RUST FEDERAL SERVICES

Nuclear Remedial Services

Plan Title/Approval

DECOMMISSIONING PLAN FOR CURTIS BAY DEPOT FACILITY

UNCONTROLLED COPY

Plan No. PL-NRS-0793-097 Revision: 2

Prepared By	6/14/94 Date
Health and Safety	6/14/94 Date
Engineering	6/14/94 Date
ALARA	6/14/94 Date
Quality Assurance	6/14/94 Date
Manager Approval	6/14/94 Date

LIST OF EFFECTIVE PAGES
(Revision Level 0 = Original Document)

Page #	Revision Level	Page #	Revision Level	Page #	Revision Level
ii	2	4-9	2	7-11	2
iii	2	4-10	2	8-1	2
iv	2	4-11	2	8-2	2
1-1	2	4-12	2	A-1	2
2-1	2	4-13	2	A-2	2
3-1	2	4-14	2	B-1	2
3-2	2	4-15	2	B-2	2
3-3	2	4-16	2	B-3	2
3-4	2	5-1	2	B-4	2
3-5	2	6-1	2	B-5	2
3-6	2	6-2	2	B-6	2
3-7	2	6-3	2	B-7	2
3-8	2	7-1	2	B-8	2
3-9	2	7-2	2	C-1	2
4-1	2	7-3	2	C-2	2
4-2	2	7-4	2	C-3	2
4-3	2	7-5	2	C-4	2
4-4	2	7-6	2	D-1	2
4-5	2	7-7	2	D-2	2
4-6	2	7-8	2	E-1	2
4-7	2	7-9	2	E-2	2
4-8	2	7-10	2	E-3	2

LIST OF EFFECTIVE PAGES
(Revision Level 0 = Original Document)

Page #	Revision Level	Page #	Revision Level	Page #	Revision Level
E-4	2				
E-5	2				
E-6	2				
E-7	2				
E-8	2				
E-9	2				
E-10	2				
E-11	2				
E-12	2				
E-13	2				
E-14	2				
E-15	2				
E-16	2				
E-17	2				
E-18	2				
E-19	2				
E-20	2				
E-21	2				
E-22	2				
E-23	2				
E-24	2				

Table of Contents Page

1.0 General Information

This decommissioning plan is submitted for the Anne Arundel county property adjacent to the Curtis Bay Depot facility located at 710 Ordnance Road in Curtis Bay, a suburb of Baltimore, Maryland. The Curtis Bay Depot is a Defense National Stockpile Center (DNSC), operated by the Defense Logistic Agency (DLA). The property to which this plan applies consists of nine (9) WWI-era wooden storage sheds each (10m x 30m on 1m - 3m brick pylons) and the soil underlying the storage sheds.

The property is currently owned by Anne Arundel County, Maryland. The property was released for unrestricted use by the NRC in 1978 and the property was subsequently sold to the County by the General Services Administration (GSA). Anne Arundel County, Maryland is responsible for asbestos abatement and demolition of the buildings. The DLA is only responsible for remediation of the thorium contamination.

The DLA has contracted Chem-Nuclear Systems, Inc. of Columbia, South Carolina, to prepare a plan and cost estimate for the decommissioning and dismantlement of the Curtis Bay Depot facility. RUST Federal Services, Inc., Nuclear Remedial Services Division (RUST) has prepared this decommissioning and dismantlement (D&D) plan under a cooperative agreement with Chem-Nuclear Systems.

Presently, all nine buildings at the Curtis Bay Depot facility are vacant and in a state of extreme disrepair. All buildings are considered unsafe for entry. The land surrounding each building consists of overgrown vegetation providing limited if any direct access to the buildings.

This decommissioning plan is written in accordance with Reference 2.1 for licenses regulated by 10 CFR 40. The license is issued to the DLA with F. Kevin Reilly as the Radiation Safety Officer. Although Reference 2.2 applies primarily to the Final Status Survey, the concepts introduced throughout References 2.1 and 2.2 have guided RUST's development of this plan.

Decommissioning activities will be performed in accordance with RUST NRC license 39-25250-01.

2.0 References

2.1 USNRC Regulatory Guide 3.65 Standard Format and Content of Decommissioning Plans For Licensees Under 10 CFR Parts 30, 40, and 70.

2.2 NUREG/CR-5849 (Draft) Manual for Conducting Radiological Surveys in Support of License Termination.

2.3 Disposal or On-site Storage of Residual Thorium or Uranium (either as natural ores or without daughters present) from Past Operations, Branch Technical Position, October 5, 1981.

2.4 ORISE 92/1-65 Radiological Survey of Portions of The Curtis Bay Depot, Baltimore, Maryland, prepared by Oak Ridge Institute for Science and Education, September 1992.

2.5 RA-OP-001, Operating Procedure for Brokering of Radioactive Materials.

2.6 ENWD-SF-013, Site Safety and Health Plan Procedure.

2.7 NRS-AD-006, Nuclear Remedial Services ALARA Procedure.

2.8 NRS-AD-007, Nuclear Remedial Services Health Physics Policy Manual.

2.9 NRS-RP-016, Respiratory Protection Program.

2.10 NRS-AD-001, Document Preparation Procedure.

2.11 NRS-RP-001, Radiological Control Procedure for Field Projects.

2.12 NRS-QA-006, Planning, Performing, Administering and Reporting Surveillances and Audits.

2.13 NRS-RP-011, Airborne Particulate Monitoring.

2.14 NRS-RP-002, Portable Instrument Procedure for Field Projects.

2.15 NRS-AD-005, Field Project Administration and Control Procedure.

2.16 NRS-RP-004, Working Level Determination of Radon Daughter Products.

2.17 NRS-AD-015, Document Review Procedure.

2.18 Title 10, Code of Federal Regulations, Part 19.

2.19 Title 10, Code of Federal Regulations, Part 20

2.20 NRS-RP-012, Radiation Work Permits Application and Use.

2.21 NRS-RP-003, Absolute Filter Testing of Air Filtration Systems.

2.22 NRS-AD-027, Chain of Custody Procedure.

3.0 Description of Planned Decommissioning Activities

Scoping surveys have been performed of the buildings and the underlying soil by Oak Ridge Institute for Science and Education (ORISE) which have identified the presence of Thorium contamination confined to the floors and underlying soil.

This plan outlines a method for remediating the property to an acceptable condition for future productive uses such that future occupants and the environment will not be subjected to unacceptable risks from residual radioactivity. The method proposed will safely remove radioactive and other materials which pose a hazard to human health, such as asbestos, and will prepare the property for subsequent future uses by removing all above-grade structures and excavating contaminated soils.

3.1 Decommissioning Objectives

The two primary objectives of decommissioning the Curtis Bay Depot property are:

(1) to reduce residual radioactive contamination of building surfaces and soil to below the current guideline values using standard construction methods and excavation equipment.

(2) to raze the nine Curtis Bay Depot facility structures once they have been decontaminated.

3.2 Decommissioning Activities

The major activities which collectively define the decommissioning process are listed below:

(1) procedure preparation, review, and approval.
(2) procurement of equipment/materials
(3) mobilize
(4) perform site set-up, site training/orientation and site specific equipment training.
(5) perform background survey of area surrounding building
(6) outline reference grid system on exterior building surfaces to be surveyed
(7) perform characterization survey of exterior wall and roof
(8) remove roof sections and survey interior of roof sections
(9) package/dispose of roof section as required
(10) remove exterior walls, survey interior surface (while positioned on ground)
(11) remove/package transite paneling (asbestos), package/ dispose of building debris as required

(12) survey flooring of building, remove and package contaminated flooring and subflooring as required
(13) raze remaining portions of building
(14) survey brick pylons, remove and package as required
(15) perform characterization survey of soil below building footprint
(16) excavate and package contaminated soil for disposal
(17) perform final status survey of remediated soil areas below building footprint
(18) perform verification surveys of remediated soil areas
(19) dispose of remaining waste materials
(20) demobilize remaining equipment and personnel
(21) prepare project final report

Before mobilization, all required site-specific procedures will be prepared, reviewed and approved for use in accordance with Reference 2.10 and 2.17.

Upon mobilization, mobile office trailers, break/lunch/meeting trailers, change trailers, storage trailers, sanitation facilities, communications provisions and utilities will be set up. After setting up basic facilities and services, site-specific training and orientation will be conducted. Any concerns raised by the DLA employees will be addressed at this time.

A controlled access area (CAA) will be established at the perimeter fence to facilitate proper access and egress controls before activities commence on individual buildings of the Curtis Bay Depot Facility. The present fencing (which surrounds three sides of the building area) will be augmented with an additional length of fence which will serve to surround all nine buildings. A gate access will be provided. This CAA will be locked after normal working hours.

The CAA will initially be posted as an radiological control area (RCA) and will be designated by proper postings in accordance with NRS-RP-001, "Radiological Control Procedure for Field Projects" (Reference 2.11). As work progresses and surveys allow, the RCA will be reduced to a smaller area around each individual building. These areas will be designated by boundary ropes and proper postings. After the RCAs have been reduced, the perimeter fence will continue to be used to ensure the area is secure after normal working hours and to limit access during working hours.

Exterior building surfaces will be cleared of any debris and vegetation which may interfere with an adequate radiological evaluation of the exterior building surfaces and pose a safety hazard. Survey locations will be referenced to building features; therefore, a grid system will not be installed on exterior building surfaces.

Teams of health physics (H.P.) technicians will begin performing a radiological survey of the exterior building surfaces as the clearing team progresses. This survey will be performed using "unaffected area" criteria (i.e., a scan of 10% of exterior building surface area, and direct and removable contamination measurements at 30 random locations).

If contamination is found that exceeds the release criteria (during the Characterization or Final Status Survey), the data will be evaluated and remediation of the area will be performed. The area will then be re-surveyed in accordance with the appropriate gridding and survey methods. These surveys may be biased to the remediated areas to confirm that all material contaminated above the project guidelines has been removed.

Results of the surveys for surface contamination will be reported to the DLA for submission to the Nuclear Regulatory Commission (NRC) upon completion of the survey. Prior NRC approval of the survey results will not be sought.

Due to the physical condition of the existing buildings, a characterization survey can not be accomplished on the interior of the walls and roofs of each building. To facilitate the characterization survey, a demolition subcontractor will remove the roof and walls to expose the interior surfaces of the walls and roof and to allow access to complete the characterization survey on the remaining portions of the building. After the characterization survey is complete, the interior of the walls and roof will be designated either affected or unaffected and the appropriate remediation or termination survey will be conducted.

The "BERG Group", a qualified asbestos abatement subcontractor, will remove all materials from the walls (previously lowered to facilitate the characterization survey) which contain asbestos from the building which might cause an unacceptable spread of asbestos fibers. The activities of the asbestos and demolition subcontractor will be monitored by RUST health physics personnel. All asbestos abatement activities will be conducted in compliance with the State of Maryland COMAR 26.11.21 "Control of Asbestos".

During building dismantlement operations, the buildings will be required to be constantly wetted. Although it is not expected, if the wetting process causes an unusually large amount of water runoff, a bermed area around the building will be required. This bermed area will be lined with plastic; and the water will be collected and tested for both radiological and asbestos contamination. Because this excess water will be collected, it is not expected that the decommissioning operations will cause any thorium contamination in the soil to migrate away from the buildings.

Decontamination of building surfaces will begin as soon as sufficient characterization data is accumulated to support formulation of an efficient remediation strategy. Decontamination of building surfaces will be performed by removing all areas of contamination using standard construction equipment and the waste material from decontamination will be packaged for disposal.

Upon completion of floor decontamination, the remaining floor will be razed and removed for disposal as clean debris by a qualified RUST subcontractor. RUST health physics personnel will monitor the activities of the demolition subcontractor to ensure that no unexpected radioactive contamination is uncovered during the demolition and clearing away the building rubble. The subsequent pylon supports will then be surveyed and remediated as deemed necessary to ensure there are no areas of contamination above the guideline limits.

Preparation of the Final Status Survey Plan will commence during the characterization survey. Upon completion of the characterization survey, the Final Status Survey Plan will be submitted to the NRC for approval.

Upon NRC concurrence with the Final Status Survey Plan, the Final Status Survey will be performed to demonstrate that outdoor land areas have been decontaminated such that no radioactive contamination exists in excess of guideline values. A report of the findings of the Final Status Survey will be prepared and submitted to the NRC upon completion of the Final Status Survey.

After all above-grade structures have been removed, the soil area underneath the footprint of the building will be characterized and remediated. Random sampling will be performed outside of the footprint. Results of the soil characterization survey will be reported to the NRC upon completion of the characterization survey.

A Final Status Survey will be performed by RUST of the remediated soil area underneath the footprint of the building. A report of the Final Status Survey findings will be prepared and submitted to the NRC.

All packaged radioactive waste remaining on site will be disposed of in accordance with Reference 2.5 and transported to an approved disposal facility. When the NRC is satisfied that the entire site has been adequately remediated (RUST will remediate any areas found to be above the unrestricted release criteria), RUST personnel and equipment remaining on the site will be demobilized.

A project final report will be prepared by RUST shortly after demobilization and delivered to the DLA.

3.3 Procedures

Activities described in this plan will be performed in accordance with the following written procedures:

(1) this decommissioning plan.

(2) The site specific safety and health plan (SSHP) will be written and approved before decommissioning activities begin in accordance with References 2.6 and 2.17.

(3) RUST standard operating procedures and other written guidance referenced.

Reference 2.10 is the RUST standard operating procedure for the preparation, approval and implementation of plans and procedures applicable to RUST operations and the operations of RUST subcontractors. In addition to approvals obtained from appropriate RUST management, approval of plans and procedures will be obtained from appropriate DLA management for all plans and procedures developed for decommissioning of the Curtis Bay Depot facility.

RUST plans and procedures are reviewed and approved by designated individuals representing Health and Safety, Engineering, ALARA, Quality Assurance and Division Operations Management before implementation. As necessary, work instructions, plans or procedures will be prepared by RUST personnel involved with the Curtis Bay Depot facility decommissioning for activities not adequately covered by RUST standard operating procedures or one of the procedures or plans developed specifically for the decommissioning. These work instructions, plans or procedures will be developed in accordance with Reference 2.10. The Site Specific Work Plan will be submitted to the DLA for approval prior to any remediation activities being conducted on site.

