated material. Most of the benefit will result from a decrease in reflected heat loss by allowing the dark blue water to absorb additional solar radiation.

<u>Floating Spray Aerators</u>

Six floating spray aerators will be installed. Three units will be placed in Pond 207A, and one unit will be installed in each of the three 207B series ponds. Aeration is not considered practical for Pond 207C; this pond contains the greatest concentration of radionuclides. The aerator units are adjustable to create a spray diameter of approximately 40 to 60 feet. The aerator units will be adjusted to a spray height of approximately four feet and a flow rate of approximately 1500 gallons per minute. The aerators will be automatically shut down when their anemometers record a wind speed that exceeds the maximum allowable wind speed for aerator operation. Aeration is a well established, accepted method for increasing natural solar evaporation. Aeration increases the surface area of the water that is in direct contact with the air, and this, in turn, increases the evaporation rate of the pond water.

Heater Soaker Pipes to Wet Pond Perimeter Areas

Another technique for enhancing evaporation is the use of a soaker pipe which runs along the top perimeter of pond 207A and each of the 207B series ponds. Water will flow through the pipe and exit through small diameter holes to keep the pond perimeter asphalt wetted.

Prior to entering the soaker pipe, the pond water will be transported through a heater pipe to raise the water temperature about 40 deg. F above the bulk, ambient temperature. Heating will be accomplished by passing the water through a natural gas volume water heater. Heat trace will be used for temperature maintenance of the water from the heater to the discharge point. Increasing both water temperature and surface area-to-volume ratio will substantially enhance the evaporation rate.

Direct Heating of Solar Pond Water

Under ambient weather conditions, evaporation rates are not sufficient to achieve the proper water to sludge ratios required for preparing the sludge for cementation. The desired evaporation rate of about 19.5 inches/month can be achieved by direct heating of the pond water to roughly 89 deg. F. Recirculating, gas heating systems, placed on the pond bermed areas, could be used for heating the water and increasing the evaporation rate. This measure will be employed if the planned portable evaporators fail to operate.

2.2.2 Forced Evaporation of Pond Water

Mechanical thermal forced evaporation systems, which consist of a vapor compression unit, in series with a four-stage flash evaporator will be used for this phase of the project. Three identical systems, connected in parallel, will be acquired and installed in Building 910. These evaporation units will utilize the existing feed, distillate, and concentrate handling equipment in the building. A diagram of the complete operating system is attached in Figure 7.

The processing plan will be to pump the water from Pond 207A and Pond 207B North, Center and South through a five-way manifold station equipped with duplex strainers and duplex filters. Pumping will be done through a double-pipe transfer line which connects to a combined feed tank located inside the building. The feed tank will be capable of supplying the feed with low dissolved solids to the vapor compression unit and supplying the brine recycled from the vapor compression unit to the feed inlet of the flash evaporator. The distillate will be collected from the vapor compression unit and the flash evaporator into two separate small surge tanks. The distillate then will be combined into one discharge stream through a flow totalizer and pumped into a 7,000 gallon capacity holding tank. Continuous circulation of the distillate will be performed at the holding tank to ensure adequate mixing until a high level volume setpoint is reached. The distillate will then be analyzed for gross alpha, gross beta, pH, conductivity and nitrates. Upon the verification of satisfactory analytical results, the distillate will then be transferred to a 500,000 gallon capacity holding tank. From there, the distillate will be injected into the raw water system. Distillate that does not meet the allowable limit will be returned to the feed tank for recycling. The concentrated brine from the flash evaporator will be cemented in the pondcrete or saltcrete process. Prior to production start-up of this process, a complete analytical characterization of the distillate and concentrated brine will be performed.

Following the removal of sludges and sediments from the pond areas, interim protective measures would be employed to prevent resuspension of dry pond-bottom materials, unnecessary erosion or sloughing of sidewalls, and infiltration or additional leaching of contaminants through the soil due to accumulation of rainwater and snowmelt. The measures would consist of the use of impermeable materials (such as water bladders, tarps, or film coatings) and forced evaporation of collected precipitation. They would be in place from the period of approximately 1991 until 1994, when final closure actions would be underway.

The cementing contractor (refer to Section 2.2.3) will provide a plan for protecting the emptied ponds from further accumulation of water and sediment. This plan is projected to be completed by July 15, 1991. The contractor will be responsible for implementing the plan.

2.2.3 Solidification of Solar Pond Sludge

Technology necessary to satisfactorily solidify solar pond sludge under the compressed time constraints, is not available on site. This technology will be acquired from an outside contractor. The contractor will provide all necessary materials, equipment, and services to characterize the sludge, and develop a cost-effective cementing process which will produce a solidified waste form acceptable for transportation and land disposal at NTS. The cementing process must be of sufficient capacity to achieve the AIP date and have automatic and continuous process controls which will permit statistical sampling and certification of the final waste forms. The contractor must also supply sufficient characterization to assure adequate worker protection during the cementing process. Selection of the Contractor, development of the cementing process parameters, and installation of the process equipment will be accomplished by March 1991.

Pond Sludge Analysis and Characterization

This task consists of sampling, packaging, shipping, and laboratory analysis of samples of pond sludge and pond water. The sampling and analysis plan has been statistically derived and is intended to determine significant variations in pond sludge composition. Sludge samples will be obtained from quadrants in each of the five ponds; and a water sample will be taken from Pond 207C. The parameters for analysis include volatile organic compounds, non-volatile organics, inorganics, metals, and radionuclides. Sampling and analysis of the sludge and water will follow standard protocol as defined by EPA SW-846. All detection limits will be sensitive enough to meet the required detection limits of SW-846. The results of this effort will be used to assist in the development of a single process formula for cementing the solar pond sludge. The analytical data will provide a technical basis for developing an acceptable sampling plan to ensure that the pondcrete meets NTS and LDR acceptance criteria. The analytical data will also provide a technical basis to assess potential worker exposure during processing.

Development of Cementing Process Parameters

This phase of the project will be accomplished by the cementing contractor. The development process will involve limited sampling and analysis to confirm prior analytical results, development of a cementing formulation that addresses the worst case chemistry conditions, and testing of this formulation with surrogate wastes and pond sludge to ensure that specific TCLP and compressive strength requirements can be achieved. Once the formula is developed, the process will be used to produce samples of actual solidified waste for life-cycle testing, (freeze-thaw-heating cycles or wet-dry cycle testing), TCLP testing, ASTM test for solid versus liquid, compressive strength, penetrometer and other required testing as deemed necessary to verify the process. The intent of this development work is to produce a single process formula which will successfully solidify the worst case chemistry conditions of the sludge and produce the least volumes of waste. The development and testing plan will be developed by the contractor.

Homogenization of Pond Sludge

Ponds 207B North, Central, and South are expected to contain approximately 2250 cubic yards of aqueous sludge/sediment which is classified as a low level mixed waste. The sludge is presumed to be reasonably evenly distributed in the three ponds. Pond 207C is estimated to contain about 750 cubic yards of sludge, sediment, and saturated salts. Sludge has been removed from Pond 207A and it is expected that this pond contains only small amounts of sediment originating from wind deposition and overflow water from the 207B series ponds.

This phase of the project involves accomplishing two significant tasks:

1) Homogenization of the sludge, sediment, salts, and water (no dewatering is planned for this pond) in Pond 207C, and

2) Consolidation/homogenization of the sludge in the three 207B series.

The plan is to consolidate the sludge from the three 207B series ponds into Pond 207B South. This action would facilitate the cementing process and permit water management actions on the remaining ponds to be accomplished concurrently with sludge cementing activities. Consolidation of the sludge also would aid in the development of a single process formulation for cementing the sludge, which in turn, may reduce project costs. Movement of sludge from Ponds 207B Center and North into 207B South should not require approval by CDH because this is considered to be one single interim status unit.

The contractor will be required to furnish equipment and technology necessary to successfully accomplish these two tasks. Equipment should be off the shelf and readily available.

High Capacity, Continuous Cementing Process

This technology, equipment, services, automated process controls, and analytical capabilities for solidifying the solar pond sludge will be provided by an outside contractor. A procurement plan has been developed to acquire this capability. The contractor will have proven technology, knowledge in cementing both hazardous and radioactive wastes, and experience performing similar projects at other DOE sites. The contractor will also provide a licensed onsite laboratory facility and continuous in-line real time monitoring of the cementing process, controlling densities of both raw and mixed products, to precisely control cement addition rates, and ensure a uniform, high quality product waste form.

The proposed process will not require new or major construction. The new process will replace existing screening and pumping equipment with better-technology units. The process will also replace the conventional cement mixers with digital-process-controlled, state of the art mixing systems. This straight-forward substitution of newer-technology units will allow performance to our committed deadlines. Pond sludge will still be solidified with portland cement.

The equipment footprint, and environmental effects of both the existing pondcrete remix process and the proposed process are the same. However, we are substituting new-technology and equipment for old. Pondcrete cannot be processed to our committed deadline without this improvement.

2.2.4 Pondcrete Resolidification

Current activities on pondcrete resolidification consist of a remix demonstration project being conducted in Tent 10 on the 904 Pad. The remixing operation consists of a batch process. Reject pondcrete is placed into a Morgen cement pumper from which small pieces are transferred with water into a batch mixer. A calculated amount of portland cement is then weighed and added to the mixer, followed by additional water, if necessary. The mixer drum is rotated a specific length of time to mix the pondcrete, cement, and water and then the mixture is poured into triwalls for curing and testing. The solidified, acceptable waste forms are then repackaged into wooden half crates for transportation and disposal.

This current remix process throughput and capacity is insufficient to meet the AIP date. The process in Tent 10 can produce about 100 triwalls per month. In order to satisfy the AIP commitment, it will be necessary to develop new cementing formulations and modified higher throughput mixing capability. The following course of action will be pursued:

Development of New Cementing Process Formulation

The development process will involve the use of a high range water reducer to make the pondcrete/water mixture more fluid. This, in turn, will permit substantial reduction in the amount of water and cement required for the same unit volume of reject pondcrete material. Development will be required to determine the optimum amount of high range water reducer for minimizing waste volume and achieving adequate compressive strength for the cemented waste form.

Modified Mixing Process

The engineering changes to the current remixing equipment in Tent 10 will be designed to permit optimum use of the new cementing formulation. Modifications will be made to the Morgen pumper to permit mixing and pumping in one operation and eliminate the batch mixer from the process. Additional high shear, cyclodial mixing systems may also be evaluated to improve the current batch process. Tent 11 will be used to evaluate modifications to the current mixing process prior to production start-up and pondcrete processing.

High Capacity, Continuous Cementing Process

In order to satisfy the AIP commitment, it may also be necessary to pursue a continuous cementing operation for both the reject pondcrete as well as the solar pond sludge. This acquired capability will be integrated into the current waste operations plans for working off the reject pondcrete inventory. The plan for combining the treatment operations is projected to be completed by July 1991.

Analysis and Characterization of Current Reject Pondcrete Inventory

Sampling of the pondcrete will serve two basic purposes. The first purpose is to determine the chemical and physical nature of the pondcrete for selecting the best recementing formulation. The second purpose is to establish the population distribution in each of three categories described as hard, soft, and liquid in order to design reprocessing equipment. A statistical sampling plan has been prepared and sampling and analysis will follow standard protocol as defined by EPA SW-846. Approximately 20 samples, based on the constituents for analysis, are required.

2.2.5 Regulatory Agency Concurrence

Pondcrete operations are RCRA interim status units, and the solar evaporation ponds are undergoing RCRA closure. Therefore, approved changes to the current Part A interim status are required in order to meet the accelerated cleanup date of the AIP project. Four techniques (a blue dye, floating spray evaporators, soaking of pond perimeter areas, and direct heating if portable evaporator units fail to operate) are being pursued to enhance solar evaporation of the pond water. Forced evaporation will be achieved through the use of portable evaporator units. All water management techniques will require CDH approval. An approved change to the current Part A interim status would also be required for the modified pondcrete remixing process, the new high capacity, continuous cementing process and the interim protective measures for the emptied ponds.

All required changes to interim status have been identified in the planning process. Technical justifications, and the required engineering documentation to support each action will be prepared and submitted to CDH for approval. Timely approval by CDH is mandatory for success of the project.

Work is in progress to prepare a required Environmental Assessment (EA) for the water management activities, sludge management activities, and transportation of the solidified waste to NTS. It is expected that this EA will result in a Finding of No Significant Impact (FONSI) by December 1, 1990.

Electric generators will be used to power portable evaporator units; this equipment burns natural gas. An Air Pollutant Emission Notice (APEN) will be required except for: 1) fuel burning equipment which use gaseous fuel at an input rate of less than 750,000 BTU/hour; 2) sources having uncontrolled emissions of less than one ton/year of any pollutant (except hazardous, toxic, or odorous).

An Air Emissions Permit will be required except for: 1) anything that does not need an APEN; 2) stationary internal combustion engines with emissions less than five tons per year or rated horsepower of less than 50; and 3) sources of pollutants less than 5 tons per year given certain circumstances. All other pieces of equipment or processes will be reviewed for possible air regulation.

Two shelters are associated with the 904 pad (#10 and #11) and two shelters are associated with the 750 pad (#5 and #6). APENs and permit applications have been submitted to the Colorado Department of Health for these shelters and those permits are pending. CDH will issue one permit for all pondcrete shelters for remixing operations. CDH anticipates the permit would be issued by November 1990.

A change in plant operations that will result in an increase in the rate of radionuclide emissions is a modification (no matter how small that increase is) according to EPA's 40 CFR 61.15. However, if the estimated maximum individual dose added by the new construction or modification is less than 1% of the standard, then the modification or new construction does not need prior approval. It is expected that solar pond cleanout will cause no additional surface disturbance; therefore, water analysis will provide the data needed to calculate dose. An analysis will be done to address the EPA NESHAP new permit issue by December 1990.

2.2.6 Operational Systems Requirements

This phase of the project would provide all required documentation, plans, procedures, reviews, and administrative actions to complete the project on schedule. The work breakdown structure identifies the major work activities associated with documentation and operations. Essential documentation requirements are summarized as follows:

Material Handling Plan

Meeting the AIP date will require high quantity pondcrete production rates. Material handling to support these rates is a major concern. A material handling plan must be developed which addresses at a minimum the following concerns:

1. Providing sufficient raw material (cement, additives, water) to the mixing operation.

2. Acquiring, storing and preparing the half crates for pondcrete cementing.

3. Movement, handling, curing, inspection, and sampling of filled half crates.

4. Preparing and loading acceptable pondcrete into trucks for shipment to NTS.

5. Providing sufficient protection for worker health and safety.

This plan must consider more than one production option. Solidification rates will be driven by the material handling constraints. Development of a comprehensive material handling plan may very well be the most important phase of this project. A material handling plan will be developed by January 1991.

Quality Assurance Plan

The current quality control sampling procedure for the pondcrete remixing operation, which requires penetrometer measurements on five surfaces of the solidified pondcrete waste form, is unacceptable for meeting the AIP accelerated cleanup date. Casting of the pondcrete directly into half crates must be accomplished in a manner which permits certification of the waste for transportation to NTS and Land Disposal.

A Quality Assurance procedure based on statistical control of the cementing process, correlation of process parameters with pondcrete performance, pre-production runs and detailed sampling to qualify the process, and statistical sampling of production quantity lots is planned. A Quality Assurance Plan, which addresses all elements of the program, is projected to be developed by January 1991.

Waste Analysis and Sampling Plan

This plan provides the basis for characterizing the physical properties, and chemical and hazardous constituents in the solar pond sludge and reject pondcrete inventory. The analytical information permits the development of cementing process parameters to ensure that the pondcrete meets all required disposal criteria. The information also provides the basis for developing a sampling plan for verifying that the pondcrete waste forms meets disposal criteria.