3.4 Schedules

Appendix D contains a proposed schedule which presents the activities from the preceding list which collectively comprises the decommissioning of the Curtis Bay Depot facility.

3.5 Decommissioning Organization and Responsibilities

The exact personnel assigned to the Curtis Bay remediation project will be determined prior to mobilization as personnel are available. The qualifications of personnel filling management/ oversight positions will be provided in the Site Specific Work Plan to be developed prior to mobilization.

3.5.1 Project Manager

The Project Manager shall maintain the overall responsibility for the performance of project operations and will be on-site for the duration of the project. He will report to the designated DLA representative for all project related activities and to the RUST Division Office (Columbia, SC) for project oversight, management direction and resolution of any company related matters. He will control all on-site professional, technical and labor forces to assure the adequate and timely completion of planned project tasks. Assisted by the assigned on-site and off-site corporate forces, the project manager shall ensure the following:

- Maintenance of a single point of contact for the DLA liaison on all project related schedule, cost, safety and technical matters, including any required communications, meetings or updates.
- Coordination of the project staff to ensure that adequate safety and radiological controls plans and procedures are enforced to ensure safe and efficient conduct of project operations in compliance with the appropriate regulatory requirements.
- Providing sufficient staffing to support the scheduled completion of project tasks.
- Coordination of appropriate procurement and subcontract activities to support project goals and schedules.
- Continuous monitoring of project status and performance and the initiation of any required corrective actions or reassignment of forces.
- Accurate reporting to the DLA of actual and projected project costs and up-to-date schedule status.
- Resolution of any cost or status related discrepancies or questions.
- Compliance with all required procedures, operating requirements, permits or other restrictions.
- Maintenance of all appropriate project data, documents and records and the compilation of a final report which accurately reflects the work performed and the final releasability of the project site.

3.5.2 Division Health Physicist

The Division Health Physicist will have the overall responsibility for conduct of radiological monitoring, surveys, protection and conduct of final release activities. He will assist the SSHS in technical and regulatory issues. He will participate in project planning and final reporting activities to assure regulatory compliance, adequacy of the decommissioning plan and appropriate development of project plans and procedures.

The Division Health Physicist will be on-site during the initial setup, training, and initial characterization surveys to ensure proper implementation and recognition of the radiological hazards associated with the project. Audits will then be performed by the Division Health Physicist periodically during the course of the project. The day-to-day radiological safety support is provided by the experienced RCS with the support of the Project Manager. Should either the Project Manager or the RCS (who are on-site for the duration of the project) need guidance or clarification on an issue, they have the support of the Division Health Physicist.

The Division Health Physicist will report to the Project Manager for all project related matters including the safe and adequate performance of radiologically related tasks.

3.5.3 Division Industrial Hygienist

The Division Industrial Hygienist will have the overall responsibility for non-radiological field monitoring, sample collection and analysis, data analysis, and use of exposure controls, including engineering, administrative selection and wear of personal protective equipment and clothing.

The Division Industrial Hygienest will be on call during the initial setup, training, and initial characterization surveys to ensure proper implementation and recognition of the industrial hazards associated with the project. Audits will then be performed by the DIH periodically during the course of the project. The day-to-day industrial hygiene and safety support is provided by the experienced SSHS with the support of the Project Manager. Should either the Project Manager or the SSHS (who are on-site for the duration of the project) need guidance or clarification on an issue, they have the support of the Division Industrial Hygienest.

The Division Industrial Hygienist will report to the Project Manager for all health and safety related matters to ensure compliance with applicable procedures, programs, plans, and regulations.

3.5.4 Project Radiological Control Supervisor/Site Safety and Health Supervisor

The Project Radiological Control Supervisor/Site Safety and Health Supervisor (RCS/SSHS) will report directly to the Project Manager for the day-to-day conduct of project radiological activities. For the purpose of this plan, the RCS and SSHS are synonymous. He/she will receive direction from the Division Health Physicist and Division Industrial Hygienist in administration of the project radiological control programs, final release activities, maintenance of all appropriate documentation and compliance with all appropriate plans, procedures, practices and regulatory requirements. The SSHS shall be responsible for the following:

- Reports directly to the Project Manager with additional reports to the DHP/DIH. The SSHS is qualified by the DHP/DIH. The DHP/DIH provide oversight to the SSHS.
- The SSHS will be responsible for performing site characterizations, for developing the SSHP, for implementing the specific provisions of the SSHP and for ensuring that all site employees and visitors understand the SSHP.
- Assisting the Project Manager and project staff in the preparation of work plans and procedures.
- Conduct of appropriate surveys and inspections to ensure that radiological and industrial safety hazards are appropriately identified and that necessary precautions are in place prior to the initiation of work activities.
- Specification of appropriate safety and radiological controls precautions for work permits and work procedures.
- Day-to-day direction of the activities of radiological controls personnel in the conduct of project operations, selection of instrumentation or decontamination techniques appropriate for protection of personnel and reduction of exposures.

- Monitoring of work in progress to ensure compliance with project plans and procedures, regulatory requirements, and good radiological work practices.

- Prevention of conduct or work activities which may jeopardize the safety of personnel, violate approved plans, procedures or practices, or have the potential to result in the release of contamination.

- Review and maintenance of all appropriate project personnel and radiological records, including survey data, training, certification and qualification records, release surveys, permits, licenses, and instrument records.

- Maintaining radiological supplies and instrument inventories.

- Inspection and assistance in the preparation of waste materials for shipment, including appropriate radiological survey and assay activities.

3.5.5 Radiological Engineer

The Radiological Engineer (RE) will interface on-site with the health physics staff, project management and the site workers on an as needed basis to make sure the radiological and technical aspects of the project meet all Department of Defense (DOD), federal and state requirements. Specific responsibilities include:

- Make recommendations to the Project Manager for the control and elimination of existing and potential radiological hazards.

- Ensure compliance with radiation protection rules, regulations, and procedures.

- Oversee the bioassay program to insure proper monitoring of internal and external exposures.

- Stop work if conditions indicate that a potential for an unanticipated excessive radiation exposure, internal or external, to site personnel or the general public exists or if an individual violates the radiation protection rules, regulations, or procedures which may adversely affect personnel working at the site or the general public.

- Assist in training of individuals in the biological effects of radiation as needed.

- The RE is an authorized user designated on the US NRC license in accordance with reference 11.16.

3.6 Training

All RUST personnel and RUST subcontractor personnel working on the site will be trained in accordance with the applicable requirements of 29 CFR 1910.120 before being allowed to participate in decommissioning activities.

Twenty-four hours of on-site training as required by 29 CFR 1910.120 will be conducted during the first few days on site following mobilization of project personnel. Attendance sheets will be used to document this training and will be kept in the project records. All site-specific training will be conducted during this training session. The following specific training requirements have been identified and will be addressed during the twenty-four hour site specific training session:

(1) requirements of this decommissioning plan and guidance referenced by this decommissioning plan,

(2) requirements of the Site Safety and Health Plan (SSHP),

(3) hazard communication training required by 29 CFR 1910.1200,

(4) lockout/tagout training required by 29 CFR 1910.134,

(5) noise abatement training required by 29 CFR 1910.95,

(6) respiratory protection program training required by 29 CFR 1910.134,

(7) safety signs and tags training required by 29 CFR 1919.145,

(8) fork lift operations training required by 29 CFR 1910.178,

(9) fire extinguisher training required by 29 CFR 1910.157,

(10) fire emergency training required by 29 CFR 1910.38,

(11) basic radiation worker training required by 29 CFR 1910.96, 10 CFR 19 and 10 CFR 20

All pertinent training records, certification of training and qualification certificates will be kept in the project files by the SSHS.

3.7 Contractor Assistance

The Defense Logistics Agency has contracted Chem-Nuclear/RUST to provide the decommissioning plan for the Curtis Bay Depot facility. RUST has previous experience in the decommissioning of numerous facilities for NRC licenses.

The BERG Group at 1401 W. Hamburg Street, Baltimore, MD. 21230 will be contracted by Anne Arundal County to perform both the demolition and asbestos abatement of the buildings under the direction of RUST.

4.0 Description of Methods Used for Protection of the Health and Safety of Curtis Bay Depot Facility Remediation Personnel and the Public

The estimated radiation exposure to any individual worker from remedial activities is expected to be < 1 mrem. The estimated exposure to the maximally exposed member of the public from remedial activities is expected to be < 0.1 mrem. These estimates are based on radiation dose rates of past remedial operations similar to the project at the Curtis Bay Depot.

4.1 Facility Radiological History Information

Historical information about operations conducted at the Curtis Bay Depot facility is limited to that which is presented in Reference 2.4. The information available from Reference 2.4 about past radiological operations is lacking in specifics, however, it is known that the buildings were used by the General Services Administration (GSA) to store thorium nitrate (mantle and reactor grades) in fiber and steel drums.

Reference 2.4 is a report of a radiological assessment of the Curtis Bay Depot facility. This assessment was performed by Oak Ridge Institute for Science and Education (ORISE) during the period of May 4 through May 7, 1992. The radiological condition of the entire facility was assessed during the course of this campaign. Eight of the nine warehouse buildings had surface contamination activity levels exceeding the NRC guideline for maximum activity.

4.2 Site Safety and Health Plan (SSHP)

A site safety and health plan will be prepared specifically for decommissioning the Curtis Bay Depot facility before mobilization of the RUST project team. The purpose of the SSHP is to establish methods of protecting employees and the public from hazards associated with decommissioning Curtis Bay Depot facility. The SSHP will be prepared in accordance with the requirements of 29 CFR 1910.120 and References 2.6, 2.10, 2.18 and 2.19.

One week after on-site work is commenced, the SSHP will be reviewed and revised as necessary to include provisions for protection against hazards that may not have been anticipated when the SSHP was originally prepared. Other changes to the SSHP will be made throughout the life of the project as circumstances dictate.

The SSHP which will be prepared for decommissioning the Curtis Bay Depot facility will contain the following elements:

(1) A clear description of key personnel, their responsibilities, and the lines of authority for health and safety oversight, including work stoppage authority.

(2) A safety and health risk or hazard analysis for each operation identified in the decommissioning plan.

a. Identify the chemical, physical, and biological hazards associated with each operation.

b. Identify conditions which may pose an inhalation or skin absorption hazard.

c. Determine the probability of exposure to safety and health hazards.

(3) Employee training to ensure compliance with 29 CFR 1910.120.

(4) Personal protective equipment to be used by employees for each operation.

a. Selection of PPE based upon site hazards.

b. Use and limitations of PPE.

c. Work duration while wearing PPE.

d. Maintenance and storage of PPE.

e. Decontamination and disposal of PPE.

f. Training in the proper use and fitting of PPE.

g. PPE donning and doffing procedures.

h. Inspection of PPE prior to, during and after use.

i. Evaluation of PPE program effectiveness.

j. Limitations imposed by wearing of PPE during temperature extremes and other adverse conditions.

(5) Medical surveillance requirements.

a. Identify individuals who could be exposed to hazardous substances at or above applicable limits for thirty days or more within a year without regard to use of respirators. The rationale and potential exposure estimates will be included in the SSHP.

b. Identify those employees who wear a respirator for 30 or more days per year.

c. Explain procedures for medical follow-up of injured or over-exposed employees.

d. Identify HAZMAT team members.

(6) Frequency and types of air monitoring, personnel monitoring, environmental sampling techniques and instrumentation to be employed, including requirements for maintenance and calibration of sampling equipment to be employed.

(7) Site control measures.

a. A site map.

b. Location of site work zones including the exclusion zone, hot line, contamination reduction corridor, contamination reduction zone and support zone.

c. Use of the buddy system for confined space entry and other specific tasks in the exclusion zone.

d. Define the extent and nature of site communications including how employees will be alerted during emergencies.

e. Safe work practices to be incorporated into standing orders.

f. Name and location of nearest medical assistance.

(8) Decontamination procedures.

a. Standard operating procedures to be followed for minimizing employee contact with hazardous substances, hazardous equipment, and radioactive material.

b. Decontamination of personnel and decontamination or disposal of contaminated PPE or other clothing.

c. Identification and correction of ineffective procedures.

d. Location of decontamination stations and provisions for preventing cross-contamination of personnel and equipment.

e. Disposal of materials and equipment used for decontamination.

f. Prevention of unauthorized employees from entering contaminated zones and change rooms.

g. Location of showers and change rooms outside of contaminated areas and compliance with sanitation requirements of 29 CFR 1910.141.

(9) Emergency response plan for safe and effective responses to emergencies.

a. Identification of possible emergencies.

b. Identification of personnel authorized to carry out emergency response roles according to the type of emergency and procedures for emergency communications for different types of emergencies in each control zone.

c. Prevention and recognition of emergencies.

d. Identification of emergency evacuation refuges.

e. Designation of emergency evacuation routes and procedures for their use.

f. Decontamination procedures not already addressed in decontamination section of the SSHP.

g. Procedures for emergency medical treatment and administration of first aid.

h. Critique and follow-up of emergency response.

(10) Confined space entry.

a. Description of space(s) to be entered including size, ventilation, nature and extent of contamination inside, provisions for air monitoring, communication provisions and equipment and personnel designated to be employed for rescues.

b. Issuing of confined space entry permits.

c. Issuing of hot work permits for use in confined spaces.

d. Lockout/tagout procedures.

(11) Spill containment.

a. Identity of hazardous substances which could be involved in a major spill.

b. Probability of a spill occurring for each hazardous substance identified.

c. Identifying spills of specific substances in order to select appropriate PPE before combatting a spill.

d. Methods for controlling and cleaning up a spill of a hazardous substance.

e. Disposal of materials used to clean up a spill.

4.3 Ensuring that Occupational Radiation Exposures Are As Low As Reasonably Achievable (ALARA)

The radiation protection program for the project will be comprised of RUST radiological standard operating procedures and site-specific plans which contain the radiological requirements for the Curtis Bay Depot facility decommissioning. As RUST will implement its radioactive materials license for this project, it is RUST's responsibility for ensuring that all project personnel are trained properly and understand the procedures which execute the radiation protection program. It will be the individual's responsibility to follow the procedures during site operations in order to minimize internal and external exposure. All applicable work and safety and health plans will reference standard operating procedures to be followed.