Sampling plans to characterize the pond sludge and pondcrete for cementing are already developed and sampling is in process. The sampling plan to ensure compliance with disposal criteria cannot be finalized until the characterization sampling and analysis has been completed. This plan requires approval by EG&G, NTS, and DOE and will be in place by May 1991.

The cementing contractor's capabilities and the current waste operations requirements and activities would be integrated prior to quantity production. This phase of the project would require a dedicated, concerted effort between operations and contractor personnel. The success of the project would depend on satisfactorily addressing each of the key operational requirements and developing procedures and systems to operate and control the production processes. The detailed work effort will commence subsequent to the selection of the continuous cementing support contractor. Finalization of all required joint operational procedures, plans, and documentation is projected to be completed by April, 1991.

2.2.7 Shipping and Disposal of Pondcrete

Shipping and disposal of pondcrete depends on the availability of the NTS and verifiable assurance that the waste form meets all applicable transportation and disposal criteria. The major elements that must be satisfied to ship pondcrete and meet the AIP date are identified in the work breakdown structure. The project plan provides for ensuring disposal criteria are met. The availability of the NTS is a concern that is beyond the boundaries of this plan. This issue must be resolved by the State of Nevada, EPA, and DOE.

3.0 ASSESSMENT OF PROJECT RISKS

The most significant project risks have been assessed to the extent possible at this stage of the project. This risk assessment considered schedule, cost, regulatory issues, NTS Disposal Site availability, and technical activities. The major project phases which pose the most significant risk with respect to achieving the AIP date are transportation of all solidified pondcrete to NTS, and installation of the interim protective measures for the emptied ponds. Completion of both activities are totally dependent on the water management and sludge management activities remaining on schedule. As the project proceeds, additional risks may become more evident. The results of this risk assessment are attached as Figure 8.

4.0 MANAGEMENT APPROACH

4.1 Organizational Responsibilities

The major technical, regulatory, and production phases of work for the project are identified in the work breakdown structures attached to the technical plan. Work breakdown structure, summarizing the major organizational responsibilities, are attached as Figure 9. Responsibilities for accomplishing the work are summarized for each functional organization.

4.1.1 Program Management

Program Management is responsible for preparing the project plan, coordinating schedules, negotiating and controlling resources, and directing the overall activities and project phases necessary for successful completion of the plan. Program Management will also control, track and report project cost and status as required, and serve as the liaison with upper management, DOE, and other organizations.

4.1.2 Waste Operations

Waste Operations is responsible for staffing, training, and operating the processing equipment and systems necessary for completing the water and sludge management actions identified in this project plan. They will provide direction, and management oversight to all matrixed and contracted services. Operations will also be responsible for waste handling, waste packaging, waste loading for transportation, and ensuring that operations are done in compliance with all applicable DOE, State and Federal regulations.

4.1.3 Facilities Project Management (FPM)/Facilities Engineering (FE)

FE will be responsible for providing design packages to cover all equipment, procurement, and installation. These packages will include necessary instrumentation controls, and supporting utilities. They will provide systems operational testing requirements for the production equipment and as-built drawings upon completion of SO testing.

FPM will coordinate all activities associated with design, procurement, construction, testing, and plant-contractor interface requirements to ensure the project is completed within budget and on schedule.

4.1.4 Waste Technology

Waste technology is responsible for conducting the pondcrete remix demonstrations, providing technical assistance to waste operations and project management as required, preparing project plans, procedures and documentation as required, and assisting with systems operational testing to support waste production operations.

4.1.5 Traffic

Traffic will specify all administrative controls for shipment of solidified pondcrete to NTS. This organization will be responsible for ensuring that the waste packages are properly marked and labeled. They are also responsible for preparing all shipping documents, the transportation arrangements, and the notifications to NTS.

4.1.6 Waste Quality Engineering

Waste Quality Engineering will be responsible for verifying that the solidified pondcrete meets DOT Transportation requirements, NTS Waste Acceptance Criteria and applicable

LDR requirements. This organization will also be responsible for providing technical assistance to develop a waste quality assurance plan, and waste inspection procedures that meet the needs of the AIP schedule. Waste Inspection will perform all waste inspections required for certification.

4.1.7 Health and Safety

Health and Safety will provide the necessary radiation protection guidelines, industrial hygiene guidelines, and personnel monitoring support to operate all phases of this project. They will be required to identify and provide recommendations for correcting all issues related to personnel protection and equipment safety.

4.1.8 Permitting and Compliance

Permitting and Compliance will prepare and submit the required documentation for all changes to RCRA Interim Status. They will be the principle liaison between the project, DOE, and CDH concerning RCRA permitting issues. Permitting and Compliance will also perform unscheduled inspections of waste treatment, handling, storage, and shipping operations to ensure regulatory compliance.

4.1.9 Engineered Systems and Technical Support

Waste Process Engineering will provide lead project engineering support as required. Lead project engineers will represent the needs of operations and coordinate the many engineering, design, construction, startup, and maintenance phases of the project. Lead project engineers will ensure that the schedule is maintained.

4.1.10 Maintenance/J.A. Jones

These organizations will be responsible for all equipment installation, repair, modification, and replacement. They will also provide an inventory of all necessary spare parts to minimize operational downtime. Maintenance also is responsible for glueing, nailing, bonding and stenciling of the half crates.

4.1.11 Purchasing

Purchasing will negotiate and award all contracts for equipment, supplies, services, and technical support for the project.

4.2 Baseline Management and Control

Program Management will control the project to the schedule and cost baselines established in this project management plan and any supporting documents required by the plan. Changes to these baselines will not be considered without first providing a written request for baseline change to the DOE project manager. Included in the request will be an explanation of the need for the change, its impact on the project and any other pertinent information that would be helpful in the decision-making process. No change to the project's baseline wil be implemented without written approval from the DOE project manager.

4.3 Project Team Organization

A project team is chartered with the responsibility to complete the solar pond cleanup project on schedule and within the allocated budgets. The project team will be directed by J.D. Roberts. In his absence, the team will be directed by D.A. Shepherd, Waste Operations Engineering and Maintenance Manager.

The project team will consist of the following members:

Environmental and Waste Programs
E.F. Lombardi

DOE Representative
J.D. Wienand

Waste Operations
S.W. Dewitt

EPM/EE
J.L. Wiggins
S.R. Kieth
P.M. Rooke
T. Satkowski
G.A. Pickerel

Site Quality Assurance
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G.A. McCormick
J. Ripley

Support of the Solar Pond Cleanup Project Team will be among the highest priorities for all Team members. These members will be obligated to provide the necessary support to complete the project on schedule.

It is recognized that the Project Team members have additional job responsibilities within their functional groups. However, these additional responsibilities will not impact the successful completion of this project plan nor prevent other functional groups from meeting their milestones as defined by the schedule. If a conflict occurs as to job priority, each Team member is asked to contact J.D. Roberts or D.A. Shepherd to help resolve priorities with their management.

Lead project engineers will coordinate all day-to-day activities, map strategies and establish priorities for maintaining the schedule. They will assist project management in controlling the project.

Specific team members may be requested to attend daily meetings at a location to be designated. This meeting will be a coordination and status meeting to agree upon work strategy for the day. As the project progresses, the meeting frequency may be adjusted.

Any Team member may call for additional personnel to resolve problems as they occur. Meetings can be arranged by contacting J.D. Roberts or D.A. Shepherd.

Project Team meetings will be held bi-weekly. These meetings will status the progress of the functional groups and identify potential problems which may impact the schedule.

Program Management Team

A Program Management Team is established to review progress and address problems encountered by the Project Team. A program organizational chart is attached as Figure 10. The Management Team will consist of the following members:

Program Management
J.D. Roberts

DOE Representative
J.D. Wienand

Waste Operations
S.W. Dewitt

EPM
J. M. Shaffer

FE
C.E. Beutler

Waste Quality Assurance
J.G. Hilbig

Health and Safety
J.R. Majestic

Traffic
D.M. Krieg

Waste Technology
T.L. Rising

Environmental and Waste Programs
E.F. Lombardi

Maintenance
H.G. Williams

Permitting and Compliance
P.W. Edrich

Plant Services
J.R. Marschall

Purchasing
G.E. Loudenburg

Changes or revisions to this Plan will be agreed to, published, and distributed through the Management Team. It will be the responsibility of each Team member to notify the Program Manager of any update or revision necessary for their respective organization. This Team will meet as required at a time and place designated. J.D. Roberts will chair this meeting.

5.0 ACQUISITION STRATEGY

An acquisition plan has been developed for evaluation, selection, and procurement of a contractor to furnish a high capacity continuous cementing process. A cost-plus fixed fee contract will be solicited. Selection and award will be in compliance with Volume 1, Section 3, Parts 2 and 3 of the Rocky Flats Plant Procurement System and Procurement Procedure 313.

The essential elements of the plan are to prepare a detailed Statement of Work (SOW) and issue a request for proposal to a sufficient number of firms capable of competing for the contract. A Source Selection Committee has been established to develop weighted criteria for evaluating the contractor proposals. A Source Selection Board has been appointed to review and approve the selection criteria, review technical evaluations of the proposals, and select a contractor.

The contractor will be selected on the basis of technical qualifications, quality assurance program, and management capability and experience. The plan is to award a letter contract to initiate work prior to a final contract award.

The above activities will be administered in accordance with a procurement schedule which is part of Procurement Plan for the Pondcrete/Saltcrete Remix contract. After contract award, work activities to be performed in accordance with the SOW will be administered and coordinated between a Rocky Flats Program Management Team and the Project Management Team proposed by the successful bidder. Contract administration pertaining to payments, invoicing, contract modification and/or clarifications will be handled by the responsible Purchasing Agent.

6.0 PROJECT SCHEDULE

Figures 11, 12, and 13 (attached) present the schedule for water management activities, sludge management activities, and regulatory activities respectively. The schedule is consistent with the major project phases described in the plan and identifies milestones with which progress of the project can be measured. Key milestones are summarized in Figure 14. Logic relationships of non-critical/critical activities have been identified in the planning and scheduling process. The project critical path starts with procurement of the cementing contractor, installation of the on-site laboratory and continues through cementing process SO testing and start-up, process review and qualification, cementing the pond sludge and reject pondcrete, and shipment of solidified, acceptable waste to NTS.

7.0 RESOURCE PLAN

A resource chart, consistent with the work breakdown structure in the technical plan is attached as Figure 15. Figure 16 (attached) summarizes the assumptions made for estimating the resources required for the project. All dollar costs for equipment, identified under water and sludge management are expense money. The total calculated ROM cost, including labor, for the project, is $57,904,000.

8.0 PROJECT CHARTER

The purpose of this project is to implement pre-remediation actions defined in the Agreement in Principle (AIP) between the DOE and State of Colorado. The AIP stipulates that DOE will stem the further migration of harmful contaminants into the soil and ground water by expediting the cleanup of five solar evaporation ponds. Accelerated cleanup involves removal and treatment of all pond water, removal and treatment of pond sludge and shipment of the solidified/stabilized sludge for disposal. All actions must be completed by October 1991. This pre-remediation action involves the capabilities and participation of many functional organizations at the Rocky Flats Plant. Additionally, this effort will require the acquisition of technology and services currently not available on-site. A program management approach is required to schedule, coordinate, and manage the resources and development, engineering, construction, and operational phases of the project.

The Program Management Office is located in the Waste Repackaging and Solidification Division in Building 750. The Program Manager for Solar Pond Cleanup is J.D. Roberts.

9.0 APPROVALS AND CONCURRENCE

The project management plan for solar pond cleanout and pondcrete resolidification defines functional group actions and management responsibilities. These commitments are recognized and agreed to by approval of this document.

Prepared by: ______________________________
Environmental and Waste Programs

Submitted by: ______________________________ 11/15/90
Director, Waste Operations

Approved by: ______________________________
Associate General Manager
Environmental Restoration and Waste Management

10.0 ATTACHMENTS

Attachments to the project plan are identified as follows:

2.0 Technical Plan

Figure 1	Work Breakdown Structure for Water Management
Figure 2	Work Breakdown Structure for Sludge Management
Figure 3	Work Breakdown Structure for Regulatory Concurrence
Figure 4	Work Breakdown Structure for Operational Systems Requirements
Figure 5	Work Breakdown Structure for Pondcrete Shipping
Figure 6	Logic/Flow Diagram for Project Phases
Figure 7	System Diagram for Forced Evaporation of Pond Water

3.0 Assessment of Project Risks

Figure 8	Summary of Project Risks

4.0 Management Approach

Figure 9	Work Breakdown Structure for Functional Organizational Responsibilities
Figure 10	Program Team Organizational Chart

6.0 Project Schedule

Figure 11	Project Schedule for Water Management Activities
Figure 12	Project Schedule for Sludge Management Activities
Figure 13	Project Schedule for Regulatory Activities
Figure 14	Summary of Project Key Milestones

7.0 Resource Plan

Figure 15	Resource Chart
Figure 16	Summary of Assumptions Made for Resource Calculations

Figure 1

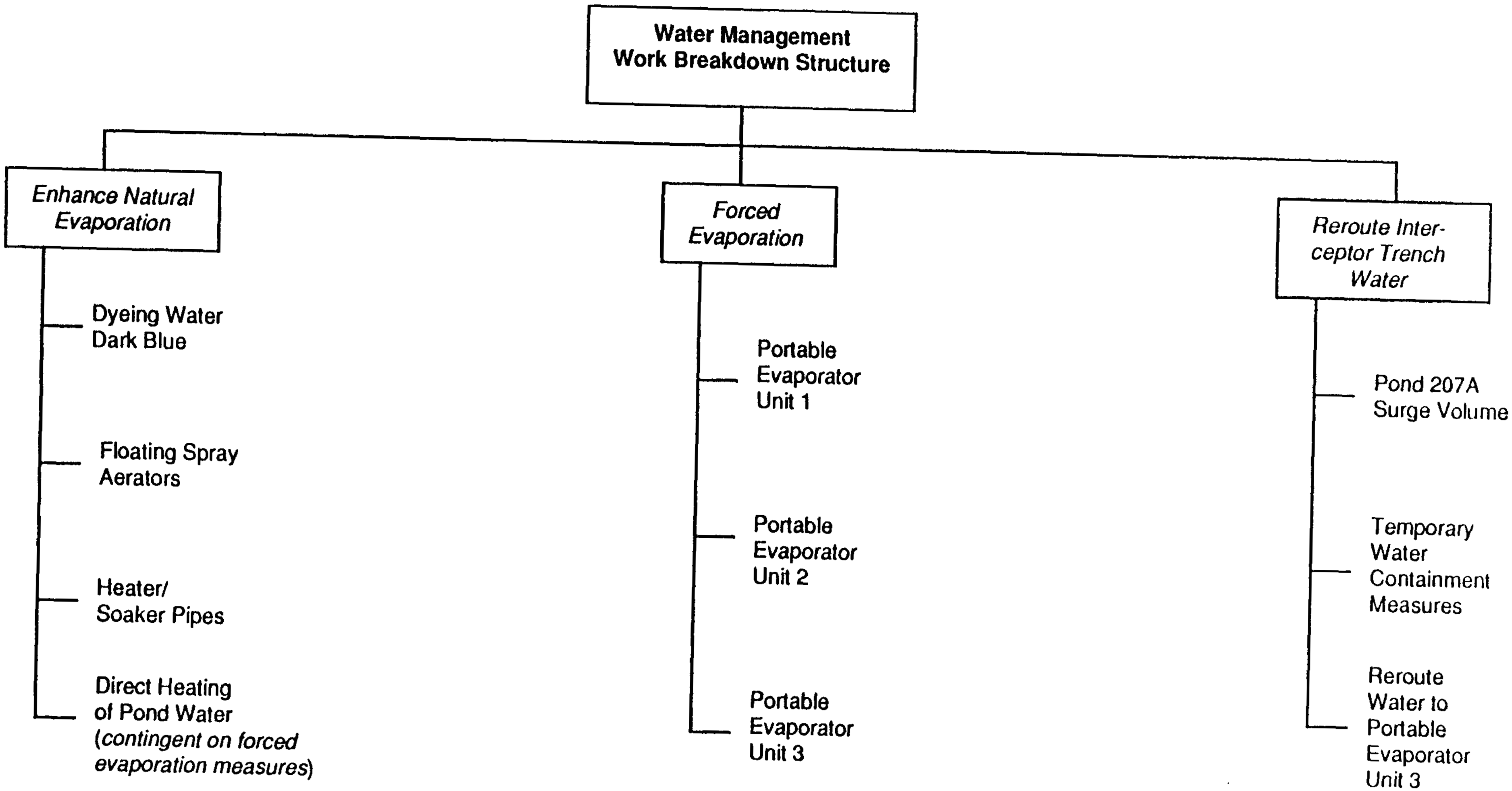

Water Management
Work Breakdown Structure
Enhance Natural Evaporation
Dyeing Water Dark Blue
Floating Spray Aerators
Heater/ Soaker Pipes
Direct Heating of Pond Water (contingent on forced evaporation measures)
Forced Evaporation
Portable Evaporator Unit 1
Portable Evaporator Unit 2
Portable Evaporator Unit 3
Reroute Inter-ceptor Trench Water
Pond 207A Surge Volume
Temporary Water Containment Measures
Reroute Water to Portable Evaporator Unit 3

Figure 2

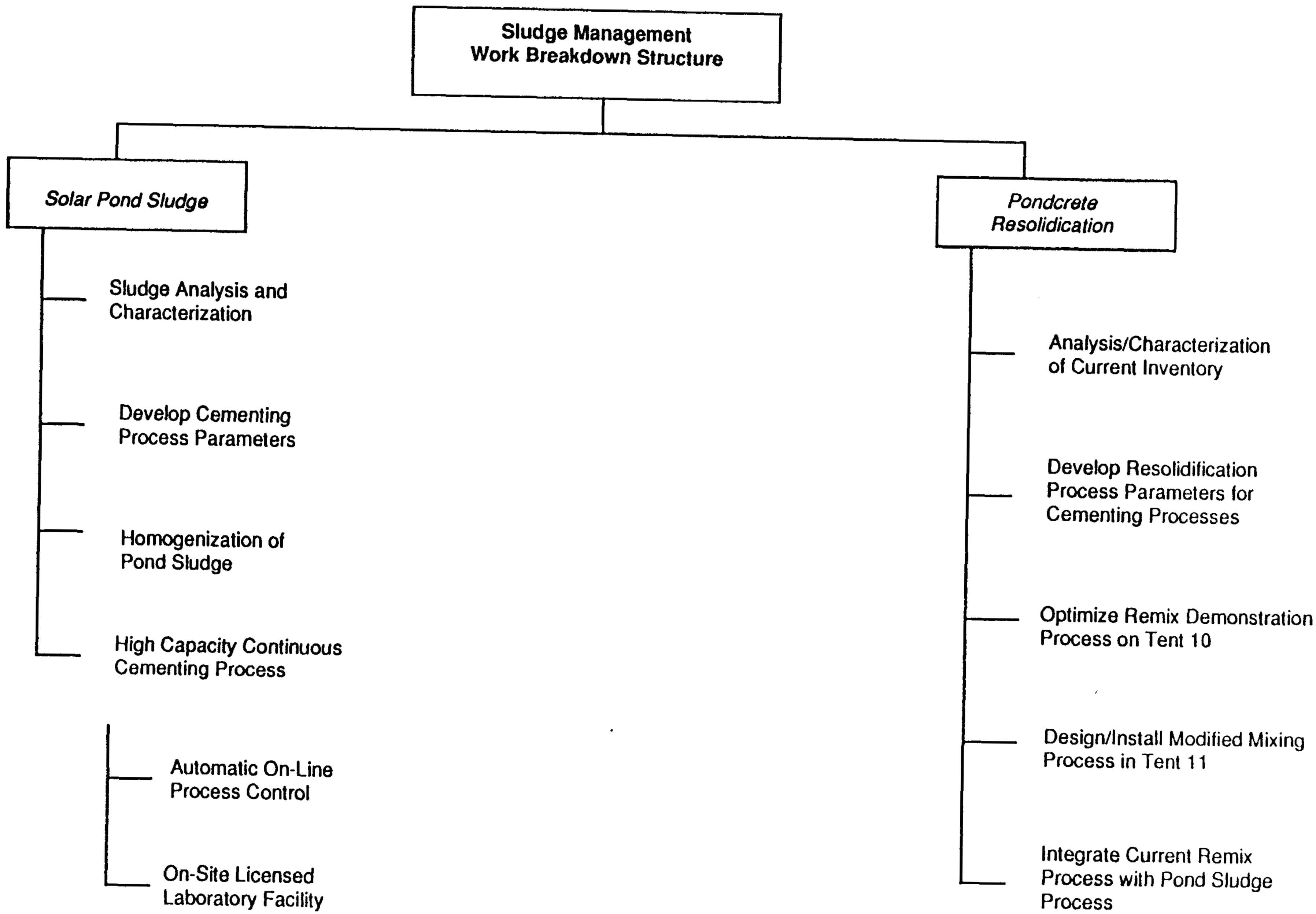

Sludge Management
Work Breakdown Structure
Solar Pond Sludge
Sludge Analysis and Characterization
Develop Cementing Process Parameters
Homogenization of Pond Sludge
High Capacity Continuous Cementing Process
Automatic On-Line Process Control
On-Site Licensed Laboratory Facility
Pondcrete Resolidication
Analysis/Characterization of Current Inventory
Develop Resolidification Process Parameters for Cementing Processes
Optimize Remix Demonstration Process on Tent 10
Design/Install Modified Mixing Process in Tent 11
Integrate Current Remix Process with Pond Sludge Process

Figure 3

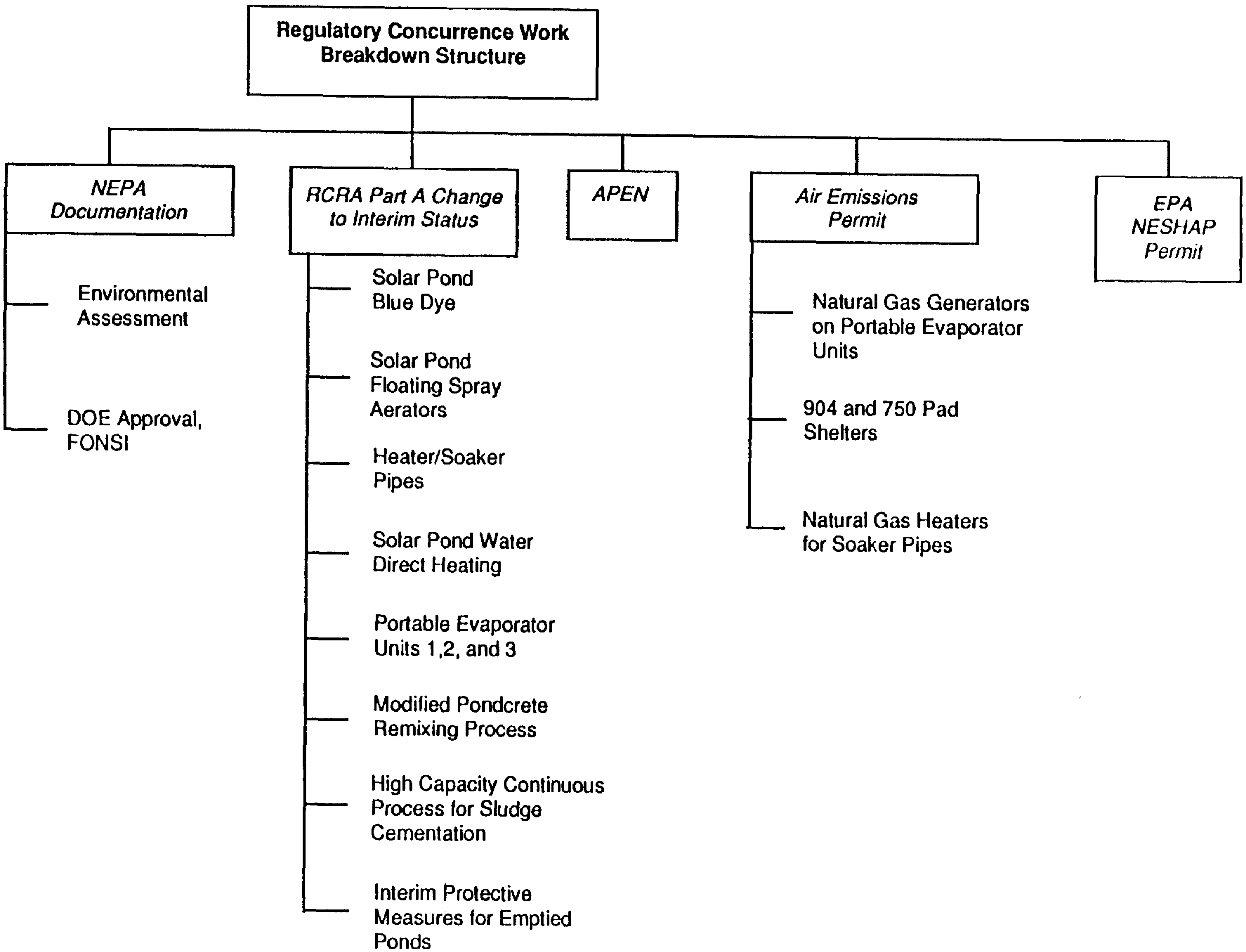
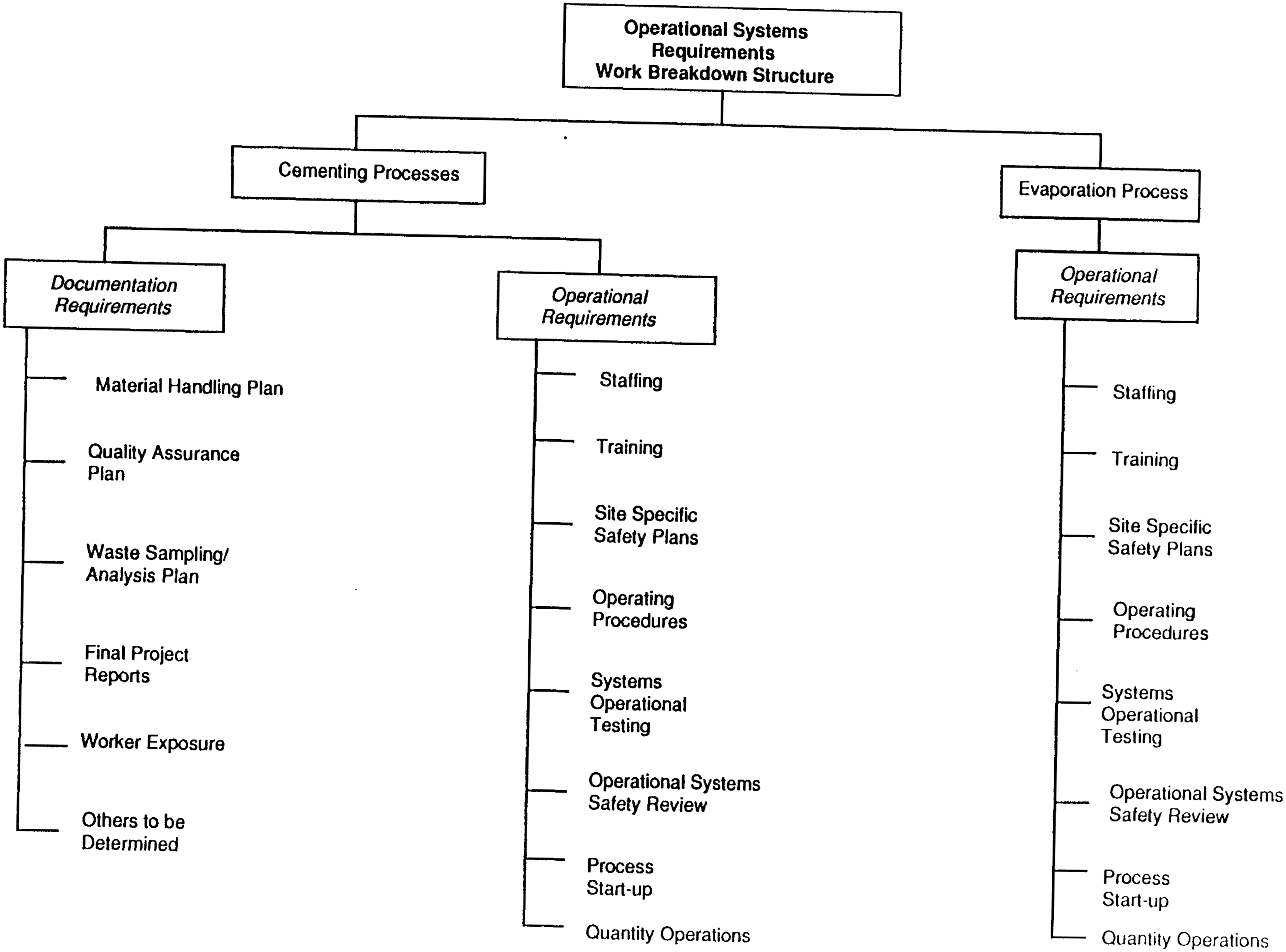

Regulatory Concurrence Work Breakdown Structure
NEPA Documentation
Environmental Assessment
DOE Approval, FONSI
RCRA Part A Change to Interim Status
Solar Pond Blue Dye
Solar Pond Floating Spray Aerators
Heater/Soaker Pipes
Solar Pond Water Direct Heating
Portable Evaporator Units 1,2, and 3
Modified Pondcrete Remixing Process
High Capacity Continuous Process for Sludge Cementation
Interim Protective Measures for Emptied Ponds
APEN
Air Emissions Permit
Natural Gas Generators on Portable Evaporator Units
904 and 750 Pad Shelters
Natural Gas Heaters for Soaker Pipes
EPA NESHAP Permit

Figure 4



Operational Systems Requirements Work Breakdown Structure
Cementing Processes
Evaporation Process
Documentation Requirements
Material Handling Plan
Quality Assurance Plan
Waste Sampling/ Analysis Plan
Final Project Reports
Worker Exposure
Others to be Determined
Operational Requirements
Staffing
Training
Site Specific Safety Plans
Operating Procedures
Systems Operational Testing
Operational Systems Safety Review
Process Start-up
Quantity Operations
Operational Requirements
Staffing
Training
Site Specific Safety Plans
Operating Procedures
Systems Operational Testing
Operational Systems Safety Review
Process Start-up
Quantity Operations