It is the policy of RUST to make every reasonable effort to maintain radiation exposures as low as reasonably achievable. Reference 2.7 is the RUST standard operating procedure for ALARA.

Reference 2.7 requires that all procedures, work instructions, new designs and design changes be reviewed and approved by at least one member of the ALARA Review Committee. Members of the ALARA Review Committee are listed in the appendix of Reference 2.7.

The Project Manager is responsible for ensuring that criteria affecting potential radiation exposure and contamination are considered in the design, operation and construction of facilities and equipment. Further responsibilities of the Project Manager with respect to ALARA include:

(1) ensuring adherence to the radiation protection program by all personnel assigned to the project,

(2) ensuring that ALARA reviews are performed of procedures, programs, policies, new equipment or facility designs and equipment changes as required by Reference 2.7.

The Division Health Physicist chairs the ALARA Review Committee. The responsibilities of the Division Health Physicist with respect to ALARA include:

(1) directing an annual appraisal of the radiation protection and exposure control programs applicable to RUST employees,

(2) overseeing and coordinating the development of exposure goals and plans, procedures and methods for maintaining radiation exposures ALARA for all RUST employees.

The SSHS is responsible for implementation of the radiation protection program for the Curtis Bay Depot facility decommissioning. The radiation protection program is comprised of all RUST radiological standard operating procedures and those procedures with radiological requirements which are written specifically for the Curtis Bay Depot facility decommissioning. These procedures are referenced in the site specific work plan and available on site. The responsibilities of the SSHS with respect to ALARA include:

(1) ensuring adequate radiation protection coverage for all personnel, including visitors, during working hours,

(2) supervising, training, and documenting the training of the radiation protection staff under his/her supervision,

(3) identifying sources or operations having the potential for causing significant exposures to ionizing radiation,

(4) implementing the radiation protection and exposure control programs,

(5) reviewing draft procedures and proposed changes in equipment to ensure that provisions are included for maintaining exposures ALARA,

(6) overseeing the collection, analysis and evaluation of data and information obtained from radiological surveys or radiological monitoring activities,

(7) making routine reports to the Division Health Physicist concerning the status of radiation protection and exposure control programs in effect at the field location to which the SSHS is assigned.

Occupational exposures to ionizing radiation for RUST personnel will be administratively limited to well below regulatory limits. These administrative limits are established by Reference 2.8 to control personnel exposures resulting from operations with radioactive materials. The RUST administrative exposure limits are presented in appendix A. Approval to exceed each successive level of administrative exposure limits shall be obtained in writing from the applicable management specified in appendix A and in Reference 2.8.

Individuals shall not be allowed to receive an accumulated whole-body occupational dose exceeding guidelines established in Reference 2.11 which reflects the requirements of 10 CFR 20 Subpart C.

4.3.1 Radiation Work Permit (RWP)

Decommissioning activities will be performed under the RUST NRC licnese (#39-25250-01), therefore RUST will have responsibility to ensure that all remedial activities are conducted in accordance with an approved RWP.

The SSHS shall issue an RWP for any work in a radiologically controlled area. In cases where no written procedure exists for an operation, an RWP may be issued with sufficient specific instructions to allow the RWP to take the place of a written procedure. The RWP is a tool used to control personnel exposures to ionizing radiation, radioactive material and hazardous material by establishing minimum requirements for dosimetry, PPE, etc., for work to be performed and providing specific information about radiological and other hazards in the area to be accessed. RWP's are issued and reviewed in accordance with Reference 2.20. All RWP's will be reviewed by all individuals prior to the start of work. This will be accomplished at the Daily Safety Meeting.

A RWP may be initiated by any individual responsible for a given operation or work to be performed. The SSHS reviews RWPs, makes any necessary changes then approves the RWP for use.

Personnel performing work covered by a RWP and project management personnel participate in a pre-job brief where requirements of the RWP are presented by the SSHS and discussed by the work group. Personnel attending the brief sign the RWP before entering the radiologically controlled area to indicate that they understand the requirements of the RWP.

A RWP is terminated by the SSHS when radiological conditions change, scope of work changes or a specified period of time has elapsed in accordance with Reference 2.20. Since RWP's are task-specific, it is likely that several RWPs will be in effect at any given time during the course of the decommissioning.

RWP's will be located at the "Access Control Point" and a copy maintained by the SSHS in his files. Individuals entering the area will be required to read the RWP and sign into the area.

4.3.2 Controlled Access Area Entry Requirements

Controlled access areas are established for the purpose of controlling radiation exposures to site workers, visitors, and the general public, and to control the spread of contamination.

Signs at points of entry into the area surrounding each building will instruct visitors and other individuals unfamiliar with decommissioning operations at the Curtis Bay Depot facility to register at the RUST project office trailer. Upon reporting to RUST personnel in the office trailer, the individual can be escorted to any area he/she may need access to. Subcontractors and other personnel who will perform work on the site will be given orientation and training which will make them aware of areas that they may access, the requirements for entering such areas, and awareness of areas which they may not access.

Radiologically controlled areas (RCAs) include controlled surface contamination areas, radiation areas and radioactive material storage areas. It is anticipated that there will be no high radiation areas, airborne activity areas or very high radiation/exclusion areas posted during the course of the Curtis Bay Depot facility decommissioning. Radiologically controlled areas will be posted with radiation warning signs which are normally suspended from yellow and magenta colored rope or ribbon or affixed to doors. Some of the requirements for entering an RCA are listed on the posted radiological warning signs applicable to a given area. The remainder of the requirements for entering a given RCA are contained in one of the active RWPs.

There shall be no eating, drinking, smoking, chewing or application of cosmetics within RCAs. The need for respiratory protection shall be evaluated and documented for all personnel entering an airborne radioactivity area.

4.3.3 Clean Area Requirements

High traffic areas outside of RCAs, especially paths to and from RCA accesses, restrooms, break/lunch rooms and field office spaces shall be surveyed for radioactive surface contamination daily to ensure that these areas are maintained essentially free of radioactive contamination above background levels. The periodicity of these routine surveys shall be determined by the SSHS in consultation with the Division Health Physicist. Clean areas shall be promptly decontaminated or controlled as RCAs if surface contamination levels are found to exceed guideline values.

The potential for an internal uptake of radioactive material remains relatively small based on the data contained in Reference 2.4. HEPA-filtered exhaust ventilation shall be evaluated and used inside all containments where airborne radionuclides may present a hazard in accordance with Reference 2.21. If air sampling indicates the need for respiratory protection then full-face negative pressure respirators with HEPA filters shall be the first choice. If air samples indicate airborne contamination levels sufficiently high, air supplied respirators shall be used to work in the affected areas.

Except for sources which are permanently attached to detection instruments, radioactive check sources "not in use" will be stored in a locked cabinet designated by the RCS. The number of keys to the cabinet and the number of personnel having access to the keys will be kept to a minimum. Radioactive check sources stored on site will be inventoried and leak tested at a periodicity specified by the SSHS not to exceed quarterly.

Radioactive waste will be stored in strong, tight containers in designated radioactive material storage areas after it is removed from an RCA. Radioactive tools, equipment and other radioactive materials will be marked with yellow and magenta colored tape or equivalent and will be stored in RCAs until decontaminated or otherwise disposed of as radioactive waste. Radioactive materials transported through uncontrolled areas will be wrapped or packaged as necessary to prevent the spread of contamination while transiting these uncontrolled areas.

Packaging, labeling, manifesting and transportation of radioactive waste will be performed in accordance with Reference 2.5 to ensure that all regulatory requirements are satisfied.

Spread of contamination will be minimized by:

(1) posting areas with removable contamination in excess of guideline values as controlled surface contamination areas (CSCAs),

(2) requiring personnel who enter CSCAs to wear anti-contamination clothing specified by the applicable RWP,

(3) ensuring that personnel remove contaminated clothing properly and place used anti-contamination clothing in designated receptacles upon exiting a CSCA,

(4) monitoring personnel, materials and equipment for the presence of radioactive contamination upon exiting or removal from a CSCA and decontaminating or controlling as radioactive material as appropriate. Monitoring instruments used to monitor individuals exiting radiation controlled areas are listed in table 7,

(5) performing contamination surveys frequently inside CSCAs, along the perimeter of CSCAs and at the exits of CSCAs,

(6) use of HEPA filter equipped ventilation equipment and HEPA filter equipped vacuum cleaners for operations likely to cause significant airborne radioactive contamination or spread of contaminated dusts.

Reference 2.9 is a RUST standard operating procedure which contains specific requirements for selection, inspection, fitting, using, cleaning and storing respiratory protection equipment.

Respiratory protection requirements will be specified in the applicable RWP. Health physics personnel will specify appropriate respiratory protective equipment based upon measurement of actual airborne radioactive contamination or suspicion/likelihood of airborne contamination in excess of applicable limits. Reference 2.13 is a RUST standard operating procedure which contains specific requirements for monitoring for airborne radioactive contamination.

Prior to using respiratory protective equipment and annually thereafter, employees shall be physically examined to determine their fitness for using respiratory equipment and shall be fit tested to ensure that a proper seal can be obtained between the individual's face and the respirator selected.

Personnel required to wear respiratory protective equipment will be trained in the proper use and care of the respiratory protective equipment to be employed. This training will contain the following minimum elements:

(1) When respiratory protection is required and why.

(2) The operating principles of the selected respiratory protective equipment and its limitations.

(3) Procedures to ensure proper fit of the respirator.

(4) Proper care and maintenance of the selected respirator.

(5) Emergency actions to be carried out by individuals who experience respirator failure or malfunction, physical or emotional distress, procedural or communication failure, significant deterioration of operating conditions and any other condition which might require relief.

4.4 Health Physics Program

4.4.1 Quality Assurance

During the course of the Curtis Bay Depot facility decommissioning project one or more audits of project activities and records will be performed by qualified personnel from the RUST (Columbia, SC) Quality Assurance staff. Records and activities will be reviewed and compared with requirements of procedures prepared specifically for the Curtis Bay Depot facility decommissioning and with standard operating procedures. Results of audit findings will be addressed by corporate management and the project manager.

References 2.11 and 2.14 are the primary RUST standard operating procedures containing specific requirements for use, storage, calibration, testing and maintenance of radiological instrumentation.

Calibration of all portable radiological instruments will be performed at a minimum periodicity of semi-annually or more frequently if specified by the instrument operating manual or as required after repairs or maintenance which could have invalidated the instrument's current calibration. The SSHS will determine whether or not a given instrument requires calibration more frequently than semi-annually. Radiological field survey equipment and laboratory analysis equipment shall be calibrated by Approved Vendors using standards traceable to the National Institute of Standards and Technology (NIST).

Portable survey instruments, self-indicating pocket dosimeters, counter-scalers and air sampling equipment shall have a current calibration prior to use. The SSHS is responsible for ensuring that all such equipment in use maintains a current calibration label and that records of the current calibration are on file. In addition to records of calibration the SSHS will maintain a copy of the operating manual provided by the manufacturer for each instrument in use at the project.

4.4.2 Airborne Monitoring

Reference 2.13 is the RUST standard operating procedure for airborne particulate radioactivity monitoring. Airborne particulate monitoring is performed to:

(1) demonstrate compliance with the intake limits for workers specified in 10 CFR 20,

(2) meet the posting requirements for airborne radioactivity areas specified in Reference 2.11,

(3) determine whether precautionary measures such as process or engineering controls, increased surveillance, limitation of working times, provision of respiratory protective equipment or other precautions should be considered,

(4) determine whether exposures to radioactive materials are being maintained as low as reasonably achievable.

The system used for monitoring airborne radioactivity shall have a Minimum Detectable Activity (MDA) not greater than 10% of the applicable Derived Air Concentration (DAC). Site specific MDA requirements shall be determined during the project ALARA briefing required by Reference 2.11.

Airborne particulate surveys shall be performed with portable air samplers as follows:

(1) at least every four hours and when airborne radioactivity is expected to be maximized. Periodicity will be determined by the SSHS in conjunction with DHP and/or Radiological Engineer assessment of air sampling data,

(2) in radiologically controlled areas where remediation work is performed,

(3) before initially entering tanks or voids or opening systems which contain potentially radioactive piping,

(4) whenever airborne radioactivity levels above the limits are suspected, and

(5) in occupied areas where removable contamination exceeds 10,000 dpm/100 cm^2 beta or 500 dpm/100 cm^2 alpha. This requirement remains in effect whether the walls and roof are in place or removed.

Portable samples are not required if continuous monitoring is performed.

If a continuous air particulate detector is not installed and operating in a ventilation exhaust system which is ventilating a radiologically controlled [illegible] radiological work is being performed, portable sampling will be performed every four hours at the ventilation exhaust instead.

Personnel air samplers (lapel samplers) will be employed whenever general area air samples indicate levels greater than 10% DAC or when breathing zone grab samples indicate levels greater than 10% DAC to more accurately measure actual concentrations of airborne radioactivity in the breathing zones of the workers.

Portable air particulate sampling equipment will be immediately available during abnormal conditions. Site specific airborne particulate surveys shall be performed as identified in the project ALARA briefing required by Reference 2.15.

Continuous air monitors (CAMs) will be employed to continuously airborne particulate radioactivity if low volume, portable air sampling is otherwise required but not performed.

Analysis of airborne particulate radioactivity samples will be performed in accordance with References 2.11, 2.13, 2.14 and 2.16.

4.4.3 Dosimetry

Dosimetry devices will be issued to all project personnel who require access to RCA's by the SSHS.

Visitors to the Curtis Bay Depot facility site will be issued dosimetry as deemed appropriate by the SSHS after considering radiation and contamination levels to be encountered by the visitor, duration of visit and the nature of the visit. A visitor may be exempted from the requirements of the dosimetry, bioassay and training programs at the discretion of the SSHS provided that the visit is expected to be a one-time occurrence and the visitor is escorted by an individual who has proper dosimetry, the required training for access to the site and is familiar with site operations.

The primary dosimeter to be employed is the Eberline TLD-100 calcium fluoride, thermoluminescent dosimeter (TLD). The SSHS may require the use of self-indicating pocket dosimeters (SRDs) and additional dosimeters such as extremity TLDs as necessary. Dosimetry requirements for a given operation or activity will be specified by the applicable RWP.