Figure 5

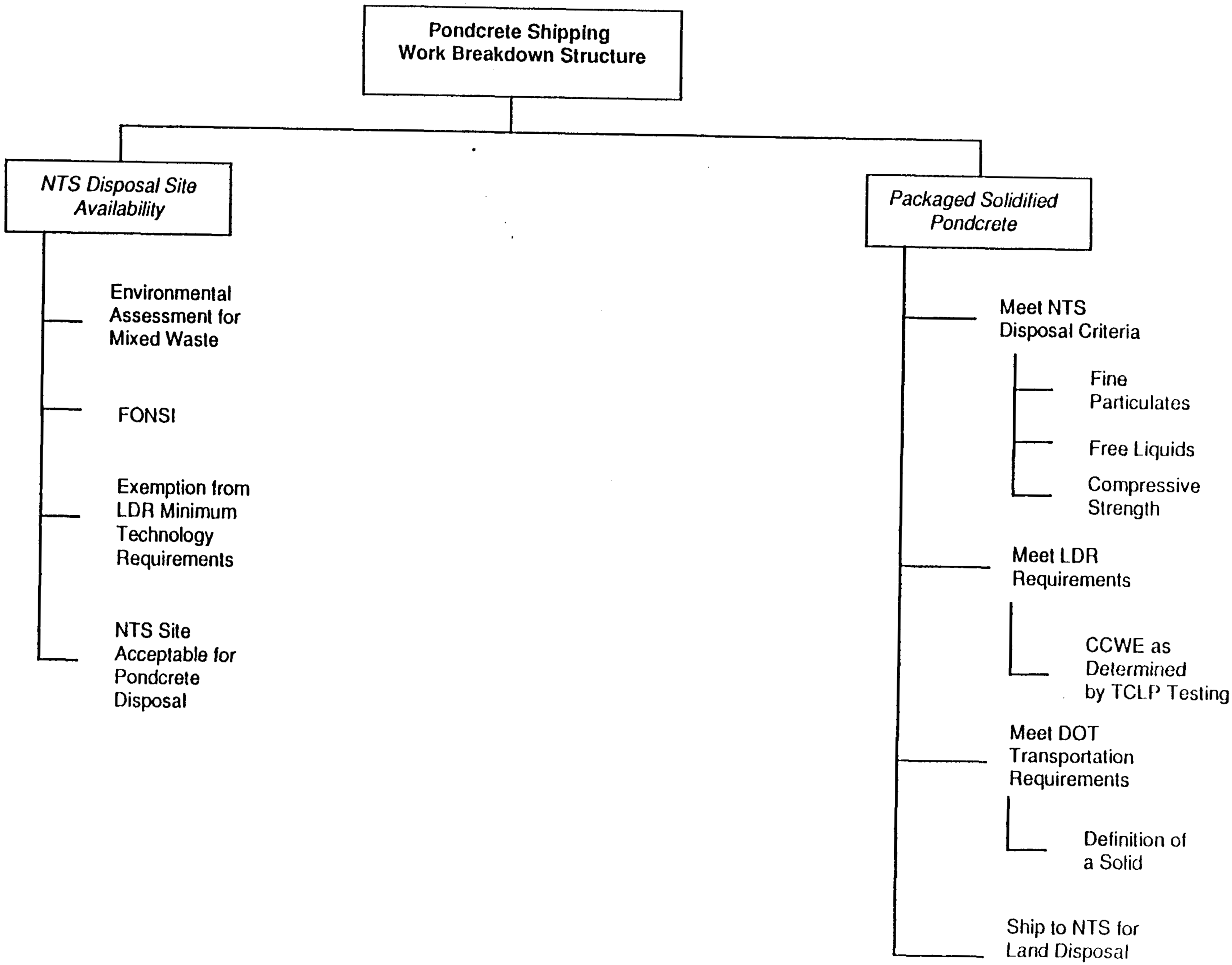

Pondcrete Shipping Work Breakdown Structure
NTS Disposal Site Availability
Environmental Assessment for Mixed Waste
FONSI
Exemption from LDR Minimum Technology Requirements
NTS Site Acceptable for Pondcrete Disposal
Packaged Solidified Pondcrete
Meet NTS Disposal Criteria
Fine Particulates
Free Liquids
Compressive Strength
Meet LDR Requirements
CCWE as Determined by TCLP Testing
Meet DOT Transportation Requirements
Definition of a Solid
Ship to NTS for Land Disposal

FIGURE 6

Solar Pond Cleanout (AIP Project)

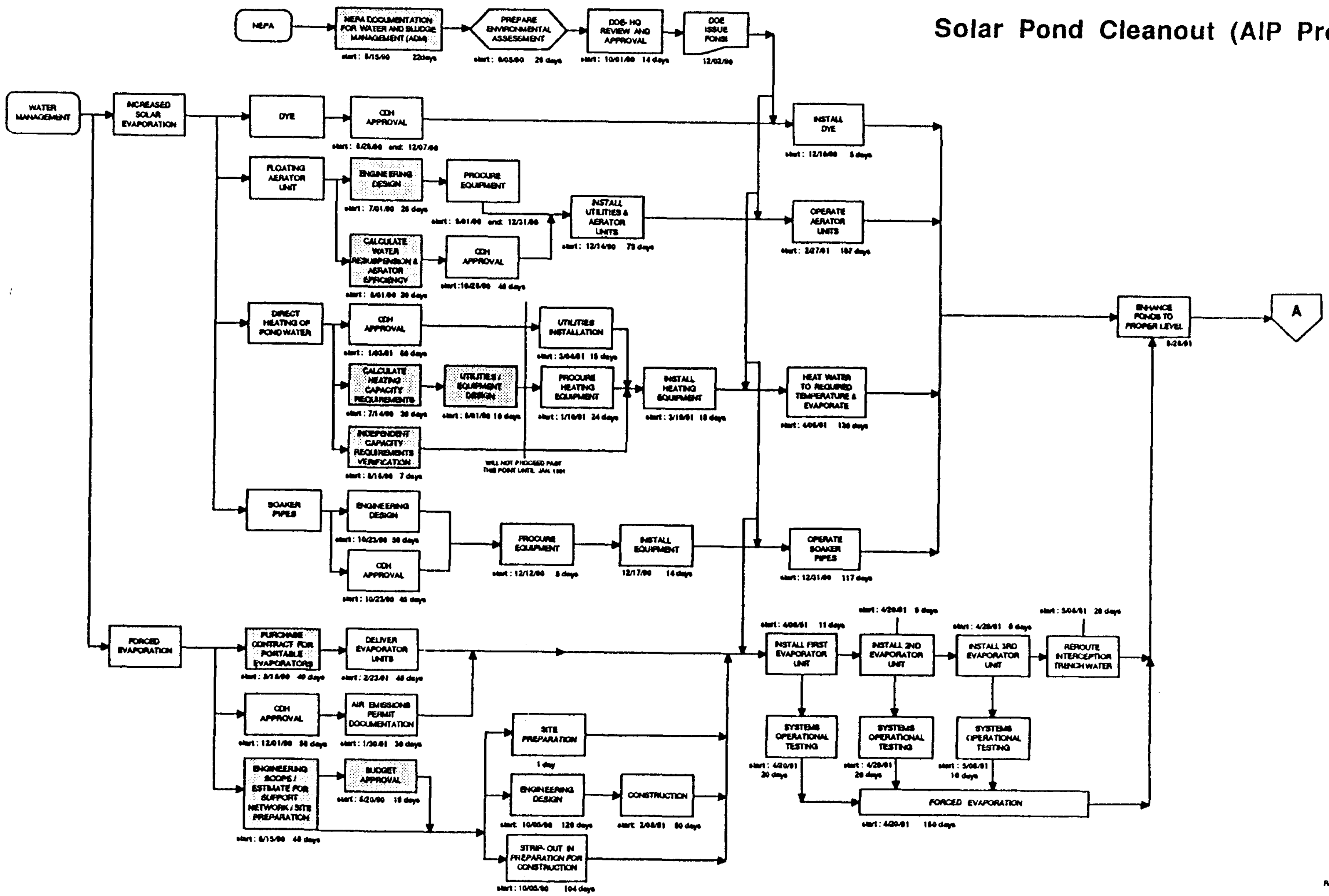


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FIGURE 6

Solar Pond Cleanout (AIP Project)(continued)

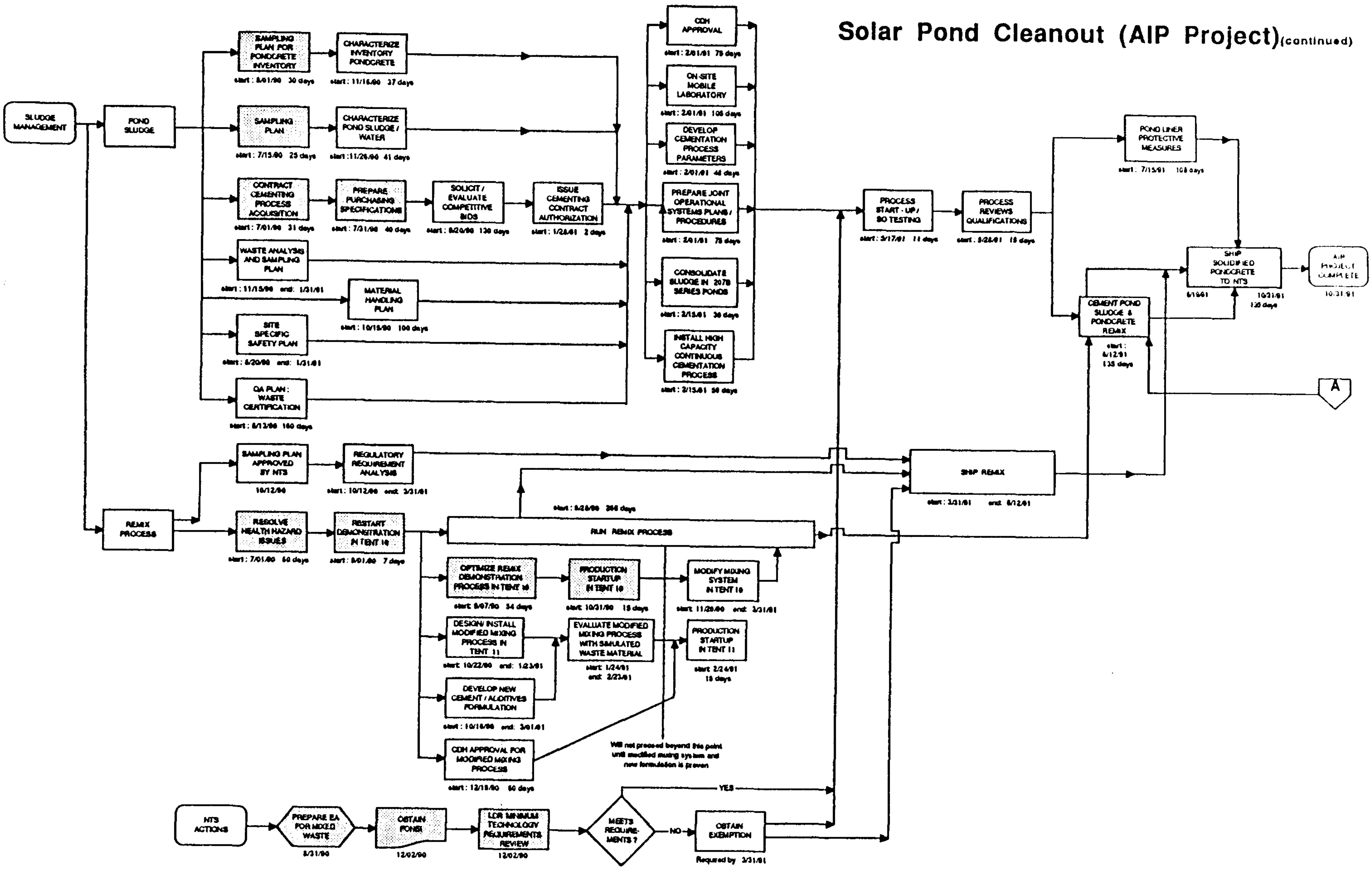


FIGURE 7

FLOW DIAGRAM
PORTABLE EVAPORATORS

TOTAL OF THREE EVAPORATING SYSTEMS IN PARALLEL (SYSTEM CONSISTS OF VC UNIT, MEMS UNIT, FEED TANK, TWO DISTILLATE TANKS, AND CONCENTRATE TANK)

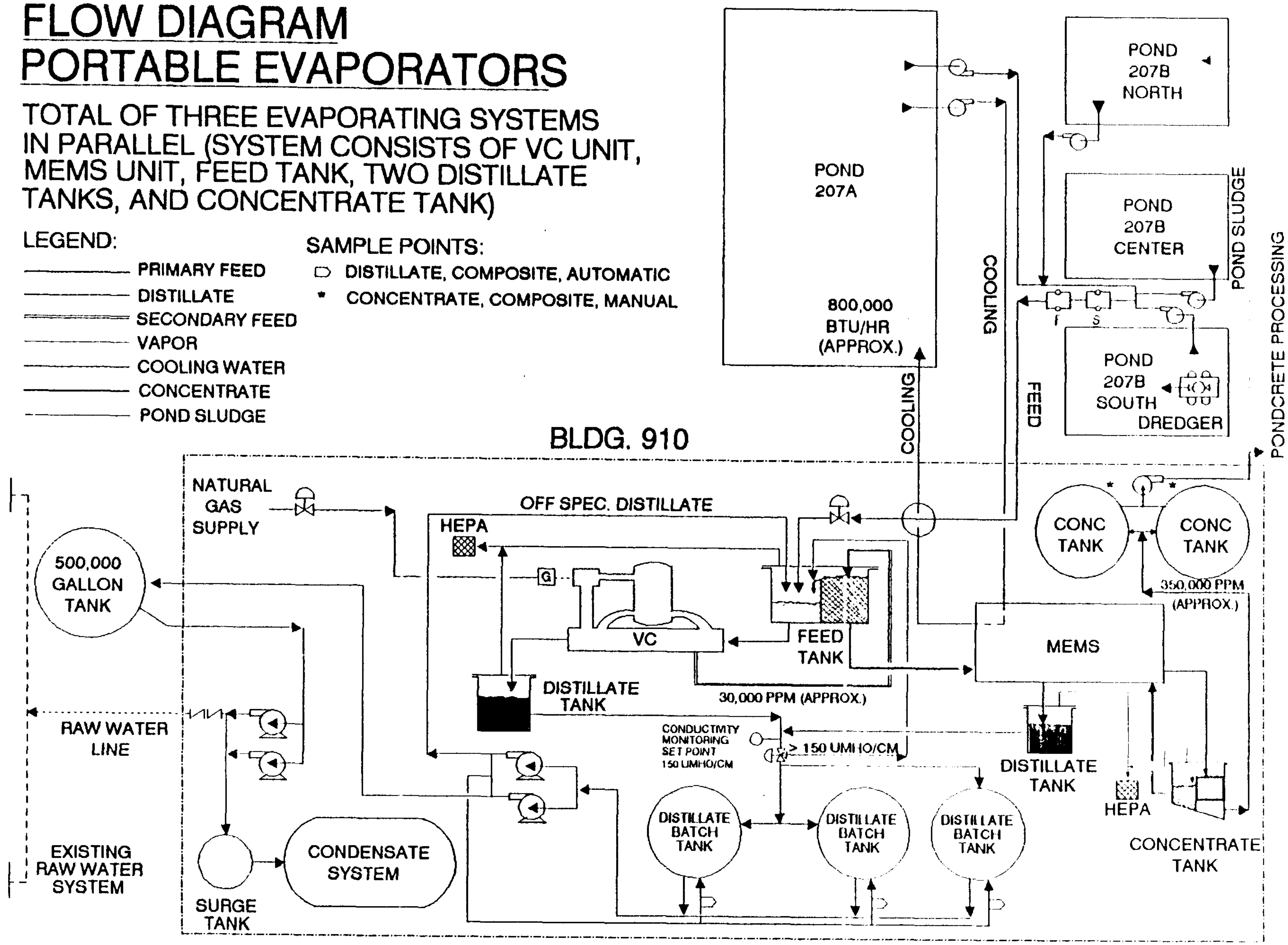


Figure 8

SUMMARY OF PROJECT RISKS

Risk	Level	Basics for Risk Assessment	Implication	Activities Planned to Minimize Risks
1. Schedule	High	• AIP requires accelerated cleanup	• Schedules will be missed. Public/political reaction would further damage plant credibility	• Matrix management approach to coordinate all phases of work
		• Project complexity involves many interdependent, parallel tasks		• Detailed planning to define total project scope
		• Regulatory constraints		• Specific requests for regulatory approvals are being prepared, Environmental Assessment (EA) being pursued on an accelerated schedule
		• Current pondcrete remix process capacity is unsatisfactory		• A high capacity continuous cementing process will be procured
		• Transportation of all solidified waste to NTS		• Accelerate cementing schedule as much as possible to permit waste shipments to start earlier than projected

Figure 8 (Cont.)

Risk	Level	Basics for Risk Assessment	Implication	Activities Planned to Minimize Risks
		• Protection of emptied ponds from sediment and water accumulation		• Accelerate pond cleanout schedule as much as possible to have sufficient time to install the interim protective measures
2. Regulatory Constraints	High	• Changes to Part A Interim status	• Delay operational phases by project	• Obtain all required regulatory approvals on time
		• NEPA requires an EA for pond dewatering, removal, solidification of pond sludge, disposal of pondcrete and other process by-products	• Operational phases of project cannot start until FONSI is obtained	• Accelerated preparation of NEPA documentation
3. NTS disposal site availability	High	• Waste shipments not approved	• AIP milestone specifies shipment of pondcrete	• Respond to NTS audit deficiencies • Adequately characterize waste streams • Verify pondcrete meets all applicable disposal criteria • Coordinate shipping with NTS

Figure 8 (Cont.)

	Risk	Level	Basics for Risk Assessment	Implication	Activities Planned to Minimize Risks
4.	Cost	Moderate	• Preliminary costs estimates significantly exceed presently approved budget	• AIP schedule will not be met	• Negotiate resources to achieve plan
5.	Technical	Moderate	• Cementing process parameters not developed. Cementing process/equipment undefined	• Solidified waste volume may be excessive	• Development and testing will be done to optimize process parameters
			• Distillate water utilization	• Evaporative process may be disrupted and water management delayed	• Coordinate activities with Building 374 evaporator output
			• Material handling plan not developed	• Processing time may cause schedule to be missed	• Contractor will assist in developing plan and provide material handling equipment
			• Quality Assurance plan for remix process inadequate for total project needs	• Certification of pond-crete for shipment will delay required shipping schedule.	• An improved Quality Assurance plan will be developed
			• Site requirements for cemented process undefined	• Delays in process implementation	• Activities are planned to integrate current remix and contractor cementing process

Figure 8 (Cont.)

Risk	Level	Basics for Risk Assessment	Implication	Activities Planned to Minimize Risks
		• Low hazard rating for portable evaporators must be approved by Safety Analysis	• Will not be able to use Building 910 and QAL III equipment and installation requirements	• Obtain low hazard rating for evaporation process

FIGURE 9

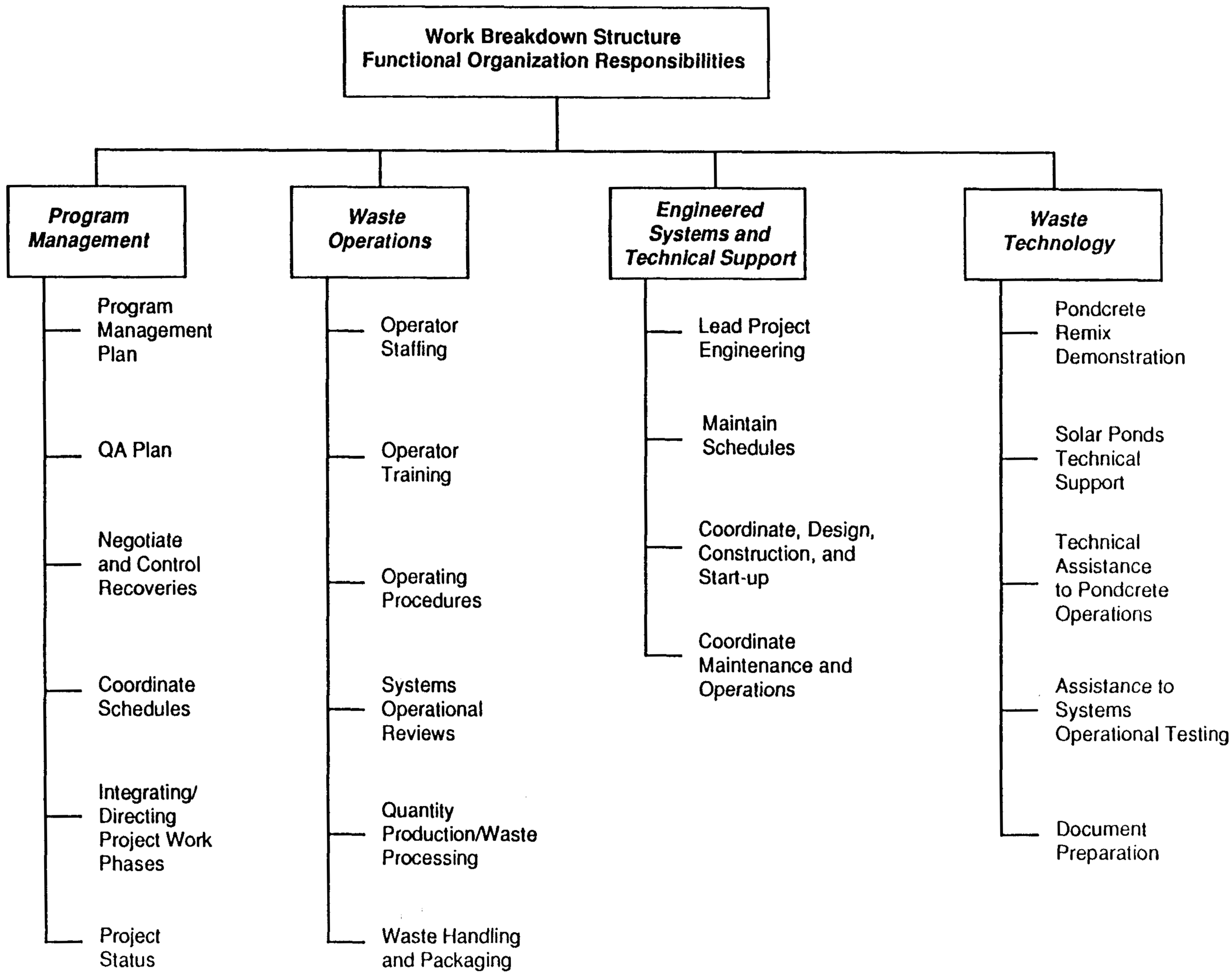

Work Breakdown Structure
Functional Organization Responsibilities
Program Management
Program Management Plan
QA Plan
Negotiate and Control Recoveries
Coordinate Schedules
Integrating/ Directing Project Work Phases
Project Status
Waste Operations
Operator Staffing
Operator Training
Operating Procedures
Systems Operational Reviews
Quantity Production/Waste Processing
Waste Handling and Packaging
Engineered Systems and Technical Support
Lead Project Engineering
Maintain Schedules
Coordinate, Design, Construction, and Start-up
Coordinate Maintenance and Operations
Waste Technology
Pondcrete Remix Demonstration
Solar Ponds Technical Support
Technical Assistance to Pondcrete Operations
Assistance to Systems Operational Testing
Document Preparation

FIGURE 9
(Cont)

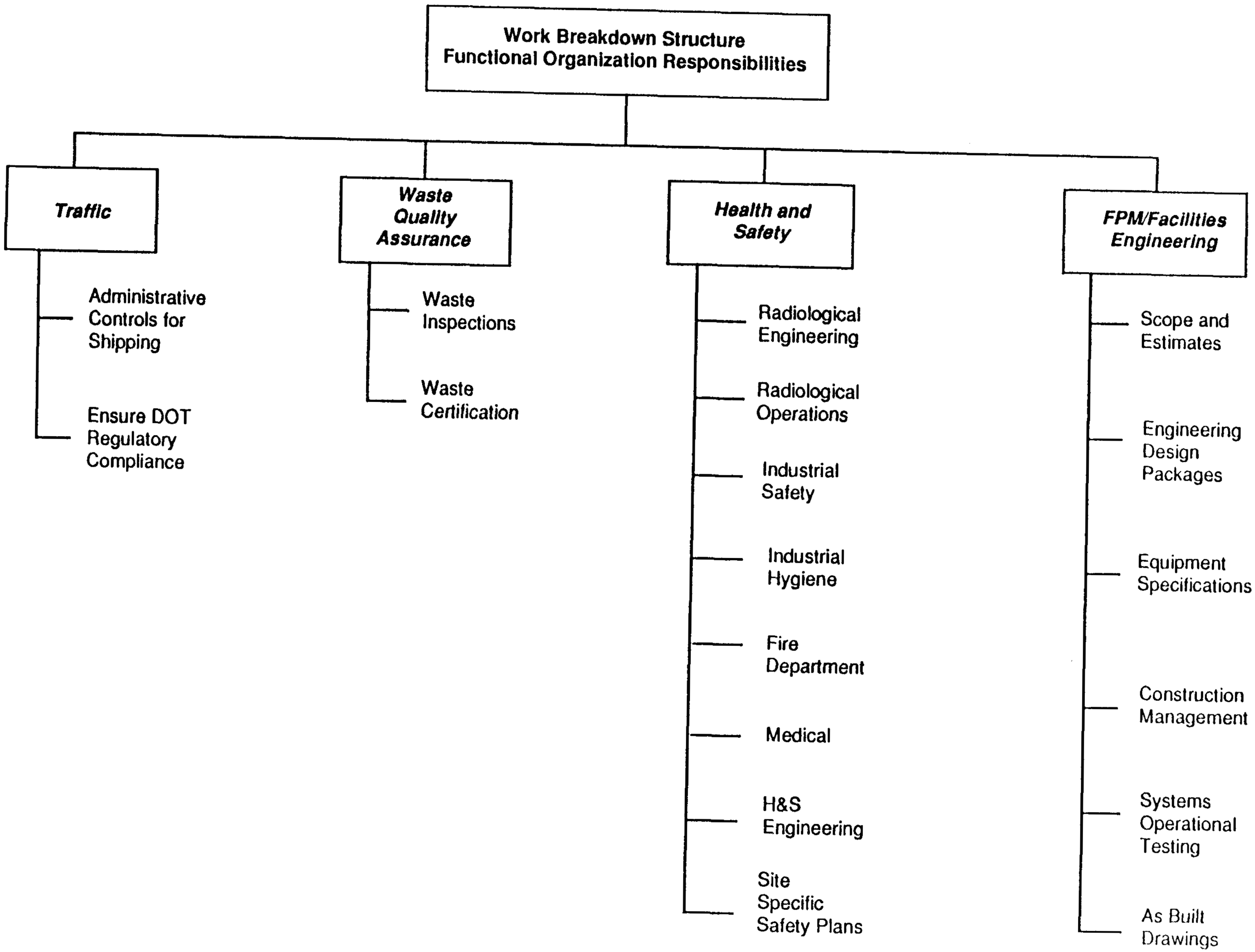


FIGURE 9
(Cont)