The Eberline TLD-100 dosimetry will be processed monthly. The SSHS will maintain records of exposure to ionizing radiation for those individuals wearing dosimetry issued by the SSHS.

Urine bioassay samples will be collected from all personnel who participate in the project dosimetry program. A baseline sample will be collected from appropriate project personnel upon mobilization and an exit sample will be collected from appropriate project personnel upon demobilization. Other samples will be collected as deemed necessary by the SSHS and at the frequency determined during the project ALARA brief required by Reference 2.15.

Urine bioassay samples will be analyzed for the presence of the radionuclides identified during the project ALARA brief required by Reference 2.15 by a laboratory selected from the RUST approved vendor list maintained by the home office quality assurance group and available on-site by project personnel.

Whole-body counting is not expected to be routinely employed during the Curtis Bay Depot facility decommissioning for determining personnel uptake of radionuclides. Whole-body counting may be employed as prescribed by the Division Health Physicist for extenuating circumstances.

4.4.4 Anti-Contamination Clothing Requirements

Reference 2.11 is a RUST standard operating procedure which contains specific requirements for selection, inspection and use of anti-contamination clothing.

The SSHS will determine the appropriate requirements for anti-contamination clothing for a given operation or activity and will include these requirements on the applicable RWP.

When working in RCAs with low levels of removable contamination, an ensemble of anti-C clothing consisting of as few items as shoe covers and rubber gloves may be adequate to protect against contamination of personnel. In such cases, precautions should be observed to prevent contaminating personal clothing.

A full set of anti-C clothing shall be worn when working in areas with high levels of removable contamination such as > 20,000 dpm/100cm^2 beta-gamma or > 1,000 dpm/100cm^2 alpha. A full set of anti-C clothing may be required in areas with less removable contamination if there is a likelihood of personnel contamination without the full set of anti-C clothing.

A double set of anti-C clothing shall be worn when working in areas with very high levels of removable contamination such as > 50,000 dpm/100cm^2 beta-gamma and > 5,000 dpm/100cm^2 alpha. A double set of anti-C clothing decreases the likelihood of radioactive contamination penetrating clothing material during work and help minimize the possibility of spreading contamination by removing the outer set before moving from areas with high levels of removable contamination to less contaminated areas.

It is anticipated that disposable anti-C clothing will be employed during the Curtis Bay Depot facility decommissioning. Soiled disposable anti-C clothing will be packaged into steel drums so that it can be efficiently volume-reduced by supercompaction.

4.5 Radioactive Waste Management

Reference 2.5 details the packaging, labeling, manifesting, and transportation requirements for radioactive waste. CNSI is providing all brokering services for the Curtis Bay Depot decommissioning project. Approximately seven B-25 boxes will be used for radioactive waste disposal. An estimated 630 ft^3 of waste will be generated (wood, rubble, etc.) This waste will be considered "Class A Waste" in accordance with Waste Classification, 10 CFR 61.55. No treatment or processing will be required for near-surface disposal; therefore, the waste will be considered "Class A - Unstable". No mixed waste is expected from the remediation activities; however, a waste profile analysis will be performed on waste soil for RCRA/TSCA hazardous constituents.

Radioactively contaminated building materials and soil will be packaged in steel boxes or in heavy-duty fabric bags sometimes referred to as supersacks.

Soiled protective clothing will be packaged in steel drums to facilitate volume reduction by supercompaction.

All radioactive waste from the Curtis Bay Depot facility decommissioning is expected to be LSA, A-Unstable waste.

It is possible that materials which contain asbestos may also be found to be radiologically contaminated. All radiologically contaminated materials which contain asbestos will be removed and packaged for disposal by a licensed subcontractor arranged by RUST. Removal of asbestos from the Curtis Bay Depot facility will be in accordance with a work instruction which will be prepared in accordance with Reference 2.10 in advance of any such operation. Health physics coverage for removal of radioactive contaminated asbestos will be provided by RUST. Radioactive waste containing asbestos will be segregated from other containers of radioactive waste to simplify management of the asbestos waste.

Packaged radioactive waste awaiting disposal will be stored in a segregated area. The exact location for the temporary storage area has not been determined. The area selected will be relatively free of radioactive contamination (below guideline values) and well out of the way of planned decontamination activities.The area selected for temporary storage of radioactive waste will be designated with yellow and magenta boundary rope and posted with signs warning that the area is a radioactive material storage area. The warning signs will state the requirements for entering the posted area.

Gamma radiation levels associated with the stored waste should not be more than a few μR/hr above background. The highest gamma dose rate documented during previous surveys of the Curtis Bay Depot facility is 36 μR/hr obtained from soil samples per Reference 2.4. Appropriate dosimetry will be required for access within the radioactive materials storage area.

Packaging, labeling, manifesting and transportation of radioactive waste will be performed in accordance with Reference 2.5.

5.0 Criteria for Release of the Curtis Bay Depot Facility for Unrestricted Use

5.1 Surface Residual Activity

The guideline values presented in this section have been selected as maximum acceptable levels of residual radioactivity. These limits apply to both alpha-emitting and beta-gamma-emitting nuclides. Residual contamination of the Curtis Bay Depot facility surfaces must be reduced to levels below the guideline values in order for those surfaces to be acceptable for release for unrestricted use.

The guideline value for removable activity is 200 dpm/100 cm^2.

The guideline value for average residual surface activity is 1,000 dpm/100 cm^2 averaged over a maximum area of one square meter.

The guideline value for maximum residual surface activity is 3,000 dpm/100 cm^2. Residual activity as high as this value is acceptable provided that the guideline value for average residual surface activity is not exceeded and that the area of maximum residual surface activity does not exceed 100 cm^2.

5.2 General Area Gamma Radiation Levels

The guideline value for general area gamma radiation levels is 5.0 μR/hr above background measured at one meter from the surface being monitored averaged over a maximum area of 100 m^2 provided that no discrete area of residual activity exceeds 10.0 μR/hr above background.

5.3 Radionuclide Concentrations in Soil

The guideline value for natural thorium concentrations (Th-232 and Th-228) in soil is 10.0 ρCi/g above background.

6.0 Background Survey

Because guidelines for residual radioactivity are presented in terms of radiation levels or radioactivity levels above background for the area or facility, it is necessary to perform and document a background survey. The purpose of the background survey is to obtain the site-specific background radiological information needed for use in comparing guideline values with measurements of actual radiological conditions.

Alpha and beta-gamma surface contamination background measurements will be determined in accordance with Reference 2.14. General area background gamma radiation levels will be determined at the site boundaries. In no case will background measurements, general area gamma radiation levels or bulk material radionuclide concentration be made within or very near the Curtis Bay Depot facility buildings marked for decommissioning.

Background soil samples will be collected from locations within a few kilometers of the Curtis Bay Depot site to minimize the possibility of using tainted soil samples for background determinations.

Because background levels will be subtracted from total observed radiation and contamination levels, the same instruments and techniques will be used for the background surveys as will be used in performing the characterization survey and final status survey so that background survey data and final status survey data are obtained with instrumentation having equivalent sensitivity and accuracy.

The SSHS shall ensure that background determinations are documented in sufficient detail and in a manner that facilitates independent review and verification of the data. Photographs of areas where background samples were collected (particularly if samples are collected off-site), in addition to sketches included as part of the survey package, may be helpful in later independent review of the background data.

6.1 Evaluation of Background Data

When the average background is insignificant relative to the guideline value, ten background measurements are usually adequate for evaluating radiological conditions. The background is considered insignificant if it is less than 10% of the guideline value. When the background level is significant relative to the guideline value (>10% of the guideline) the average background determination must be representative of the true background level to assure correct decisions in assessing final site radiological conditions. A representative background should accurately represent the true background average to within +\- 20% at the 95% confidence level. Selection of this criteria for defining an acceptable accuracy for background determinations is arbitrary, based on the natural variations of background levels occurring in the environment and the need to keep the effort and cost devoted to background determination reasonable.

Initially, ten measurements for each parameter of concern (direct surface alpha contamination, general area gamma radiation, soil radionuclide concentration, etc.) will be performed. From these ten measurements the average and the 95% confidence level will be determined. If the upper 95% level bound on the background average is less than 10% of the guideline value for that parameter, variations in background will be considered insignificant and no further measurements will be required. However, if the upper 95% level bound on the background average is greater than 10% of the guideline value, the background data will be tested to assure that the average represents the true mean to within +/- 20% at the 95% confidence level. If necessary, additional background measurements will be performed to satisfy this level of representativeness. The procedure for testing the data and determining the number of additional measurements needed is described in section 8.6 of Reference 2.2.

The total number of background measurements needed to satisfy the objective is calculated by the method presented in section 8.6 of Reference 2.2. If this calculation indicates that additional background data points are needed, they should be collected uniformly over the area sampled\surveyed using the same measurement methodology as that used for the initial ten measurements.

The description of the background survey which is contained in this section is sufficiently detailed that a background survey procedure, separate from and in addition to this decommissioning plan, is unnecessary.

7.0 Characterization Survey

The description of the characterization survey which is contained in this section is sufficiently detailed so that a characterization survey procedure, separate from, and in addition to this decommissioning plan, is unnecessary.

The purpose of the characterization survey is to identify every place within the Curtis Bay Depot facility where residual radioactivity exists in excess of established guideline values. In "unaffected areas" and in affected areas where contamination does not exceed project guidelines, results from the characterization survey may be used as part of the Final Status Survey. Direct surface radioactivity measurements, analyzing smear samples and analyzing samples of bulk materials for radionuclide concentrations are the methods to be employed for evaluating residual radioactivity levels remaining within the buildings.

Enough information is available to divide areas of the buildings into "affected" and "unaffected areas" before beginning the characterization survey. From data collected in Reference 2.4 and the history of the buildings, the exterior walls and roofs of the buildings as well as the interior walls above 2 meters are to be designated "unaffected". The building floors, interior walls below 2 meters, underlying soil, and pylons are designated "affected" based on data obtained in Reference 2.4. In the event that any unaffected areas are determined to be contaminated in excess of 25% of the guideline, the entire interior wall, roof, or other area will be designated "affected". This information, combined with the fact that thorium nitrate is crystalline in form and soluble in water, justifies the classification of the affected and unaffected areas.

Scans of unaffected areas surfaces will cover a minimum of 10% of the area. Surface contamination measurements will be taken at 30 randomly selected locations for each survey block. Scans of 100% of all affected areas will be performed.

Reasonable efforts shall be made to survey surfaces where access is prevented by the breech of structural integrity. The SSHS shall document any decision not to survey a given surface because of personnel safety considerations, contracted scope of work considerations or evaluation of contamination potential versus efforts required to make a given surface accessible.

Radiological surveys shall be documented in a manner that will enable an independent re-creation and evaluation of the data collected and the derived results.

For optimum detection sensitivity, headphones shall be worn by health physics personnel performing scanning surveys. It is imperative that headphones be used during performance of the scanning surveys that are part of the characterization survey because acceptable minimum detectable activities may not be attainable without using headphones. Using headphones enables the surveyor to discern smaller increases in audible count rate due to increases in radiation level measured by the detector which has the effect of lowering the MDA associated with the scanning technique. The RCS may allow the use of other audible indication, such as a speaker attached to or built into the instrument, in situations where it is not practicable to wear headphones. The SSHS shall ensure that headphones are used to the maximum extent practicable. Monitoring the audible response from a speaker attached to the survey instrument eliminates concern for the time lag inherent in a meter response, but doesn't minimize distractions from nearby noises or activities, such as the speaker response from other survey meters nearby.

7.1 Preparation for the Characterization Survey

To implement the survey strategy, certain portions of the buildings and land area around the buildings will be grouped into survey blocks. Each building will be broken down into the following survey blocks and their respective contamination potential classifications:

- exterior walls and roof (unaffected);
- interior walls below two meters (affected);
- interior walls above two meters and ceiling (unaffected);
- floor (affected);
- ground beneath the footprint of the building (affected); and
- ground surrounding the footprint of the building (a series of 10m by 10m grids which surround the building - unaffected).

In preparation for establishing a reference grid system on building surfaces, loose material which would interfere with measurements of surface radioactivity will be removed. Many areas of the buildings have surfaces covered with dust, vegetation and other debris which act as a barrier to alpha and beta particles. Loose material on building surfaces will be removed by suitable means. A specific work instruction for removing the loose material will be prepared prior to beginning this cleaning operation. Waste material resulting from this cleaning operation will be evaluated for radionuclide content and the presence of other regulated materials/substances before disposal of the collected material.

7.2 Reference Grid System

A reference grid system will be established by marking a series of intersecting lines onto surfaces to be surveyed such as floors, interior walls, exterior walls, exterior roof surfaces and exterior concrete (loading docks) or ground surfaces. In actual practice, only the intersection points of the imaginary lines will be marked on building surfaces. In instances where it is impracticable to mark interior ceiling surfaces, ceiling areas can be described by relating them to corresponding floor survey blocks. The grid system is referenced to a convenient origin such as the corner of a room, the corner of a building or some other convenient reference point. Individual survey blocks will have similar grid systems with different origins.

The grid system of intersecting lines will divide the surface to be surveyed into survey blocks of uniform 1m x 1m size for interior affected areas (floors) and the exterior loading docks, 3m x 3m size for interior unaffected areas (walls), interior ceiling area and exterior surface areas (roof, walls, etc.). Survey blocks smaller than those designated should be surveyed as if they were consistent with the grids in that area. Establishing a reference grid system is necessary in order to:

(1) facilitate systematic selection of measuring\sampling locations during the final status survey,

(2) provide a mechanism for referencing a measurement\sample back to a specific location so that the same survey point can be relocated, and

(3) provide a convenient means for determining activity levels per $100cm^2$ does not exceed unrestricted release guideline criteria.

7.3 Comprehensive Gamma Scan Survey

Prior to performing sampling or direct measurements for residual radioactivity in a given survey block, a gamma scan shall be performed to identify areas of elevated gamma radioactivity. Areas with elevated gamma radioactivity are more likely to contain residual radioactivity in excess of guideline values than are areas with background gamma radioactivity levels.

The gamma scan shall be performed with instruments selected from appendix B, table three or with instrumentation determined by the RCS to be equivalent. It is intended that the most sensitive portable instrumentation available be used for the general area gamma scan.