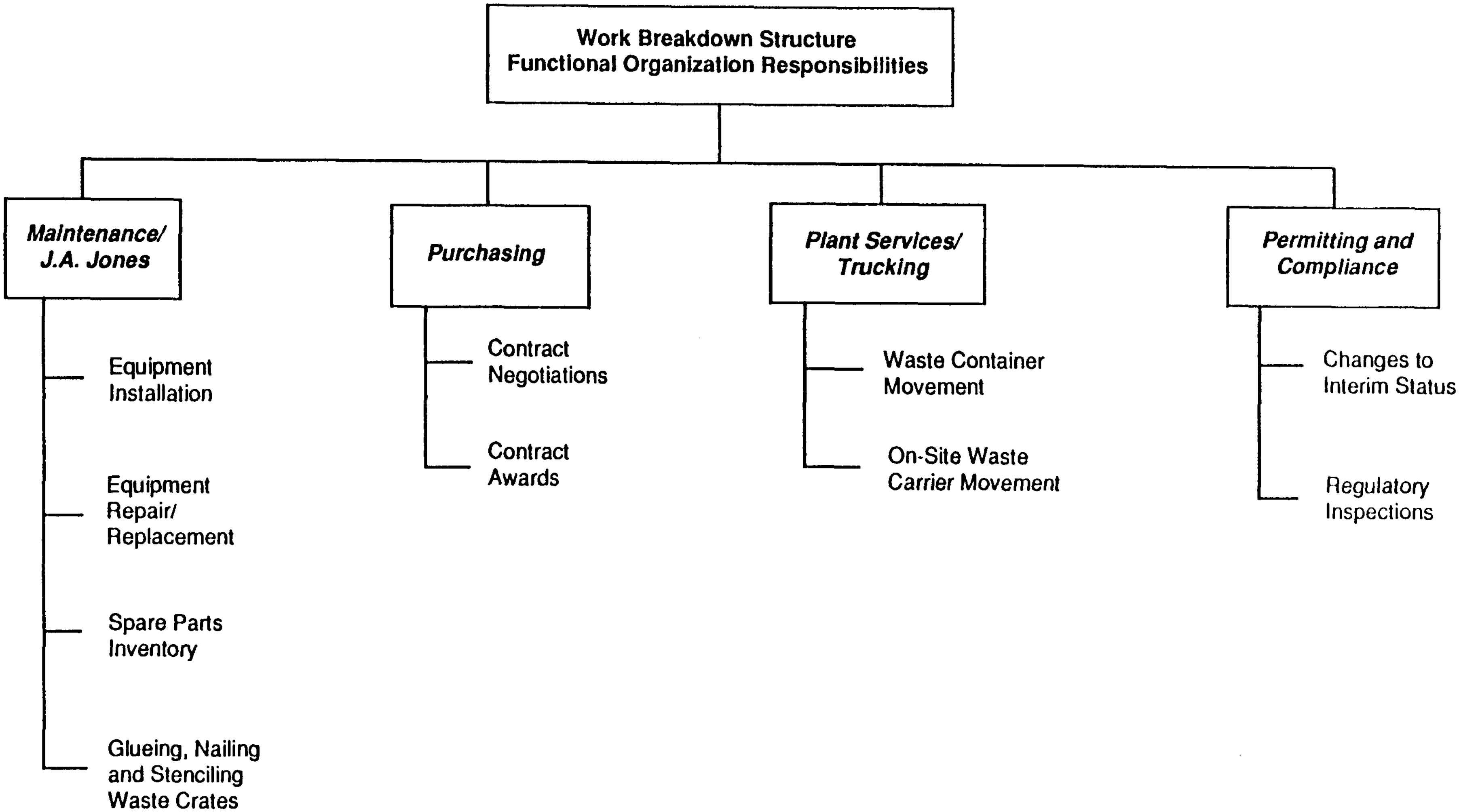


Figure 10

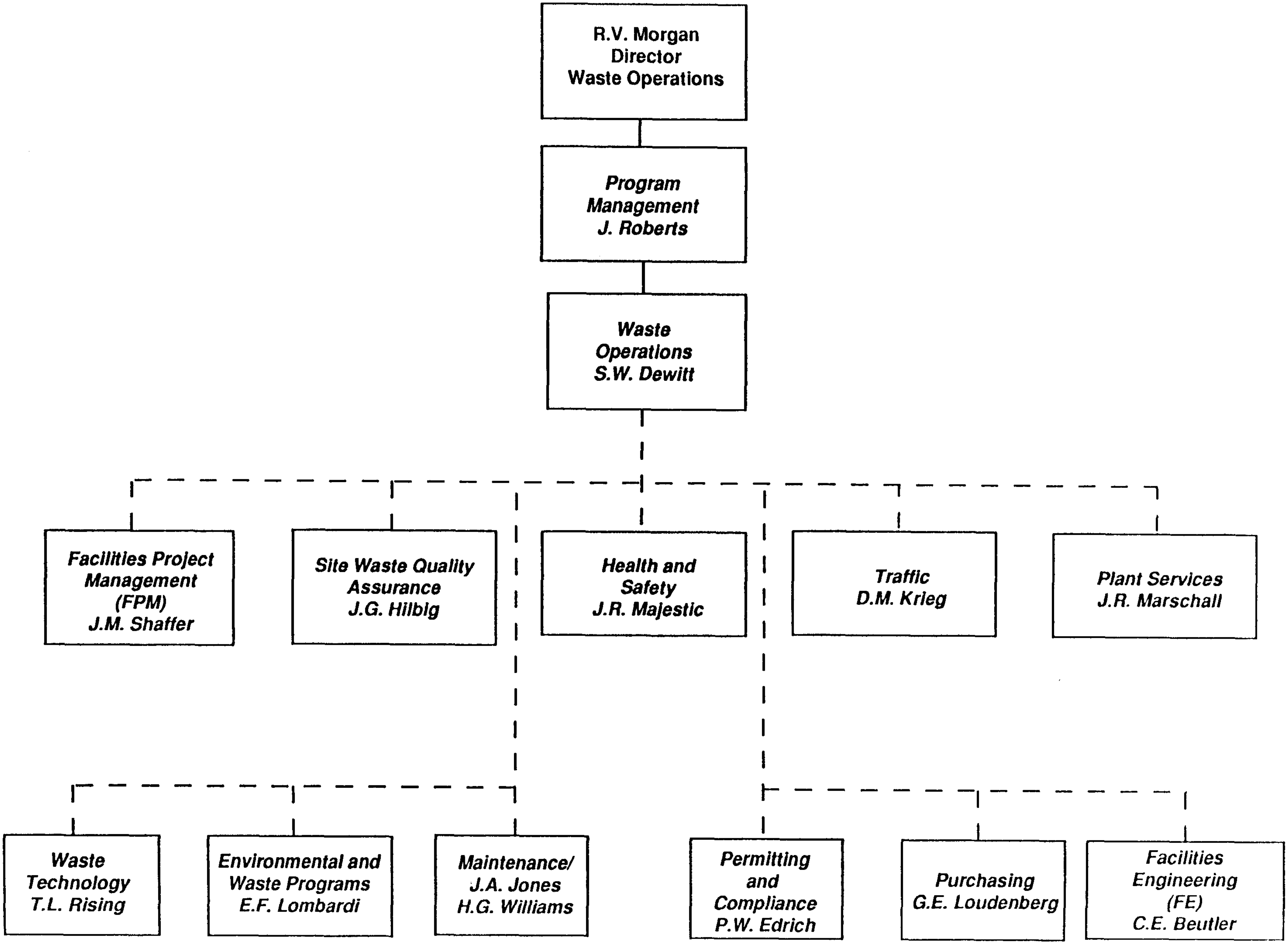
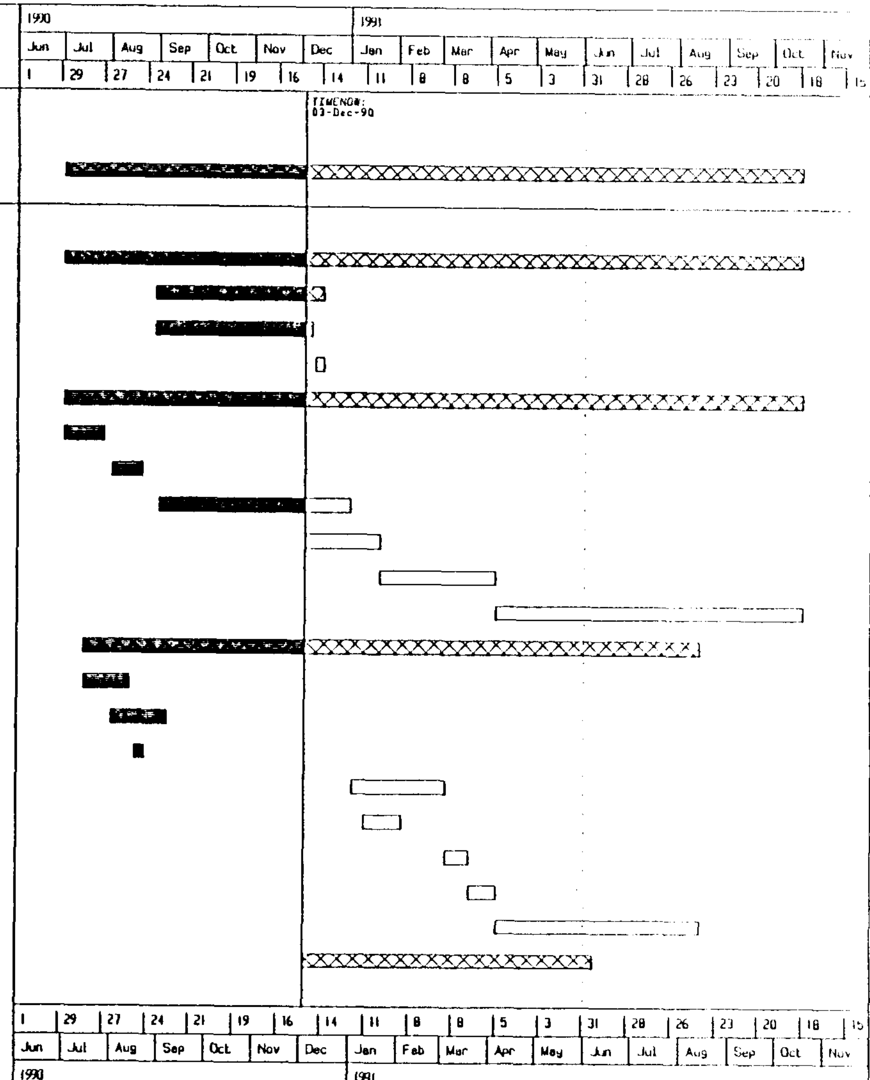

R.V. Morgan Director Waste Operations
Program Management J. Roberts
Waste Operations S.W. Dewitt
Facilities Project Management (FPM) J.M. Shaffer
Site Waste Quality Assurance J.G. Hilbig
Health and Safety J.R. Majestic
Traffic D.M. Krieg
Plant Services J.R. Marschall
Waste Technology T.L. Rising
Environmental and Waste Programs E.F. Lombardi
Maintenance/ J.A. Jones H.G. Williams
Permitting and Compliance P.W. Edrich
Purchasing G.E. Loudenberg
Facilities Engineering (FE) C.E. Beutler

FIGURE 11

Rocky Flats Plant – Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
		03. WATER MANAGEMENT			
15	HI258AI001	WATER MANAGEMENT	01-Jul-1990	18-Oct-1991	475 DAYS
		04. INCREASED SOLAR EVAPORATION			
16	HI258AI002	INCREASED SOLAR EVAPORATION	01-Jul-1990	18-Oct-1991	475 DAYS
17	HI258AI003	DYE	29-Aug-1990	14-Dec-1990	108 DAYS
18	WI258AI004	CDH APPROVAL	29-Aug-1990	07-Dec-1990	101 DAYS
19	WI258AI005	ADD SOLAR DYE TO PONDS	10-Dec-1990	14-Dec-1990	5 DAYS
20	HI258AI006	FLOATING AERATOR UNIT	01-Jul-1990	18-Oct-1991	475 DAYS
21	WI258AI007	ENGINEERING DESIGNS AERATOR UNIT	01-Jul-1990	26-Jul-1990	26 DAYS
22	WI258AI009	CALCULATE WATER RESUSPENSION & AERATOR EFFICIENCY	01-Aug-1990	20-Aug-1990	20 DAYS
23	WI258AI008	PROCURE AERATOR EQUIPMENT	01-Sep-1990	31-Dec-1990	122 DAYS
24	WI258AI010	CDH APPROVAL	03-Dec-1990	19-Jan-1991	48 DAYS
25	WI258AI011	INSTALL UTILITIES AND AERATOR UNITS	20-Jan-1991	04-Apr-1991	75 DAYS
26	WI258AI077	OPERATE AERATOR UNITS	05-Apr-1991	18-Oct-1991	197 DAYS
27	HI258AI012	DIRECT HEATING OF POND WATER	14-Jul-1990	13-Aug-1991	365 DAYS
28	WI258AI015	CALCULATE HEATING CAPACITY REQUIREMENTS	14-Jul-1990	12-Aug-1990	30 DAYS
29	WI258AI041	UTILITY/EQUIPMENT DESIGN	01-Aug-1990	05-Sep-1990	36 DAYS
30	WI258AI019	INDEPENDENT CAPACITY REQUIREMENTS VERIFICATION	16-Aug-1990	22-Aug-1990	7 DAYS
31	WI258AI013	CDH APPROVAL	03-Jan-1991	03-Mar-1991	60 DAYS
32	WI258AI016	PROCURE POND WATER HEATING EQUIPMENT	10-Jan-1991	02-Feb-1991	24 DAYS
33	WI258AI014	UTILITIES INSTALLATION	04-Mar-1991	18-Mar-1991	15 DAYS
34	WI258AI017	INSTALL POND WATER HEATING EQUIPMENT	19-Mar-1991	05-Apr-1991	18 DAYS
35	WI258AI018	DIRECT HEATING OF POND WATER	06-Apr-1991	13-Aug-1991	130 DAYS
36	HI258AI020	SOAKER PIPES	03-Dec-1990	06-Jun-1991	186 DAYS



PROGRESS
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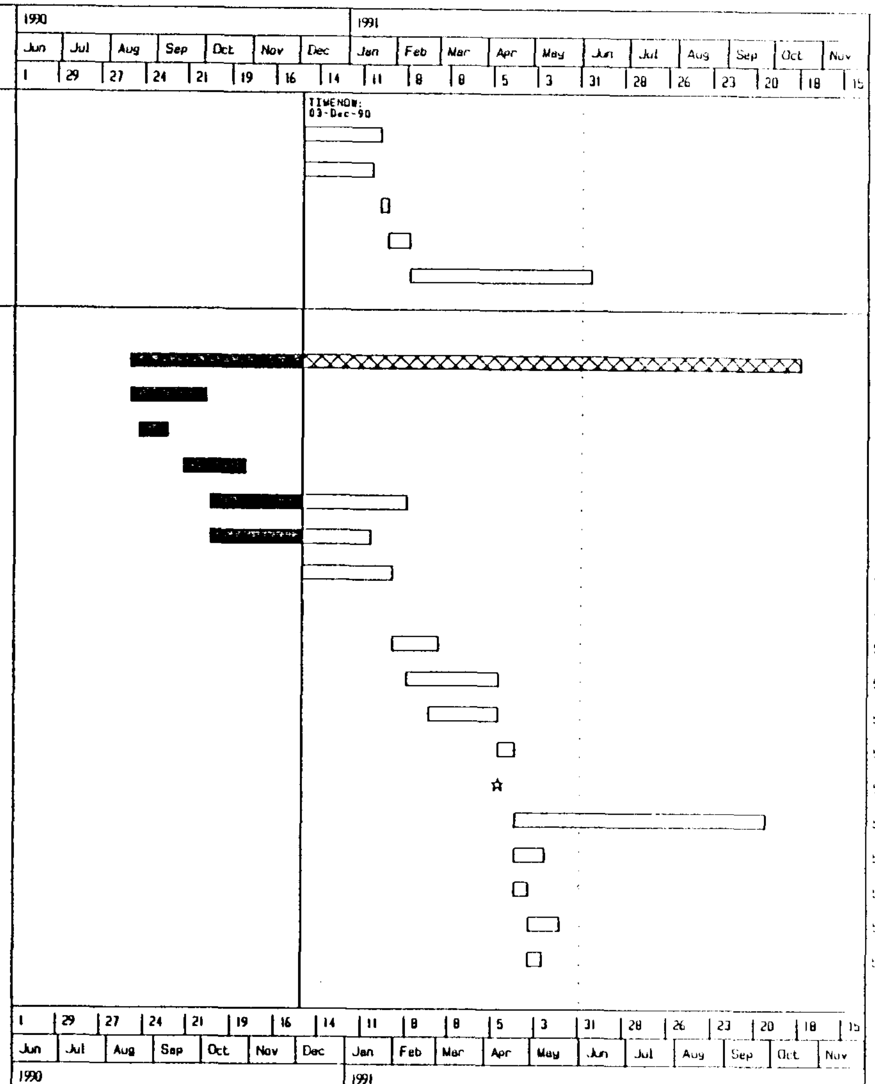
FIGURE 11

Rocky Flats Plant – Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
37	W1258A1021	ENGINEERING DESIGN	03-Dec-1990	21-Jan-1991	50 DAYS
38	W1258A1024	CDH APPROVAL	03-Dec-1990	16-Jan-1991	45 DAYS
39	W1258A1022	PROCURE SOAKER PIPE EQUIPMENT	22-Jan-1991	26-Jan-1991	5 DAYS
40	W1258A1023	INSTALL SOAKER PIPE EQUIPMENT	27-Jan-1991	09-Feb-1991	14 DAYS
41	W1258A1076	OPERATE SOAKER PIPES	10-Feb-1991	06-Jun-1991	117 DAYS
		05. FORCED EVAPORATION			
42	H1258A1026	FORCED EVAPORATION	15-Aug-1990	18-Oct-1991	430 DAYS
43	W1258A1037	ENGINEERING SCOPE/ESTIMATE FOR SUPPORT NETWORK/SIT	15-Aug-1990	02-Oct-1990	49 DAYS
44	W1258A1038	BUDGET APPROVAL	20-Aug-1990	07-Sep-1990	19 DAYS
45	W1258A1027	PURCHASE PORTABLE EVAPORATORS	18-Sep-1990	27-Oct-1990	40 DAYS
46	W1258A1039	ENGINEERING DESIGN OF FORCED EVAPORATORS	05-Oct-1990	07-Feb-1991	126 DAYS
47	W1258A1029	STRIP-OUT IN PREPARATION FOR CONSTRUCTION	05-Oct-1990	15-Jan-1991	103 DAYS
48	W1258A1035	CDH APPROVAL	03-Dec-1990	29-Jan-1991	58 DAYS
49	W1258A108P	SITE PREPARTATION	03-Dec-1990	03-Dec-1990	1 DAYS
50	W1258A1036	AIR EMISSIONS PERMIT DOCUMENTATION	30-Jan-1991	28-Feb-1991	30 DAYS
51	W1258A1080	CONSTRUCTION	08-Feb-1991	08-Apr-1991	60 DAYS
52	W1258A1028	DELIVER EVAPORATOR UNITS	23-Feb-1991	08-Apr-1991	45 DAYS
53	W1258A1030	INSTALL FIRST EVAPORATOR UNIT	09-Apr-1991	19-Apr-1991	11 DAYS
54	M1258A1083	BEG. INSTALL FORCED EVAPORATOR UNITS	09-Apr-1991		0 DAYS
55	W1258A1031	FORCED EVAPORATION OF PONDS	20-Apr-1991	26-Sep-1991	160 DAYS
56	W1258A1089	#1 SYSTEM OPERATIONS TESTING	20-Apr-1991	09-May-1991	20 DAYS
57	W1258A1032	INSTALL 2ND EVAPORATOR UNIT	20-Apr-1991	28-Apr-1991	9 DAYS
58	W1258A1090	#2 SYSTEM OPERATIONS TESTING	29-Apr-1991	18-May-1991	20 DAYS
59	W1258A1033	INSTALL 3RD EVAPORATOR UNIT	29-Apr-1991	07-May-1991	9 DAYS