Gamma scans may be performed of all floor surfaces, exterior roof surfaces, outdoor pavement/ground surfaces, all interior and exterior wall surfaces, along the exterior of all ventilation ducting runs, etc. It is intended that surfaces being monitored for radioactivity during the performance of the characterization survey be scanned for gamma radioactivity. Scanning a given surface for gamma radioactivity discernable from the background level is a very effective screening process which serves to enhance the effectiveness of subsequent elements of the characterization survey.

The gamma scan data serves only to direct subsequent survey-block-by-survey-block surveying so that particular attention can be paid to areas more likely to have surface radioactivity in excess of guideline values.

7.4 Characterization of Surfaces Which are Mostly Two-Dimensional (floors, walls and ceilings)

Before conducting any fixed measurements, surfaces are scanned to identify the presence of elevated direct beta-gamma and alpha radiation. Scans are conducted for all radiations potentially present. The scanning detector is kept as close as possible to the surface while slowly moving the detector over the surface being scanned. The detector should be maintained as close as practicable to the surface. For beta-gamma scans, the detector should be maintained within two centimeters of the surface being scanned. For alpha scans, the detector should be maintained within one centimeter of the surface being scanned. For radiations from natural thorium and its daughters, the scanning rate should not exceed one detector width per second.

When performing scans of survey blocks for the presence of surface contamination, electrical boxes attached to walls, railings attached to floors, piping and wiring suspended from ceilings, structures built onto roofs, window sills and window frames which make up portions of walls, etc., shall all be scanned along with the two dimensional surface being surveyed. The SSHS is responsible for identifying structures, surfaces, etc., that may not have been surveyed as part of a survey block and for ensuring that such surfaces are adequately characterized according to the intent of the characterization section of this decommissioning plan.

7.4.1 Direct Measurements of Beta-Gamma Surface Activity

Direct measurements of beta-gamma surface activity shall be recorded in units of dpm/100 cm^2. In no case shall direct measurements of beta-gamma surface activity be recorded as dpm/probe (due to the varying probe faces that are utilized by RUST, dpm/probe is used out of convenience) unless the measurement is converted to dpm/100 cm^2 somewhere within the same entry or on the same survey record sheet.

Direct measurements of beta-gamma activity shall be performed with instruments selected from appendix B (Table 1) or with instrumentation determined by the SSHS to be equivalent.

Surfaces within each survey block shall be surveyed for the presence of beta-gamma emitting radioactivity by scanning the surface with an instrument selected from appendix B, Table 1. If surface activity is detected during the scan of the survey block that may exceed the guideline value for average surface contamination level (even an area as small as one spot), obtain four direct surface contamination measurements inside the survey block for use in determining the average surface contamination level of the survey block. The locations of the four measurements should be selected so that discreet areas of elevated activity are measured and used in determining the average activity of the survey block. One general area of the survey block should be identified as the area of maximum surface activity. This area of maximum surface activity should always be included as one of the four measurements used in calculating the average surface activity level.

It is intended that the locations selected for surface activity measurements be biased toward including all known areas of elevated surface activity. The locations selected for the four direct measurements should be as indicated in figure one of appendix C if small, discreet spots of surface activity can't be readily differentiated by the surveyor. The four point pattern shown in figure one should be used as a guide in selecting measurement locations in situations where the surface activity is elevated and more-or-less uniform or widespread. In summary, the actual conditions encountered within a survey block will dictate the locations of the four locations of measurements of direct surface activity unless the elevated activity is more-or-less uniformed or widespread, in which case four of the four measurements (the maximum measurement is made in the spot of maximum surface activity) can be made in the non-biased pattern shown in figure one of appendix C.

Scanning with a beta-gamma instrument is performed before scans with an alpha instrument because beta-gamma emitters are more readily detected than alpha emitters and, since all radioactivity present at Curtis Bay Depot facility is due to natural thorium and its daughters, alpha emitters should always be accompanied by the more readily detectable beta-gamma emitters.

While scanning for alpha and beta-gamma contamination, particular attention will be paid to areas identified as exceeding twice background during the general area gamma scans.

Areas determined to have surface activity in excess of guideline values shall be physically marked for subsequent decontamination. The method of marking shall be distinguishable from markings which serve other purposes. The method of marking contaminated areas for subsequent decontamination shall be specified by the SSHS.

Survey blocks which are scanned for the presence of beta-gamma radioactivity and are found to have surface contamination below guideline values, need not be scanned for the presence of alpha radioactivity. On some sites which have alpha-emitting and beta-gamma-emitting radionuclides, the guideline values for alpha surface activity are much lower than the guideline values for the beta-gamma emitters. On such sites, it would be prudent to scan for the presence of alpha surface activity even in the absence of beta-gamma surface activity. For the Curtis Bay Depot facility, the guideline values for alpha surface activity are equivalent to the guideline values for beta-gamma surface activity. It is partially due to these equivalent guideline values that scans for alpha surface activity are considered unnecessary when scans for beta-gamma surface activity indicate that beta-gamma surface activity is not present in amounts approaching guideline values.

7.4.2 Direct Measurements of Alpha Surface Activity

Direct measurements of alpha surface activity shall be recorded in units of dpm/100 cm^2. In no case shall direct measurements of alpha surface activity be recorded as dpm/probe unless the measurement is converted to dpm/100 cm^2 somewhere within the same entry or on the same survey record sheet.

Direct measurements of alpha activity shall be performed with instruments selected from table two of appendix B or with instrumentation determined by the SSHS to be equivalent.

Scans for direct alpha surface activity will be performed for survey blocks where scans for direct beta-gamma surface activity have been performed and elevated levels of beta-gamma surface activity were found which approach the guideline value for average beta-gamma surface activity, except as indicated in the remainder of this paragraph. It is assumed that significant alpha surface activity will not be detected in the absence of significant beta-gamma surface activity. The SSHS shall ensure that at least one entire survey block is surveyed by both beta-gamma and alpha scanning to test the previously-stated assumption. If this assumption is determined by the SSHS to be incorrect, this plan shall be revised accordingly before continuing the characterization survey.

In survey blocks where beta-gamma scans have detected the presence of surface activity which approach the guideline value for average beta-gamma surface activity and the average and maximum beta-gamma surface activity were determined, the average and maximum alpha surface activity shall be determined in the same manner.

7.4.3 Measurements of Removable Surface Activity

Measurements of removable surface activity shall be recorded in units of dpm/100 cm^2.

Analysis of smear samples shall be performed with instrumentation selected from table six of appendix B or with instrumentation determined by the SSHS to be equivalent.

One smear sample shall be collected from each survey block and subsequently analyzed for removable alpha and beta-gamma radioactivity. The smear sample will be collected from the location within the survey block which exhibits maximum surface (alpha and/or beta-gamma) activity as detected during the previous alpha or beta-gamma scans. In instances where a single area of maximum surface activity can't be distinguished or surface activity in the survey block is near background, the smear sample should be collected from the center of the survey block. This location for collection of a smear sample is somewhat arbitrary and is selected for the purpose of consistency. Chain-of-custody shall be maintained for smear samples in accordance with Reference 2.22.

7.4.4 Measurements of Gamma Radioactivity

Gamma exposure rate measurements shall be multiplied by the Quality Factor of 1. and shall be recorded in units of microrem/hr (μrem/hr) or millirem/hr (mrem/hr) as applicable. Gamma dose rate measurements shall be made with instrumentation selected from table three of appendix B or equivalent instrumentation as determined by the SSHS.

Gamma dose rate measurements shall be performed at one meter perpendicular to the plane of the surface being surveyed. One gamma dose rate measurement shall be measured and recorded for each survey block.

7.5 Characterization of Other Than Two-Dimensional Surfaces (pipes, ducting, etc.)

Buildings such as those at the Curtis Bay Depot facility are, of course, three dimensional and are composed of much more than just wall, floor, roof and ceiling surfaces, which are mostly two-dimensional. All surfaces must be evaluated during the performance of the characterization survey since fixed and removable surface activity can be expected on almost any exposed surface of a building.

Some characterization may have to be delayed until the remediation phase, such as surveying buried piping believed to be contaminated and performing soil samples underneath the building.

Many surfaces for characterization may be difficult to survey because of the inaccessibility of the material surfaces. These items shall be surveyed by performing as many of the following measurements as practicable:

(1) perform direct surface activity measurements of accessible openings as much as practicable,

(2) collect smear samples from as many accessible openings as practicable,

(3) collect bulk material from inside areas which are inaccessible to portable instrumentation detectors and analyze the bulk materials for concentrations of or the presence of radionuclides of interest.

Direct surface activity measurements, gamma dose rate measurements, analyses of smear samples and analyses of bulk materials shall be made with instrumentation selected from tables one through six of appendix B or equivalent instrumentation as determined by the RCS.

Smear samples shall be collected from within areas inaccessible to portable instrumentation detectors as deeply as practicable by using suitable extension devices with smears attached to reach into the opening being surveyed. Smear samples collected just inside openings by hand may not be representative of the radiological condition deeper into the opening.

Bulk material shall be collected from areas inaccessible to portable instrumentation detectors to supplement information obtained by collecting and analyzing smear samples from the same area. Particular attention shall be given to low points where radioactive material would be expected to accumulate.

The primary purpose of collecting samples of bulk materials from inside areas inaccessible to portable instrumentation detectors is to guide the radiological investigation of such areas.

7.6 Characterization of Soil

7.6.1 Scope of Soil Characterization

After each building at the Curtis Bay Depot facility has been razed and the footprint of each building has been cleared of rubble, the remaining soil will be characterized to establish whether or not the thorium concentration in the soil is within guideline values. A separate work instruction or procedure will be prepared which will address the method of razing the buildings and of monitoring the building rubble before disposing of the rubble as non-contaminated building debris.

Present plans call for razing of the building once it has been characterized, remediated and released from radiological controls. It is likely that only the brick pylons of the building that were in contact with the soil will require monitoring before disposal, since all other portions of the building will already have been monitored for the presence of surface activity.

7.6.2 Reference Grid System

A reference grid system shall be established for the soil beneath the buildings. A system of perpendicular imaginary grid lines will be spaced ten (10) meters apart forming a pattern of square survey blocks of equal size (10x10 meters). A two-dimensional coordinate system for distinguishing one survey block from another will be specified by the SSHS.

7.6.3 Collection of Surface and Subsurface Soil Samples

Ensure that the locations of any underground utilities or other hazardous energy sources that might interfere with the safe collection of surface and subsurface soil samples are known to the workers prior to collecting soil samples. Locations of such hazards shall be marked on the surface of the ground with stake wire flags or other suitable means.

Sample size, specific sample container to be used and specific sample collection equipment to be employed shall be determined by the SSHS.

It is anticipated that only shallow subsurface soil sampling will be necessary. The soil sampling equipment employed shall be capable of removing discreet cores of soil twelve inches thick. The soil sampling equipment should collect a sufficient volume of soil to fill one sample container each time a core of soil is collected.

All samples shall be discrete cores of soil collected from locations identified by a physical marker, such as a stake wire flag, and identified with a unique number which implies the location from where the sample was collected and other pertinent information required by the SSHS. The SSHS shall designate or approve of a sample identification system for soil samples which is compatible with the grid system employed and provides sufficient information to distinguish one sample from all other samples.

Each soil area survey block shall contain no more area than 100 m^2. It is intended that the characterization soil survey be performed by collecting samples in a biased manner from locations which exhibit elevated gamma radiation levels distinguishable from background radiation levels. Soil areas will be characterized by evaluating many survey blocks which, when combined, makeup the entire soil area. Since a given survey block may have none-at-all, few or many discrete locations of elevated gamma radioactivity, a minimum number of four (4) soil samples must be collected and analyzed to arrive at an informed conclusion regarding the radiological status of that survey block.

Prior to collecting soil samples, the soil area shall have been surveyed in accordance with sections 7.3 and 7.4 of this plan by scanning the surface of the soil with instrumentation from table three of appendix B to locate areas of soil which exhibit elevated gamma radiation levels, which might indicate residual gross activity or hot spots. Areas of soil which exhibit elevated gamma radiation levels shall have been documented by designating these areas on drawings or sketches of the areas surveyed. These areas shall also have been physically marked, where practicable, to facilitate relocating the area for collection of soil samples.

A minimum of four (4) soil sampling locations shall be selected for each survey block as shown in figure two of appendix C. The purpose of the sampling scheme shown in figure 2 is to provide a minimum number of sampling locations in the absence of elevated gamma radiation levels to adequately assess the soil concentration of radionuclides in all areas of the survey block.

Within the survey blocks (100 m^2), areas of elevated gamma radiation levels shall be divided into 5m x 5m survey blocks as shown in appendix C figure three, to facilitate detailed soil sampling for elevated gamma radiation levels. The remaining unaffected survey blocks will require one confirmatory sample from each block to ensure the soil is below the release criteria.

Grass, large rocks, and foreign objects shall be removed from soil samples to the degree practicable at the time of sampling. If there is reason to believe that any of these materials contain elevated radioactivity, the material in question shall be retained as a separate sample. Sampling tools shall be cleaned and monitored following each use to minimize the possibility of cross-contamination of samples.

Compositing of samples shall be avoided, since results obtained from analysis of composite soil samples are of limited value. Determining the average soil concentration of radionuclides in a given area of soil shall be determined mathematically from the results of a number of discrete samples of soil.

7.6.4 Analysis of Soil Samples

Soil samples will be analyzed by RUST health physics personnel using instrumentation from table five of appendix B in an on-site laboratory.

Soil samples shall be prepared for analysis and analyzed in accordance with a specific work instruction or procedure which shall be prepared prior to collecting and analyzing soil samples. The procedure developed for analyzing soil samples will ensure that samples are analyzed by trained individuals using appropriate equipment and procedures. The method for evaluating soil samples will be in accordance with NUREG 5849, in conjunction with Gamma Spectroscopy training personnel. The analysis procedure will document the laboratory's analytical capabilities for the radionuclides of interest.

The guideline values for natural thorium concentration in soil is given as 10 ρCi/g in accordance with Reference 2.3. The guideline value for natural thorium for the Curtis Bay facilities shall be established by the NRC.

7.6.5 Hydrogeologic Assessment

RUST Environment and Infrastructure (RE&I) will perform the hydrogeologic assessment of the area containing the nine buildings addressed during this project. The assessment will be performed according to a detailed work plan being developed by RE&I.

Initially, RE&I will research background information and evaluate it for applicability and validity. They will then perform a preliminary hydraulic characteristics evaluation using the six existing monitoring wells on-site. Basic contaminant transport calculations will be conducted based on the characteristics of thorium nitrate and groundwater flow parameters to determine the likely location of thorium contamination if it has reached the water table.

A soil boring program will then be implemented. One soil-test boring will be drilled adjacent to each of the eight buildings with known thorium release to determine if thorium is present in the subsurface soils and at what depths.

In-situ groundwater sampling adjacent to buildings with known thorium releases will be conducted to determine if thorium is present in the groundwater at these locations. Additional locations will be chosen based on the results of the preliminary hydraulic characteristics evaluation and the soil sampling effort.

When the data acquisition phase is complete, RE&I will prepare a report of their findings with recommendations for additional sampling locations, permanent monitoring wells, and any further groundwater and/or soil remediation.

8.0 Final Status Survey

The purpose of the final status survey is to demonstrate that the radiological conditions at the Curtis Bay Depot facility satisfy the NRC guidelines approved for use at this site which are contained in this decommissioning plan and that the buildings should, therefore, be released for unrestricted use without the need for radiological controls. The specific objectives of the final status survey are to demonstrate that:

A. Residual Surface Activity of Building Surfaces and Structures

1. Reasonable efforts have been made to clean up removable activity and remaining removable/fixed activity does not exceed the authorized guideline values.

2. Average exposure rates resulting from residual activity are less than 5 μrem/hr above background.

B. Volume Activity of Soil

1. Concentrations of natural thorium are within the authorized guideline value. Soil radionuclide concentrations are averaged over a maximum area of 100 m^2.

2. Reasonable efforts have been made to identify and remove areas of elevated soil activity that may exceed the guideline value.

3. Biased sampling will be performed to demonstrate that the total thorium concentration is less then 10 pCi/g.

C. Exposure Rate

1. Exposure rates do not exceed 5 μrem/hr above background at 1 meter above the surface. Exposure rates may be averaged over a 100 m^2 grid area. Maximum exposure rates over any discrete area may not exceed 10 μrem/hr above background.

The radiological conditions described above will be demonstrated at a 95% confidence level for each survey block as a whole.

Although the final status survey is used to determine the final condition of the site, it may not necessarily be performed as a single specified stage of the decommissioning process. In accordance with Reference 2.2, data from surveys conducted at other stages of the decommissioning, such as scoping survey and characterization survey, can, under proper conditions, be incorporated into the final status survey.

This methodology will be implemented in the final status survey of the Curtis Bay Depot facility. Since the buildings will be razed as the characterization survey determines the specific structures are below the guidelines for residual activity, there will be no structure available for final survey. However, final surveys will be performed for the area in which the building was razed.

8.1 Reference Grid System

A reference grid system has been established for the characterization survey and will be used for the final status survey. Portions of the grid system should be re-established as a result of decontamination activities that would have destroyed grid markings on original surfaces.

8.2 Data Interpretation

Radiological measurement data will be converted to units of dpm/100cm^2 (surface activity), μrem/hr (exposure rates) and ρCi/g (soil radionuclide concentrations) for comparison with guideline values. Values will be adjusted for contributions from natural background. Individual measurements and soil concentrations will be compared guideline values for maximum (hot-spot) activity. Average values for survey block radiological parameters will be determined and compared with guideline values for average activity. Data collected during the final status survey for each survey block will be tested against the confidence level objective using guidance and procedures described in Reference 2.2 (NUREG/5849).

Additional remediation and/or further sampling and measurements will be performed where guidelines are not met or cannot be demonstrated to the specified level of confidence. Computations and comparisons will be repeated as necessary.

Appendix A

RUST Administrative Exposure Limits

(2 Pages)

NRS ADMINISTRATIVE LIMITS

LEVEL	ACCUMULATED DOSE (Rem)	CATEGORY	CALENDAR PERIOD	APPROVALS REQUIRED FOR EXTENSION
I	0.25	TEDE	Month	RCS/RSO, or equivalent, and Project Manager
	0.75	LDE	Month	"
	2.5	SDE, TODE	Month	"
II	0.5	TEDE	Month	DHP and NRS Operations Manager
	1.5	LDE	Month	"
	5.0	SDE, TODE	Month	"
III	1.0	TEDE	Quarter	NRS Health and Safety Manager and NRS General Manager
	3.0	LDE	Quarter	"
	10.0	SDE, TODE	Quarter	"
MAXIMUM LIMIT	4.0	TEDE	Annual	No Extension Allowed
	12.0	LDE	Annual	"
	40.0	SDE, TODE	Annual	"

TEDE Total Effective Dose Equivalent
LDE Lens Dose Equivalent
SDE Shallow Dose Equivalent
TODE Total Organ Dose Equivalent

Appendix B

Tables

(8 Pages)

TABLE 1

Direct Beta-Gamma Survey Instruments

INSTRUMENT	DETECTOR	REMARKS
Ludlum Model 2221	Ludlum 43-68	Gas proportional detector with a .8 mg/cm^2 window. Effective area of 100 cm^2.
Ludlum Model 2220	Ludlum 43-68	Gas proportional detector with a .8 mg/cm^2 window. Effective area of 100 cm^2.

TABLE 2

Direct Alpha Survey Instruments

INSTRUMENT	DETECTOR	REMARKS
Ludlum Model 2220	Ludlum 43-65	Zinc Sulfide scintillation detector with a .8 mg/cm^2 window. Effective area of 50 cm^2.
Ludlum Model 2221	Ludlum 43-5	Zinc Sulfide scintillation detector with a .8 mg/cm^2 window. Effective area of 50 cm^2.
Ludlum Model 2221	Eberline AC-3	Zinc Sulfide scintillation detector with a .5 mg/cm^2 window. Effective area of 59 cm^2.
ESP-2	Eberline AC-3	Zinc Sulfide scintillation detector with a .5 mg/cm^2 window. Effective area of 59 cm^2.

TABLE 3

Gamma Survey Instrumentation

INSTRUMENT	DETECTOR	REMARKS
Ludlum Model 19 (Micro R)	Internal	2.5 x 2.5 inch internal Sodium Iodine scintillation detector.
ESP-2	Eberline HP-270	Geiger-Mueller detector.
ESP-2	Eberline SPA-3	2 x 2 inch Sodium Iodine scintillation detector.
ESP-2	Ludlum 44-33	2 x 2 inch Sodium Iodine scintillation detector.

TABLE 4

Airborne Radionuclide Collection and Monitoring Equipment

INSTRUMENT	DETECTOR	REMARKS
EBERLINE ALPHA 5A	Internal Zinc Sulfide detector	Low volume continuous air sampler with audible and visual alarm.
SAIC RADECO	N/A	High volume air sampler
EBERLINE MODEL RAS-2	N/A	High volume air sampler
GILAIR PERSONAL AIR SAMPLER	N/A	Low volume air sampler

TABLE 5

Soil Analysis Instrumentation

INSTRUMENT	DETECTOR	REMARKS
EG & G Gamma Spectroscopy system	Solid State Germanium detector	High Purity Germanium detector.

TABLE 6

Smear Sample Analysis Instrumentation

INSTRUMENT	DETECTOR	REMARKS
Protean low background Alpha/Beta Automatic Planchet Counting System Model #9025	Internal	Gas Proportional detector with a .4 mg/cm^2 window. Effective area of 50 cm^2.
Ludlum 2929 Dual Channel Alpha/Beta Scaler	Ludlum 43-10-1	Scintillation detector

TABLE 7

Personnel Monitoring Instrumentation

INSTRUMENT	DETECTOR	REMARKS
Eberline RM-20	Eberline HP-260	Geiger-Mueller detector with a 1.4 mg/cm^2 window. Effective area of 15.5 cm^2.
Eberline RM-14	Eberline HP-260	Geiger-Mueller detector with a 1.4 mg/cm^2 window. Effective area of 15.5 cm^2.
Eberline PAC 4S	Eberline AC3	Zinc Sulfide scintillation detector with a .5 mg/cm^2 window. Effective area of 59 cm^2.

Appendix C

Figures

(4 Pages)

FIGURE ONE

Four (4) measurement locations for determining the average surface activity of a 1m x 1m survey block.

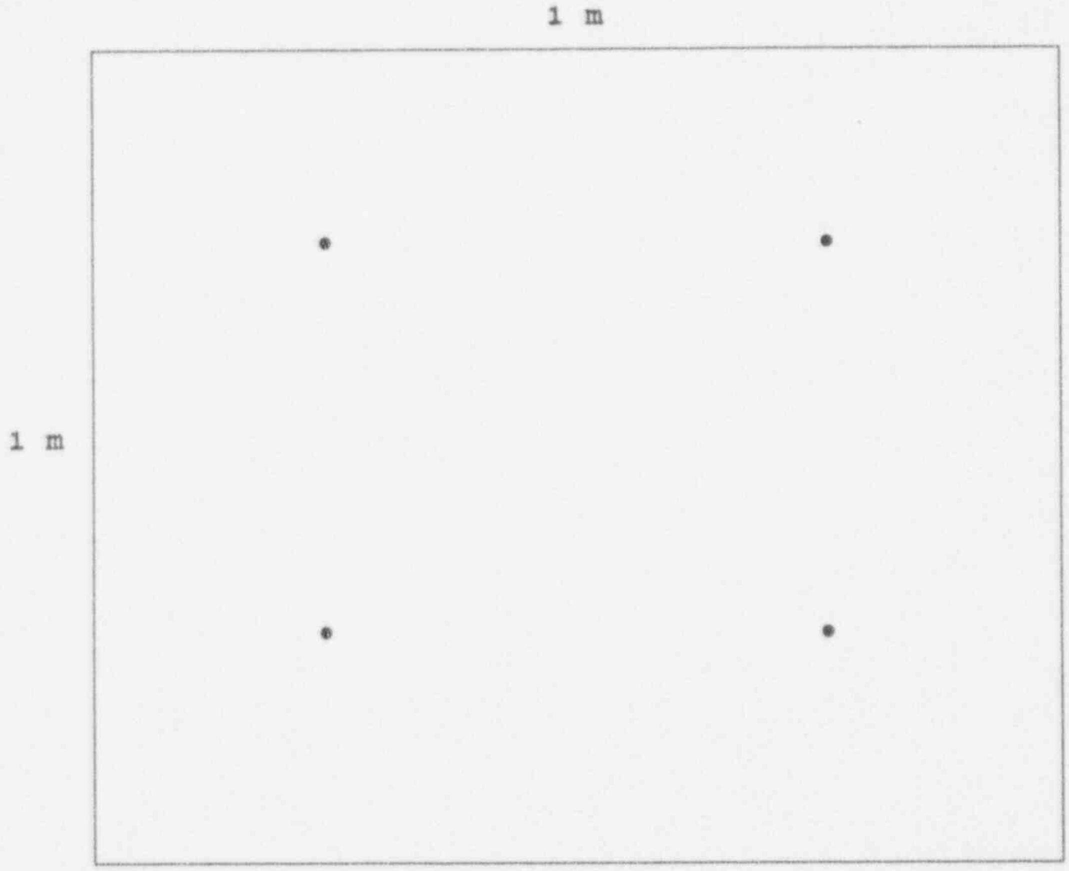


FIGURE TWO

Four (4) soil sampling locations for determining the average soil radionuclide concentration of a 10m x 10m survey block.