PROGRESS
HAMMOCK
ACTIVITY BAR
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CMPT. MILESTONE

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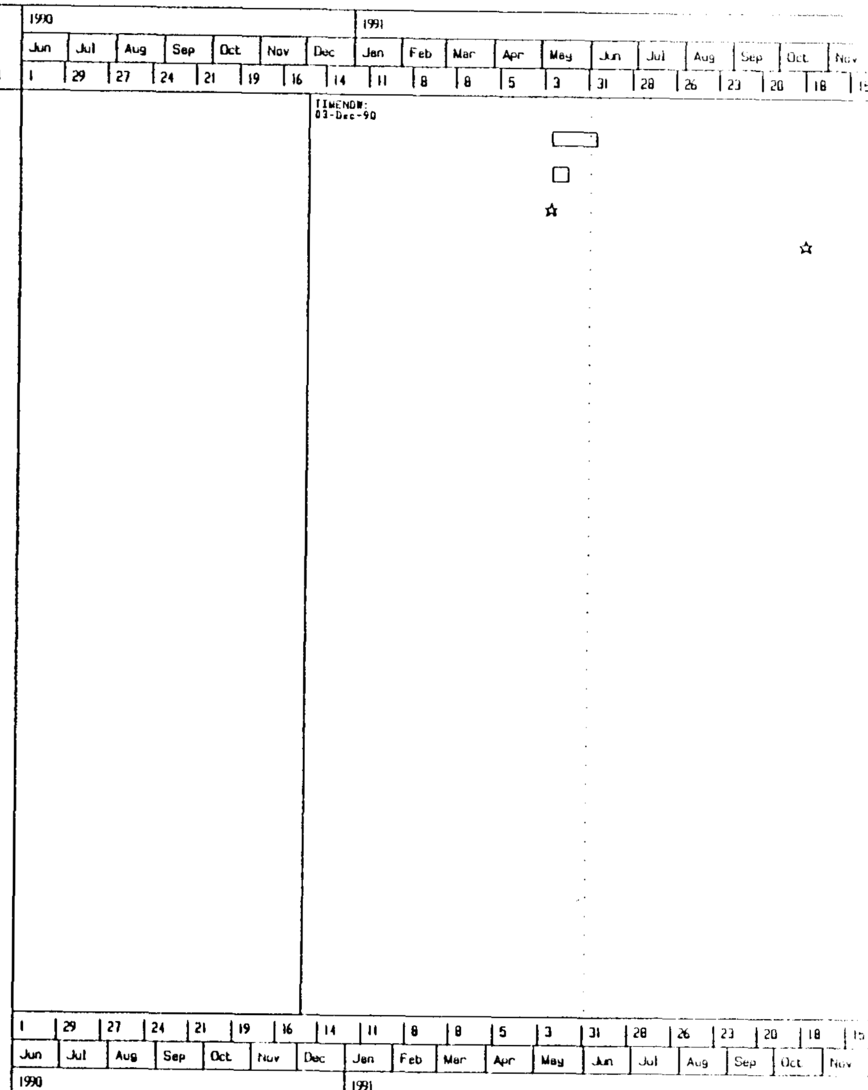
FIGURE 11

Rocky Flats Plant - Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
60	W1258A1034	REROUTE INTERCEPTOR TRENCH WATER	08-May-1991	04-Jun-1991	28 DAYS
61	W1258A1091	#3 SYSTEM OPERATIONS TESTING	08-May-1991	17-May-1991	10 DAYS
62	M1258A10BH	FORCED EVAP. UNITS INSTALL COMPLETE		07-May-1991	0 DAYS
63	M1258A1040	ENHANCE PONDS TO PROPER LEVEL		18-Oct-1991	0 DAYS



PROGRESS
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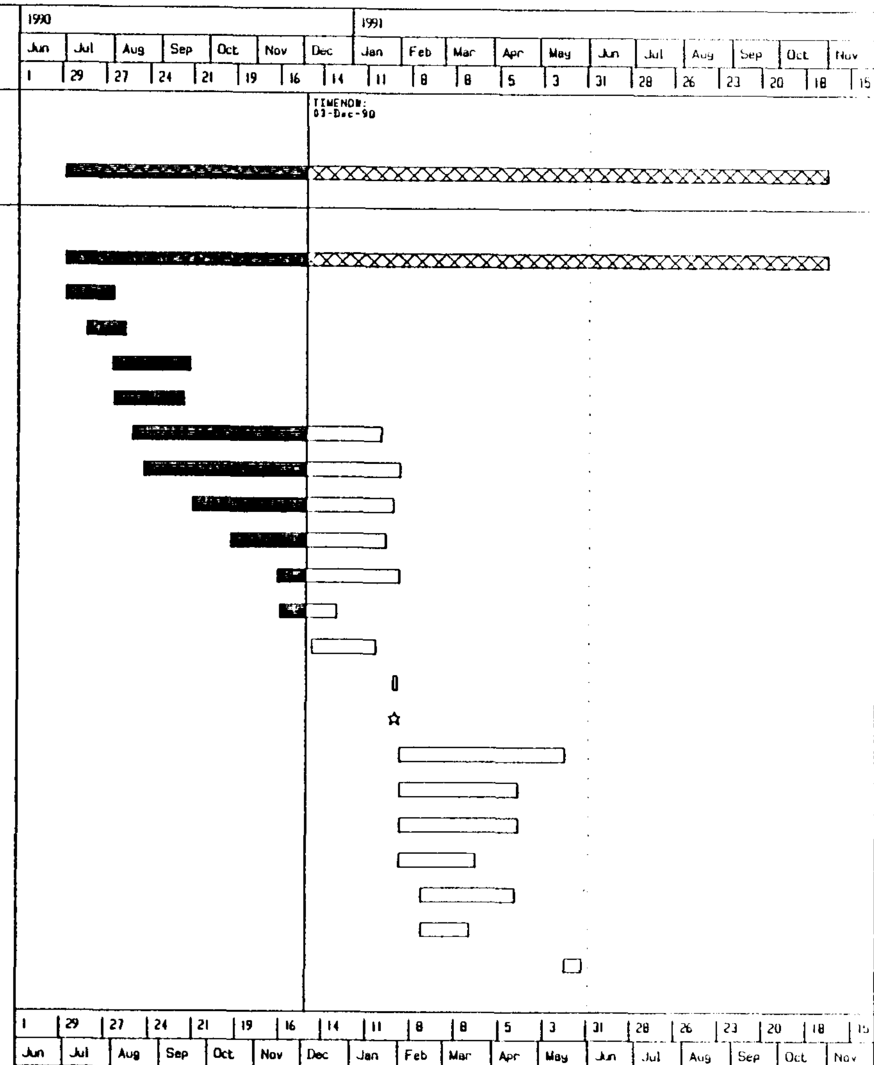
FIGURE 12

Rocky Flats Plant – Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
		06. SLUDGE MANAGEMENT			
64	H1258A1042	SLUDGE MANAGEMENT	01-Jul-1990	31-Oct-1991	488 DAYS
		07. POND SLUDGE			
65	H1258A1043	POND SLUDGE	01-Jul-1990	31-Oct-1991	488 DAYS
66	W1258A1046	CONTRACT CEMENTING PROCESS ACQUISITION	01-Jul-1990	31-Jul-1990	31 DAYS
67	W1258A1044	SAMPLING PLAN	15-Jul-1990	08-Aug-1990	25 DAYS
68	W1258A1047	PREPARE PURCHASING SPECIFICATIONS	31-Jul-1990	18-Sep-1990	50 DAYS
69	W1258A1093	SAMPLING PLAN FOR PONDCRETE INVENTORY	01-Aug-1990	14-Sep-1990	45 DAYS
70	W1258A1053	QA PLAN: WASTE CERTIFICATION	13-Aug-1990	19-Jan-1991	160 DAYS
71	W1258A1052	SITE SPECIFIC PLAN	20-Aug-1990	31-Jan-1991	165 DAYS
72	W1258A1048	SOLICIT/EVALUATE COMPETITIVE BIDS	20-Sep-1990	27-Jan-1991	130 DAYS
73	W1258A1095	MATERIAL HANDLING PLAN	15-Oct-1990	22-Jan-1991	100 DAYS
74	W1258A1096	WASTE ANALYSIS & SAMPLING PLAN	15-Nov-1990	31-Jan-1991	78 DAYS
75	W1258A1094	CHARACTERIZE PONDCRETE INVENTORY	16-Nov-1990	22-Dec-1990	37 DAYS
76	W1258A1045	CHARACTERIZE POND SLUDGE/WATER	07-Dec-1990	16-Jan-1991	41 DAYS
77	W1258A1049	ISSUE CEMENTING CONTRACT AUTHORIZATION	28-Jan-1991	29-Jan-1991	2 DAYS
78	M1258A1084	ISSUE CEMENTING CONTRACT AUTHORIZATION		29-Jan-1991	0 DAYS
79	W1258A1079	ON-SITE MOBILE LABORATORY	01-Feb-1991	16-May-1991	105 DAYS
80	W1258A1080	PREP JOINT OPERATIONAL SYSTEMS PLANS/PROCEDURES	01-Feb-1991	16-Apr-1991	75 DAYS
81	W1258A1092	CDH APPROVAL OF SLUDGE SOLIDIFICATION PROCESS	01-Feb-1991	16-Apr-1991	75 DAYS
82	W1258A1054	DEVELOP CEMENTATION PROCESS PARAMETERS	01-Feb-1991	20-Mar-1991	48 DAYS
83	W1258A1055	INSTALL HIGH CAPACITY CONTINUOUS CEMENTATION PROCE	15-Feb-1991	14-Apr-1991	59 DAYS
84	W1258A1081	CONSOLIDATE SLUDGE IN PONDS 207B SERIES PONDS	15-Feb-1991	16-Mar-1991	30 DAYS
85	W1258A1056	PROCESS START-UP/S-O TESTING	17-May-1991	27-May-1991	11 DAYS



PROGRESS
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FIGURE 12

Rocky Flats Plant – Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
86	MI258AI085	BEGIN PROCESS START-UP/TESTING	17-May-1991		0 DAYS
87	WI258AI078	PROCESS REVIEWS QUALIFICATIONS	28-May-1991	11-Jun-1991	15 DAYS
88	WI258AI058	CEMENT POND SLUDGE & PONDCRETE REMIX	12-Jun-1991	24-Oct-1991	135 DAYS
89	MI258AI086	BEG. CEMENT POND SLUDGE & PONDCRETE REMIX	12-Jun-1991		0 DAYS
90	MI258AI08G	CEMENTATION PROCESS DEVELOPMENT COMPLETE		11-Jun-1991	0 DAYS
91	WI258AI059	SHIP SOLIDIFIED PONDCRETE TO NTS	19-Jun-1991	31-Oct-1991	135 DAYS
92	MI258AI060	AIP PONDCRETE COMPLETE		31-Oct-1991	0 DAYS
		08. REMIX PROCESS			
93	HI258AI061	REMIX PROCESS	01-Jul-1990	20-Jun-1991	355 DAYS
94	WI258AI062	RESOLVE HEALTH HAZARD ISSUES	01-Jul-1990	29-Aug-1990	60 DAYS
95	WI258AI063	RESTART REMIX DEMONSTRATION IN TENT 10	01-Sep-1990	08-Sep-1990	8 DAYS
96	WI258AI064	OPTIMIZE DEMONSTRATION PROCESS IN TENT 10	07-Sep-1990	30-Oct-1990	54 DAYS
97	WI258AI067	RUN REMIX PROCESS	28-Sep-1990	20-Jun-1991	266 DAYS
98	WI258AI099	COMPLETE REGULATORY REQUIREMENT ANALYSIS	12-Oct-1990	01-Mar-1991	141 DAYS
99	WI258AI066	DEVELOP NEW CEMENT/ADDITIVES FORMULATION	16-Oct-1990	01-Mar-1991	137 DAYS
100	WI258AI065	DESIGN/INSTALL OPTIMIZED PROCESS IN TENT 11	22-Oct-1990	23-Jan-1991	94 DAYS
101	WI258AI08B	PRODUCTION START-UP IN TENT 10	31-Oct-1990	14-Nov-1990	15 DAYS
102	MI258AI08L	PRODUCTION STARTUP IN TENT #10	31-Oct-1990		0 DAYS
103	WI258AI08C	MODIFY MIXING SYSTEM IN TENT 10	20-Nov-1990	31-Mar-1991	132 DAYS
104	WI258AI08A	CDH APPROVAL FOR MODIFIED MIXING PROCESS	15-Dec-1990	12-Feb-1991	60 DAYS
105	WI258AI08D	EVAL MOD MIXING PROCESS W/SIMULATED WASTE	02-Mar-1991	12-Mar-1991	11 DAYS
106	WI258AI08E	PRODUCTION START-UP IN TENT 11	13-Mar-1991	27-Mar-1991	15 DAYS
107	MI258AI08M	PRODUCTION STARTUP IN TENT #11	13-Mar-1991		0 DAYS
108	WI258AI098	SHIP REMIX	31-Mar-1991	12-Jun-1991	74 DAYS

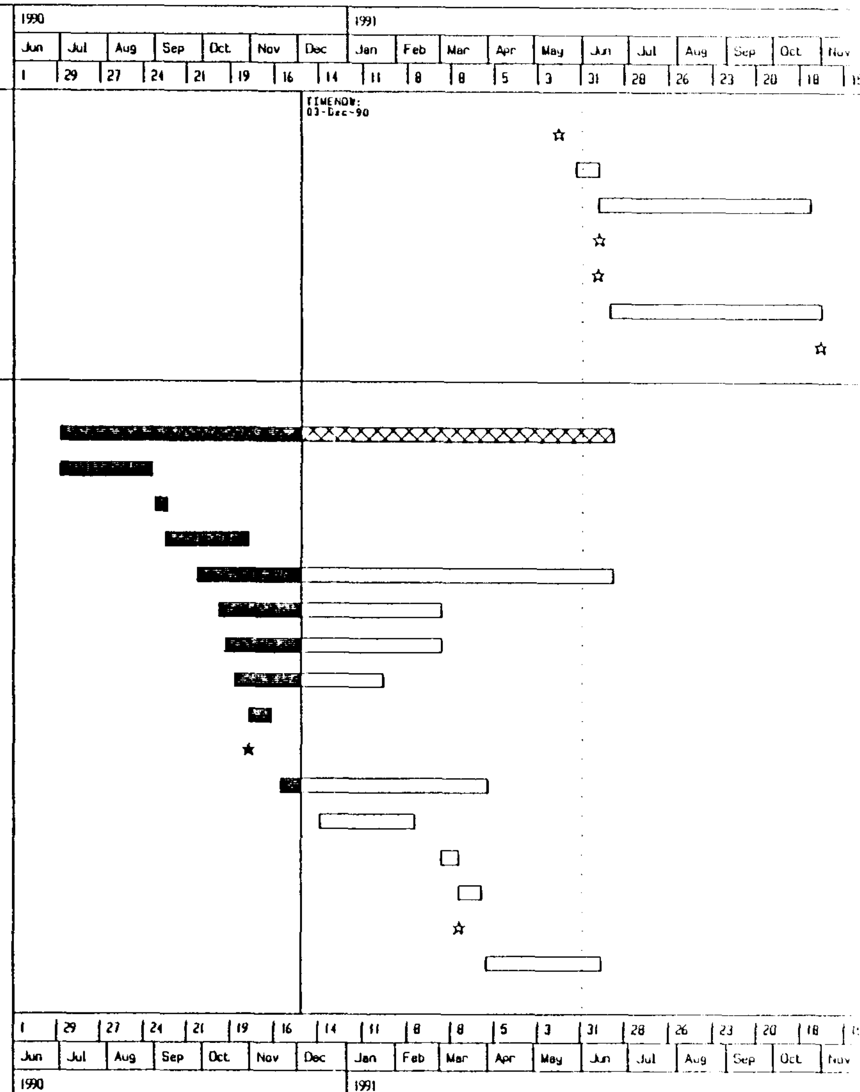

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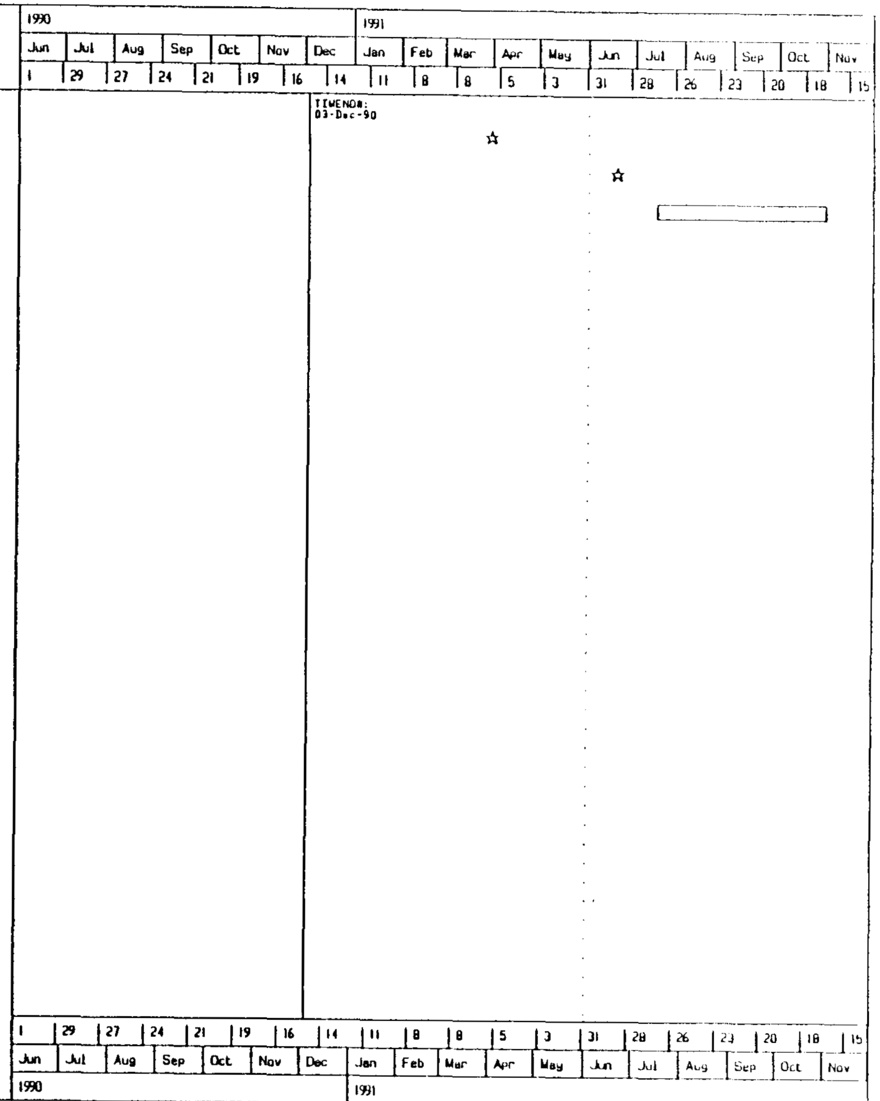
FIGURE 12