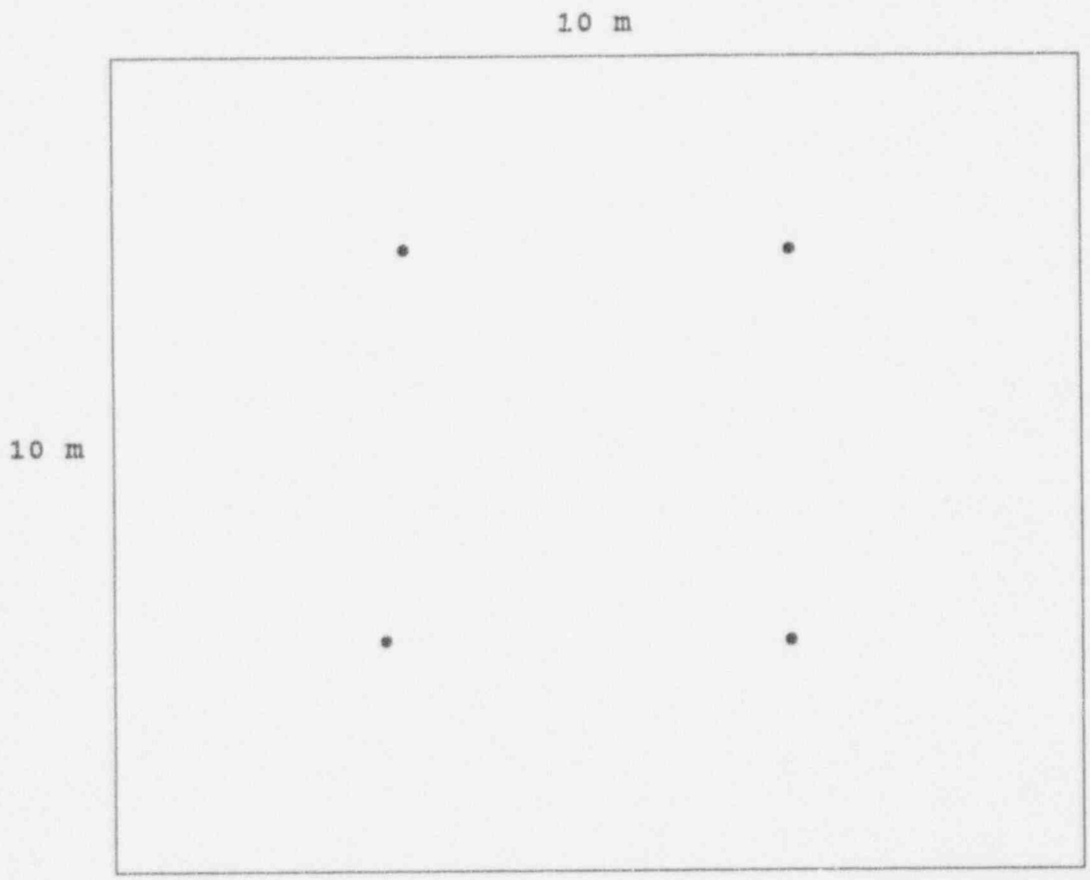
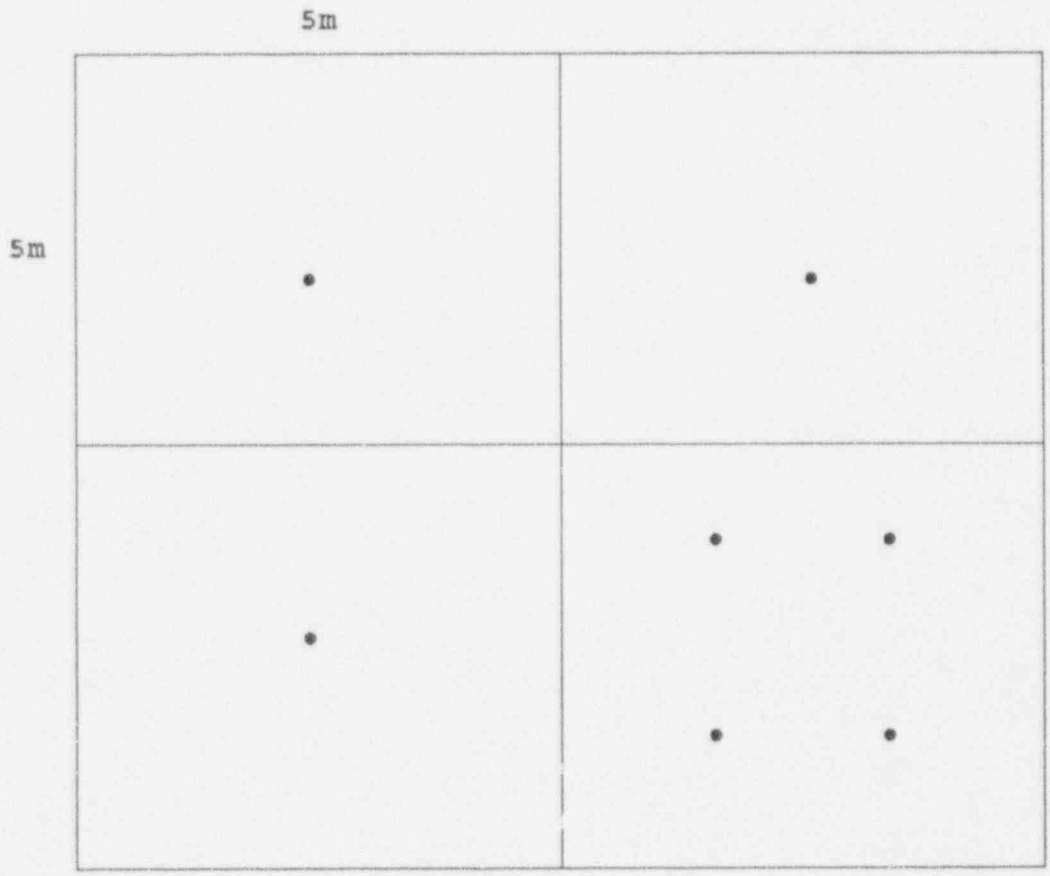


FIGURE THREE

Soil sampling locations for determining the average soil radionuclide concentration of a 10m x 10m survey block which has been subdivided into 5m x 5m survey blocks due to areas of elevated gamma radiation levels, or soil samples above the release criteria.



Appendix D

Project Schedule

(2 Pages)

Project Schedule

Client/Regulatory Review Phase

Event	Forecast Completion Date
NRC/DLA Review Final D&D Plan	-3 weeks
D&D Plan Finalized	-3 weeks

Project Phase

Event	Forecast Completion Date
Submit Work Plans/Procedures	-3 weeks
Work Plans/Procedure Approval	-3 weeks
Complete Mobilization/Training	T_0
Modify Fencing/Cut Vegetation	+1 week
Complete Remediation & Confirmation Surveys	+13 weeks
Site Restoration Complete	+14 weeks
NRC Survey Confirmation Complete	+15 weeks
Demobilization Complete07/02/94	+16 weeks

Post-Project Phase

Event	Forecast Completion Date
Final Report Complete	+24 weeks
Project Complete	T_F

Appendix E

Personnel Qualifications and Résumés

(24 Pages)

PHILLIP J. MALICH
PROJECT SUPERVISOR

EDUCATION

B.S., Valdosta State College, Valdosta, Georgia, 1989

CERTIFICATIONS

American Managers Association Leadership Seminar
Primavera Project Planning
Expedition Project Controls
OSHA 40-Hour Basic Worker Training
OSHA 8-Hour Supervisor Training
First Aid/CPR

EXPERIENCE SUMMARY

Mr. Malich has over twenty years of supervisory experience in training, scheduling, and supervising personnel. He is skilled in the supervision of line operations personnel and troubleshooting/ maintenance of mechanical and electronic systems.

WORK HISTORY

1993 to Present - Rust Remedial Services Inc., Columbia, South Carolina
Project Supervisor

1994 - Mallinckrodt Specialty Chemical Company, Area 510 Grid 8, St, Louis, Missouri
Project Manager
Supervised Grid 8 excavation and final verification surveys/soil samples. Coordinated subcontract labor for heavy equipment operation. Interfaced with Mallinckrodt Engineering department to ensure customer's needs were met. Completed on time and under budget.

1993 - U.S. Army Aberdeen Proving Grounds, Aberdeen, Maryland
Project Manager
Coordinated efforts in the development of Safety and Health, Quality Assurance, Radiation Protection, and Site Work Plan. Interfaced with Business Development personnel to ensure timely and correct submission of deliverables. Scheduled all aspects of the project using Primavera Project Management (P3) system, including pricing ($2.1M) and allocation of available resources. Interfaced with State Agencies to identify project specific permit requirements.

1993 - Mallinckrodt Specialty Chemical Company, Building 235, St. Louis, Missouri
Project Manager
Responsible for on-site operations involving characterization and remediation of soil within building 235. Worked under severe time constraints due to all production by customer on hold until resolution. Coordinated efforts between customer and construction Project Manager to ensure minimal delay. Project completed on time and under budget.

1993 - Curtis Bay Army Depot, Baltimore, Maryland
Project Manager
Developed D&D plan and $1.2M detailed costing for nine thorium nitrate contaminated buildings. Coordinated efforts between asbestos abatement firm and demolition firm to handle all aspects of the deconstruction of buildings, remediation of soil within the footprint of the buildings and disposal of all waste.

1993 - Mallinckrodt Specialty Chemical Company, St. Louis, Missouri
Project Manager
Responsible for all on-site operations, involving conduct of Pilot Water treatment test, preliminary site characterization, involving over 80 soil sample, excavation, and packaging of radioactive waste. Included sampling, repackaging of nineteen 20-yd rolloff containers resulting in over 289 SuperSacs. Coordinated efforts between customer and Department of Energy for long-term storage. Utilized on-site mobile laboratory to provide accurate and timely analysis to the customer.

1992 - Ste-Lar Textiles Thorium-Contaminated Material Removal, Camden, New Jersey
Project Supervisor
Responsible for initial pricing, planning, organizing, budgeting, and management of a project which removed and shipped over 450 tons of thorium-contaminated material and equipment from a building in Camden, New Jersey. Worked closely with Project Manager to ensure that all provisions of the contract were fulfilled, while operating in strict compliance with all company, state, and federal regulations. Replaced Project Manager on several occasions. On-site operations were completed according to schedule using only one-half the number of allotted laborers and shipped one and one-half times the number of containers.

1971 to 1992 - U.S. Navy, Strategic Weapons Forces

1990 to 1992 - Assistant Strategic Weapons Repair Division Officer
Managed over 53 civilian and military personnel, responsible for the day-to-day operation of four Trident repair shops activation.

1988 to 1990
Tasked with the activation of a Second Level Electronic and Mechanical Repair Shop. Developed procedures, procured equipment and established manning levels to accomplish expected maintenance tasks.

DAVID A. VALENTINE
INDUSTRIAL HEALTH AND SAFETY SUPERVISOR

QUALIFICATIONS

U.S. Navy, Washington, DC:
- Training/Instructor - Crew Divisional Training Representative
- Engineroom Supervisor - Shutdown Roving Watch
- Gauge Calibration Technician
- Submarine Control Material Supervisor

Chemical Waste Management, Columbia, SC:
- Barnwell Site Orientation
- 40-Hour OSHA Training
- 8 Hour Supervisory OSHA Training
- Site Safety Officer Qualifications

EXPERIENCE SUMMARY

Mr. Valentine has more than 12 years of experience in the nuclear industry. While with Chemical Waste Management, he has achieved the qualifications of Radiological Controls Supervisor, Waste Broker, Waste Treatment Technician, and Cost/Scheduling Technician.

WORK HISTORY

1989 to Present - Rust Federal Services, Inc., Columbia, South Carolina

June 1993 to January 1994 - Pit-9 Proof of Process, Clemson Technical Center, Anderson, South Carolina
Site Safety and Radiological Controls Officer
Responsible for the implementation and coordination of all aspects of the Pit-9 Health and Safety Plan. Provide oversight and monitoring of project personnel in the areas of radiation safety, industrial safety, and industrial hygiene. Also responsible for compliance of all project operations in these areas. Maintained responsibility of subcontractors during mixing of hazardous and radioactive sludges for the Proof of Process in the areas of radiation control monitoring and industrial hygiene monitoring. Provided assistant to project management in the areas of procurement and cost tracking.

1993 - Riedel-Peterson, Grand Isle, Louisiana
Provided assistance and oversight in the evaluation of Riedel-Peterson's remediation program. Was instrumental in obtaining a radioactive materials license for Riedel-Peterson. Site visit and inspection by the Louisiana Department of Environmental Quality revealed no major deficiencies. Received numerous complements from customer and from Exxon Corporation.

1993 - SAIC, Rockville, Maryland
Radiological Controls Supervisor/Broker
Supervised the survey and release of an analytical laboratory. Responsible for the packaging, manifesting, and shipment of 72,000 pounds of contaminated soil and building rubble. Accomplished all tasks in a timely manner, ahead of schedule and well below budget. Worked with burial site closely to ensure waste was disposed of prior to 1993, resulting in a significant savings to the customer.

1992 - Broker, Columbia, South Carolina
Responsible for packaging, transportation, and disposal of contaminated waste from the University of Kansas Research Reactor Dismantlement. Successfully disposed of over 35,000 pounds of contaminated rubble and reactor components. Ensured all manifests were in compliance with all local, state, and federal regulations for transportation and disposal. Accomplished work mission on short schedule under adverse weather conditions with compliments from customer.

Provided emergency response services to Chambers Medical Technologies in Hampton, South Carolina. Packaged and shipped radioactive medial waste back to hospital. Customer compliments on response time and ability to effectively handle problem.

1992 - RUST Federal Services, Inc., Oak Ridge, Tennessee
Responsible for the training and qualification of over 200 local hire personnel as radiation workers. Supervised the initial start-up of a Department of Energy Project dealing with 33,000 drums of hazardous waste processing. Tracked project costs for Health Physics personnel and consumable supplies. Implemented a program by which CWM and DOE successfully coordinated on posting, surveying, and reporting radiological conditions on project site. Utilized many new pieces of equipment not previously used in this line of work, (i.e. Protean Automated Smear Centers, Liquid Release Testing Device, Mobile Sludge Dryer Units). Maintained all records associated with training, personnel, and instrument calibration and maintenance.

1991 to 1992 - Radiological Controls Supervisor, BP Chemical Cat-21 Remediation Project, Lima, Ohio
Responsible for the training and qualification of 75 subcontractor personnel as radiation workers. Supervises the demolition and decontamination of the Acrylonitrile facility. Provides oversight of the excavation and disposal of 90,000 cubic feet of soil contaminated with depleted uranium. Tracks project costs for Health Physics personnel and consumable supplies. Maintains instrument calibration and maintenance records. Trained in the use of the Canberra HpGe Accuspec gamma spectroscopy system.

1991 - Radiological Controls Supervisor and Cost/Scheduling Control Technician, Hoffman-LaRoche Acceleration, Emeryville, California
Responsible for the training and qualification of ten subcontractors as radiation workers. Supervised the decontamination and demolition of the accelerator vault. Tracked all project costs and coordinated with Corporate Office to keep daily costs in line. Project completed significantly ahead of schedule with compliments from State of California and customer.

1990 to 1991 - Senior Radiological Controls Technician, Waste Treatment Technician - Radiation Sterilizers, Inc., Decatur, Georgia
Served as Assistant Radiological Controls Supervisor and supervised ten personnel aiding in decontamination efforts for the RSI Facility. Assisted in the treatment of the source pool water using the pool demin system.

1990 - Waste Treatment Technician - Savannah River Plant, Retention Basin Processing and Cleanup, Jackson, South Carolina
As a Waste Treatment Technician and supervisor of site operations, directed and maintained the CWM-Nuclear Portable Demineralization Unit to aide in the processing of over 25 million gallons of radioactive liquids.

1990 - Radiological Controls Technician - Cambridge Medical Facility, Billeria, Massachusetts
Supervised decontamination and remediation efforts of the medical laboratory facility. Responsible for daily instrument checks and surveys. Directed the packaging of materials and waste for storage and decay.

MARYANN T. KOCH, MSPH, IHIT
INDUSTRIAL HYGIENE SPECIALIST

EDUCATION

MSPH, Industrial Hygiene and Safety Management, University of South Florida, Tampa, Florida, 1992
B.S., Chemistry, University of South Florida, Tampa, Florida, 1991
40-Hour OSHA Training
OSHA Supervisor Training
Advanced RCRA Training
OSHA Instructor Training for the Construction Industry

WORK HISTORY

1993 to Present - Rust Nuclear Remedial Services, Columbia, South Carolina
Industrial Hygienist
Duties include assuring that the divisional safety procedures, project work instructions and plans, business proposals, and site specific health and safety plans are in compliance with occupational safety and health and environmental acts/regulations/standards such as OSHA, RCRA and CERCLA. Also responsible for advising site personnel in all areas of industrial hygiene including field monitoring, sample collection and analysis, sample data reduction, the use of exposure controls including engineering and administrative practices, and the selection and wear of personal protective equipment and clothing. Responsible for performing site audits and surveillances, providing health and safety training, maintaining the division OSHA 200 Log and 101 Forms, coordinating worker's compensation, and purchasing industrial hygiene equipment.