Rocky Flats Plant - Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
109	M1258A1087	BEGIN SHIP REMIX TO NTS	31-Mar-1991		0 DAYS
110	M1258A10BK	BEGIN SHIPMENT OF SOLIDIFIED PONDCRETE TO NTS	19-Jun-1991		0 DAYS
111	W1258A10BJ	POND LINER PROTECTIVE MEASURES	15-Jul-1991	30-Oct-1991	108 DAYS



PROGRESS
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FIGURE 13

Rocky Flats Plant – Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT)

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DURATION
1	HI258A1000	SOLAR POND CLEANOUT (AIP PROJECT)	01-Jul-1990	31-Oct-1991	488 DAYS
	01. NEPA				
2	HI258A1050	NEPA	15-Aug-1990	02-Dec-1990	110 DAYS
3	WI258A1051	NEPA DOC FOR WATER & SLUDGE MANAGEMENT (ADM)	15-Aug-1990	05-Sep-1990	22 DAYS
4	WI258A1025	PREPARE ENVIRONMENTAL ASSESSMENT	05-Sep-1990	30-Sep-1990	26 DAYS
5	MI258A1082	SOLAR POND EA COMPLETE		30-Sep-1990	0 DAYS
6	MI258A1081	RFO APPROVE & FORWARD DRAFT EA TO DOE-HQ		30-Sep-1990	0 DAYS
7	WI258A1072	DOE - HQ REVIEW & APPROVAL	01-Oct-1990	14-Oct-1990	14 DAYS
8	MI258A1075	DOE ISSUE FONSI & PROCEED W/PROJECT		02-Dec-1990	0 DAYS
	02. NTS ACTIONS				
9	HI258A1068	NTS ACTIONS	31-Aug-1990	30-Mar-1991	94 DAYS
10	MI258A1069	NTS - PREPARE EA FOR MIXED WASTE		31-Aug-1990	0 DAYS
11	MI258A1097	SAMPLING PLAN APPROVED BY NTS		11-Oct-1990	0 DAYS
12	MI258A1070	NTS - OBTAIN PONDCRETE FONSI		01-Dec-1990	0 DAYS
13	MI258A1071	NTS - LDR MINIMUM TECHNOLOGY REQUIREMENTS REVIEW		01-Dec-1990	0 DAYS
14	MI258A1073	OBTAIN MIN. TECH. REQUIREMENTS WAIVER		30-Mar-1991	0 DAYS

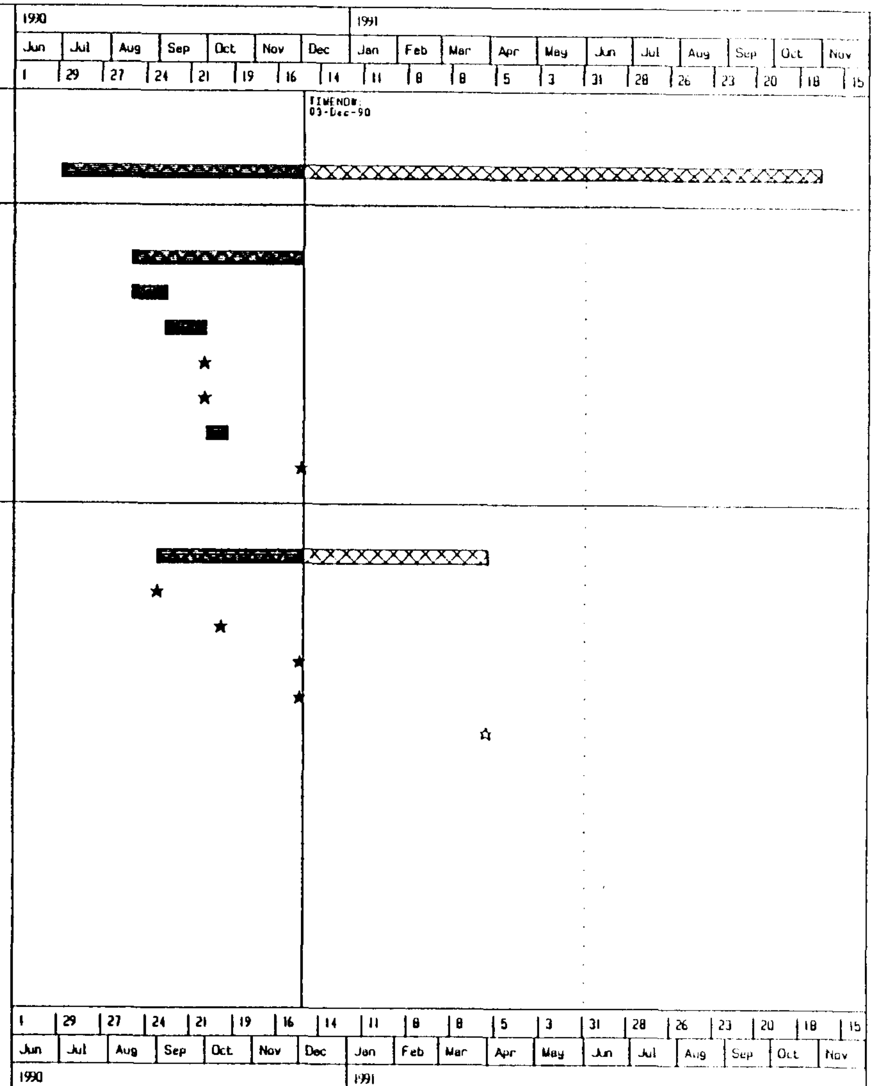

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FIGURE 14

Rocky Flats Plant – Summary Master Plan
SOLAR POND CLEANOUT (AIP PROJECT) – Key Milestones

	ACT. NUM	ACTIVITY DESCRIPTION	START	FINISH	DUR
1	M1258A1069	NTS - PREPARE EA FOR MIXED WASTE	31-Aug-90	31-Aug-90	
2	M1258A1082	SOLAR POND EA COMPLETE	30-Sep-90	30-Sep-90	
3	M1258A10BI	RFO APPROVE & FORWARD DRAFT EA TO DOE-HQ	30-Sep-90	30-Sep-90	
4	M1258A1097	SAMPLING PLAN APPROVED BY NTS	11-Oct-90	11-Oct-90	
5	M1258A10BL	PRODUCTION STARTUP IN TENT #10	31-Oct-90	31-Oct-90	
6	M1258A1070	NTS - OBTAIN PONDCRETE FONSI	01-Dec-90	01-Dec-90	
7	M1258A1071	NTS - LDR MINIMUM TECHNOLOGY REQUIREMENTS REVIEW	01-Dec-90	01-Dec-90	
8	M1258A1075	DOE ISSUE FONSI & PROCEED W/PROJECT	02-Dec-90	02-Dec-90	
9	M1258A1084	ISSUE CEMENTING CONTRACT AUTHORIZATION	29-Jan-91	29-Jan-91	
10	M1258A10BM	PRODUCTION STARTUP IN TENT #11	13-Mar-91	13-Mar-91	
11	M1258A1073	OBTAIN MIN. TECH. REQUIREMENTS WAIVER	30-Mar-91	30-Mar-91	
12	M1258A1087	BEGIN SHIP REMIX TO NTS	31-Mar-91	31-Mar-91	
13	M1258A1083	BEG. INSTALL FORCED EVAPORATOR UNITS	09-Apr-91	09-Apr-91	
14	M1258A10BH	FORCED EVAP. UNITS INSTALL COMPLETE	07-May-91	07-May-91	
15	M1258A1085	BEGIN PROCESS START-UP/TESTING	17-May-91	17-May-91	
16	M1258A10BG	CEMENTATION PROCESS DEVELOPMENT COMPLETE	11-Jun-91	11-Jun-91	
17	M1258A1086	BEG. CEMENT POND SLUDGE & PONDCRETE REMIX	12-Jun-91	12-Jun-91	
18	M1258A10BK	BEGIN SHIPMENT OF SOLIDIFIED PONDCRETE TO NTS	19-Jun-91	19-Jun-91	
19	M1258A1040	ENHANCE PONDS TO PROPER LEVEL	18-Oct-91	18-Oct-91	
20	M1258A1060	AIP PONDCRETE COMPLETE	31-Oct-91	31-Oct-91	

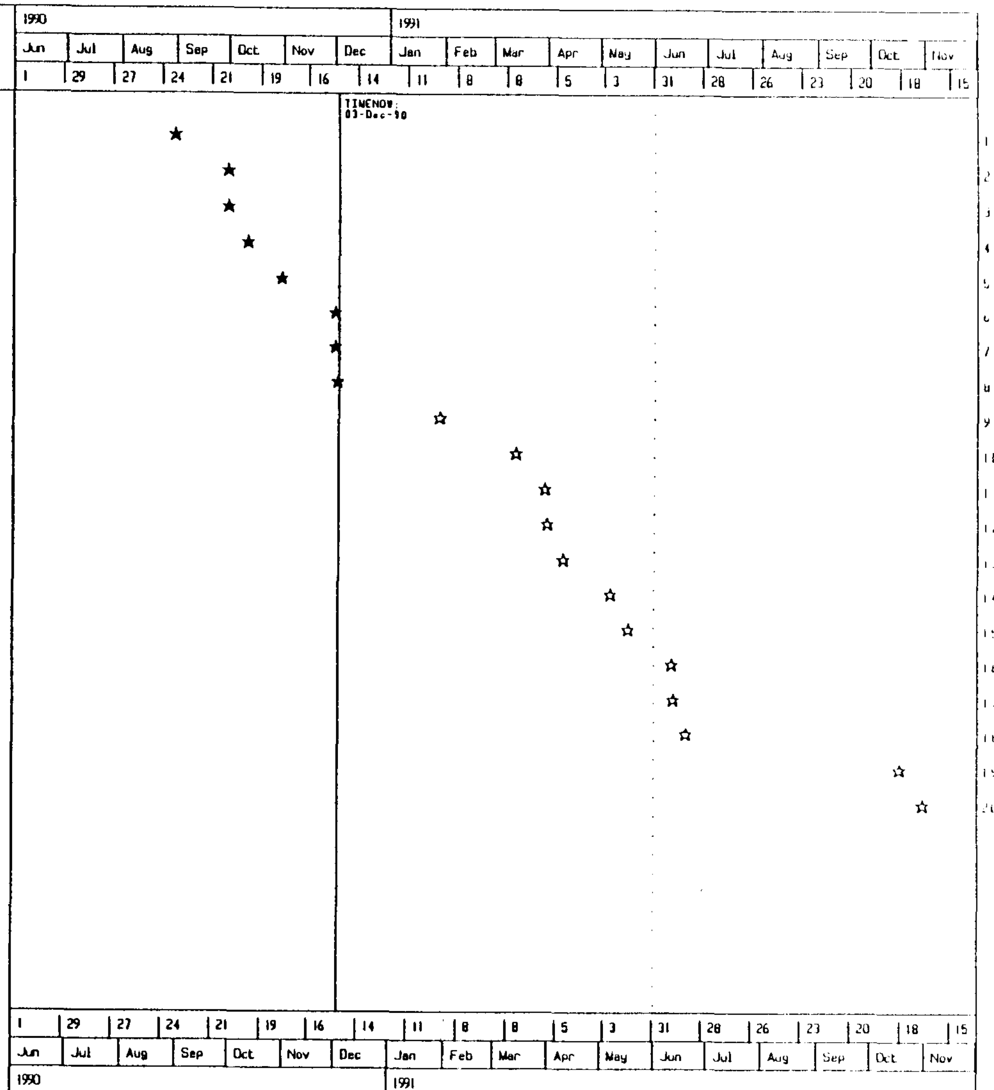

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Figure 15

Resource Chart
Rough Order of Magnitude (ROM) Costs

Project Phase		Dollars x 1,000
Water Management		
- Enhanced natural evaporation		
• Floating spray evaporators		50
• Heater/soaker pipes		500
• Electrical repair/upgrades		89
- Forced evaporation		
• Pond piping		130
• Labor		1673
• Pond covers		600
	Subtotal	**3042**
Sludge Management		
- Solar Pond Sludge		
• Analysis/characterization		100
• Contractor technology and equipment		9000
• Labor		16728
• Half crates (6,000)		1400
	Subtotal	**27228**

Figure 15 (Cont.)

		Dollars x 1,000
- Pondcrete Remix		
• Analysis/characterization		100
• Half crates (6,000)		1400
• Contractor technology/equipment		9000
• Labor		14760
	Subtotal	**25260**
Operational System/Regulatory Requirements		
• Labor (documentation)		374
Pondcrete Shipping		
• Transportation		2000
	GRAND TOTAL	**57904**

Figure 16

Summary of Assumptions Made for Resource Calculations

1. Number of half crates generated is based on a 100% volume increase for solidified pond sludge and a 50% volume increase for re-solidified reject pondcrete; and estimated quantities of pond sludge (100,275 cubic feet) and existing reject pondcrete (133,700 cubic feet).

2. Contractor/technology costs are based on estimated processing costs of $89.75/cubic foot; estimated quantity of sludge is 200,550 cubic foot (quantity of pondcrete has been reduced 25%; this assumes existing pondcrete contains some cement).

3. Cost for each *half crate* is $230.00.

4. Shipping/trucking costs are $2,033/truck, and 840 truckload required for solidified waste for pondcrete remix and cemented pond sludge.

5. All labor costs (EG&G) are burdened costs at $82.00/hour or $171,000/manyear.

   - Forced evaporation: 5/shift; 15 shifts/week; 34 weeks.
   - Solar pond sludge: 50/shift; 15 shifts/week; 34 weeks.
   - Pondcrete remix: 50/shift; 15 shifts/week; 30 weeks.
   - Operational system/regulatory requirements: 114 manweeks; 4560 hours.