1992 to 1993 - KEM, Tampa, Florida
Industrial Hygienist
Responsibilities included asbestos surveys, hazard assessments, preparation of asbestos operations and management programs. Performed indoor air quality surveys including air monitoring, ventilation assessments, and asbestos bulk sampling.

1991 to 1992 - Wadsworth/Alert Labs, Tampa, Florida
Chemist/Laboratory Safety Officer
Responsible for pesticide, herbicide, and PCB sample preparation and gas chromatography analysis of soil, water, and waste samples. Implemented software to interface and computerize all GC analysis. Performed laboratory safety audits and was hazardous waste management.

1990 to 1991 - Honeywell, Inc., Clearwater, Florida
Industrial Hygienist
Duties included air, water, and soil sampling, noise measurement, temperature extreme monitoring, sizing methodology, indoor air quality/ventilation analysis, ergonomic evaluation, electromagnetic field measurement, safety inspections, hazardous waste management, and qualitative and quantitative respirator fit testing. Also performed portable gas chromatography analysis, received training to sample in clean rooms, ultra-clean rooms, radiation areas, and beryllium work areas. Responsible for report writing, data collection, and QA/QC.

AWARDS

NIOSH Traineeship Recipient - Graduate Studies

CERTIFICATIONS

Certified by the American Board of Industrial Hygiene as an Industrial Hygienist in Training (IHIT)

WILLIAM J. HLOPAK
PROJECT MANAGER

EDUCATION

B.S., Marine Engineering, U.S. Naval Academy, 1981

U.S. Navy:
- Prospective Nuclear Engineer Officer Course, 1986
- Chemistry/Radiological Control Officer Course, 1986
- Nuclear Power Training Unit, 1982
- Nuclear Power School, 1982

OSHA 40-Hour Health and Safety Training, 1992
OSHA 8-Hour Supervisor Course, 1992
Project Management System Course, 1992
Transportation Seminar, 1992
First Aid/CPR, 1992
Confined Space, 1993
DOT HAZMAT Employee, 1993

EXPERIENCE SUMMARY

Mr. Hlopak has over eleven years of management and supervisory experience in government and commercial low-level radioactive and hazardous waste sit remediation, and the Navy's nuclear power program. He has gained this experience through w k on several remediation projects and time spent in the U.S. Navy. Specifically, he has been assigned to the Restart Team of the K-25 Sludge Dewatering Project; as Project Manager for Ste-Lar Textiles Thorium Contaminated Material Project; and Brookhaven National Laboratory Underground Storage Tank Removal Project; as well as Training Coordinator on the K-25 Sludge Dewatering Project. He has previously been responsible for the operation and maintenance of reactor and propulsion plant systems. He has maintained records of radiation exposure and reactor plant chemistry, and has supervised several major nuclear maintenance projects and test programs. He is currently assigned as a Project Manager.

WORK HISTORY

1993 to Present - RUST Remedial Services Inc., Columbia, South Carolina
Project Manager

Brookhaven National Laboratory Underground Storage Tank Removal, Upton, Long Island, New York
Organized and managed a project which sampled and characterized several underground storage tanks of mixed hazardous waste. Analysis and treatability studies were conducted on the waste in order to determine the most cost-effective method of treatment and disposal of the waste followed by removal of storage tanks. Interfaced with the analytical/treatability laboratory to ensure that all requirements of the contract were met and results supported the recommended treatment and disposal method.

1992 to 1993 - CWM Nuclear Remedial Services, Inc., Columbia, South Carolina
Project Manager

Restart Team K-25 Sludge Dewatering Project, Oak Ridge, Tennessee
Project Manager
Assigned as a member of the K-25 Sludge Dewatering Project Restart Team. Responsible for developing restart plans for resumption of Thermal Process Operations, and modifications to existing processing facilities at the K-25 Site. Assisted in the implementation of a tracking system to ensure all Restart Plan items are resolved and completion documented. Additionally, prepared several plans, procedures, and instructions required to conduct project operations.

Ste-Lar Textiles Thorium Contaminated Material Removal, Camden, New Jersey
Project Manager
Responsible for the planning, organization, budgeting, and management of a project which removed and shipped over 450 tons of Thorium-contaminated material and equipment from a building located in Camden, New Jersey. Worked closely with the New Jersey Department of Environmental Protection and Energy to ensure that all provisions of the contract were fulfilled, while operating in strict compliance with all company, state, and federal regulations. Tracked all rail shipments of waste from the project site to final disposal in Hanford, Washington. On-site operations were completed according to schedule using only 1/2 the number of allotted laborers, and shipping 1 1/2 times the number of containers estimated.

K-25 Sludge Dewatering Project, Oak Ridge, Tennessee
Training Coordinator
Planned and scheduled the training required for K-25 Site access for approximately 150 project personnel. Interfaced with several organizations both on-site and off-site to coordinate the myriad of training courses at a variety of locations. Tracked completion of individuals' training, and submitted the documentation necessary for badging.

1981 to 1992 - United States Navy, Commissioned Officer

1989 to 1991 - Navigator/ Operations Officer on Nuclear Submarine
Supervised and directed Navigation and Operations Department (2 officers and 22 enlisted men). Responsible for safe navigation, communications, security, as well as operations and maintenance of an inertial navigation system, radar, communications equipment and various auxiliary equipment. During an 11-month shipyard period functioned as ships force representative on both the Joint Test Group, which approved and coordinated ship-wide system testing, and the Ship Safety Council with responsibility to control maintenance affecting watertight integrity. In addition, provided senior supervision of reactor plant tests and major evolutions during system acceptance test programs.

1986 to 1989 - Assistant Operations and Electronic Materials Officer, Submarine Squadron 8

Responsible for scheduling maintenance, equipment installations, and operations for 14 nuclear powered submarines. Planned and supervised several major projects/exercises to increase ships operational readiness and/or correct system deficiencies. Conducted certification of ship's Engineering Departments following extensive shipyard periods.

1983 to 1986 - Division Officer and Watch Officer on Nuclear Submarine During Refueling Overhaul

Performed as Electrical Officer, Interior Communications Officer, Chemistry and Radiological Controls Assistant, Damage Control Officer, and Quality Assurance Officer. Engineering Watch Officer for several major evolutions and tests during overhaul, including: reactor plant drain, fill and hydrostatic testing; refueling and initial criticality/power range testing; and steam generator chemical cleaning. Responsible for all radiological controls during extensive maintenance in radiation areas. Verified proper controls were maintained during ripout of components containing asbestos.

WAYNE C. GAUL, C.H.P.
DIVISION HEALTH PHYSICIST

EDUCATION

Ph.D., Student in Environmental Health, University of South Carolina, Columbia, South Carolina
M.S., Radiation Biophysics, University of Kansas, 1983
M.B.A., Business Administration, University of Kansas, 1983
B.A., Biology, University of Kansas, 1972
Radiation Chemistry, Computer Automated Design, University of Idaho
40-Hour OSHA Training and 8-Hour Supervisor Training

CERTIFICATIONS

Certified Health Physicist, Comprehensive, American Board of Health Physics, 1991

EXPERIENCE SUMMARY

Mr. Gaul has more than ten years of experience in the nuclear industry, with specific experience in radiological instrumentation, applied health physics and waste management. As the Division Health Physicist, he oversees evaluation and coordination of alternative technologies to improve waste handling and minimize doses to personnel and the public. His responsibilities include dose assessment, contamination control, work environment monitoring programs, radiological assessments, including pathway and risk analysis, regulatory compliance including interactions with state and federal officials, and decommissioning studies. Currently, Mr. Gaul is the Division Health Physicist responsible for radiological assessment and radiological control program design for major field projects, and oversees other radiological engineer work performed in the office and for field support.

WORK HISTORY

1988 to Present - RUST Remedial Services Inc., Columbia, South Carolina
Division Health Physicist
Responsible for the design and development of applied health physics programs as related to company field projects. Specific responsibilities include performance and interpretation of site radiological assessments, development of a radiological control program for site-specific conditions, radiological oversight of on-going projects, and review of radiological records for regulatory compliance. Special assignments in the development of radiological controls related to atypical and unusual project conditions. Has interacted with state and federal officials on regulatory compliance concerning a multi-use license on several occasions. Performed the radiological aspects of an environmental assessment and decommissioning plan for a reactor decommissioning. Performed pathway analyses and risk assessments for leaving low quantities of residual radioactivity. Assessed risk and radiation safety for a cyclotron decommissioning and nuclear reactor decommissionings.

Helped design, develop and test remote handling equipment for packaging high activity materials. Has overseen numerous decontaminations and decommissionings at projects using a large variety of techniques, abrasive and non-destructive.

1984 to 1987 - Wolf Creek Nuclear Operating Company, Wichita, Kansas
Health Physicist
Applied Health Physics in the area of radioactive waste, dose assessment and ALARA compliance. Maintained contracts and permits with burial sites and state regulatory agencies. Worked with vendors for shielded and unshielded transportation, processing services, and numerous support services. Supervised Health Physics technicians and decontamination crews during refueling outages. Reviewed technical guidance and evaluated regulatory changes from the NRC, states and burial sites to incorporate into plant procedures. Reviewed pending and existing legislation and commented to management on potential effects on plant operation. Established and maintained mixed waste program. Performed long-term tracking and trending of radioactive waste. Supervised the update of the plant decommissioning study. Performed shielding analysis, dose calculations, ALARA justifications, and hot particle skin contamination calculations. Developed lesson plans, trained technicians on radiological assessment, off-site radiological and environmental monitoring. Participated in the radiological assessment part of the site emergency plan as supervisor of off-site field teams.

1983 to 1984 - Westinghouse Idaho Nuclear Company, Idaho Falls, Idaho
Health Physicist
Responsibilities included full spectrum of applied health physics activities for a fuel reprocessing facility. Routinely worked on internal dose assessments, including uranium and plutonium bioassay, gamma and neutron shielding codes, contamination control, waste management, statistical analysis and dose calculations. Developed plans and performed decontamination of high-activity fission products and alpha-contaminated hot cells and fuel storage pools. Responsible for work environment air monitoring program for airborne alpha including routine reports to management and DOE. Instructed technicians on computer use, techniques and applications.

1980 to 1981 - Canberra Industries, Inc., Meriden, Connecticut
Project Manager, Marketing Specialist
Responsibilities included configuring complex radiation detection systems, computer interfaces, monitoring applications including alpha/beta and gamma spectroscopy. Assessed market radiation detection needs and developed entire system to meet the needs. Managed large radiation safety projects for timely completion and coordinated technical interfaces.

PRESENTATIONS/PUBLICATIONS

Instructor for 2-hour Professional Enrichment Program at Health Physics Society Meeting entitled "Waste Management at Decommissioning Projects."

Radiation Research Society, 1983, "Studies of Radiation Dose Modification with Cis-Platinum II Diamminedichloride"

Health Physics Society, 1987, "Neutron Spectral and Dose Measurements Inside a Power Reactor Containment"

Health Physics Society, 1988, "Coordination of a Mixed Waste Management Program"

Health Physics Society, 1990, "High Activity Waste Disposal"

ANS Topical Meeting 1990, "Pathway Analysis for Development of Alternative Surface Contamination Release Limits"

Instructor at Health Physics Society Summer School "Decontamination and Decommissioning" 1992

PROFESSIONAL AFFILIATIONS

Active member of the Standards Subcommittee ANS-5.6.1 writing the Standard "Radiation Protection Design Criteria for Post-Accident Shielding and Access Control"

American Nuclear Society

Health Physics Society

Charter Member American Association of Radon Scientists and Technologists

Panel Member, ANSI N13.12 "Surface Radioactivity Guides for Materials, Equipment and Facilities To Be Released for Uncontrolled Use"

SENIOR PROJECT MANAGERS (Sr PMs)

Reports to: NRS General Manager

Duties

Responsible for the overall operation and administration of specific NRS projects, business development ventures, and bid/proposal efforts as assigned by the NRS GM. The NRS GM will make specific assignments to the various Sr PMs based on several factors, such as:

- Experience with the prospective customer
- Experience with the proposed/planned technology
- Geographic proximity to current field assignments
- Current work load and capacity

A summary of the Sr PM assignments will be provided in a matrix format by the Operations Manager on a periodic basis.

- Establishing and managing the necessary organization to accomplish their specific assignments. The Sr PMs will work with the Operations Manager (OM) for assignment of operational resources to his/her specific project and/or bid/proposal effort.

- Work closely with the RFS staff and the OM to ensure that all NRS operations under their cognizance are conducted safely, in full compliance, and represent a quality customer service.

- Work with the OM to ensure that all NRS operations are conducted in a consistent and organized fashion. These operations include project cost and revenue tracking, premobilization, mobilization, demobilization, and project closeout.

- The Sr PMs are responsible for the specific project and bid/proposal costs and revenue centers, assigned to them by the NRS GM, that roll up into the Unit 702 (Operations) cost/revenue center. In this capacity, the Sr PMs will:

  - ° Provide individual project/contract financial data (Close Reports, Flash Reports, etc.) to the OM for consolidated reporting to the NRS GM and the NRS Project Controller.

- Maintain current and accurate statuses of accounts receivable and invoicing for assigned project(s).

- Work closely with the NRS Project Controller to ensure project financials are current, accurate, and consistent with the requirements of JD Edwards and the RFS Controller.

- The Sr PMs may function as a specific project PM for large, complex projects. In this capacity, the Sr PM will still report directly to the NRS GM since he/she will still maintain the Sr PM responsibility for that, and possibly other, assignments.

- The Sr PMs will work with the Business Development Manager (BDM) for the assignment of proposal production/coordination resources and marketing/BD resources. The Sr PMs may function as Business Development Representatives for specific project/sales opportunities.

Qualifications:

- BS Degree in Engineering or Physical Science

- Six years military or civilian experience in applicable direct supervision of technical and skilled workers.

- Four years experience having direct responsibility for on-site, day-to-day management of project or plant operations/maintenance activities.

- In lieu of a BS Degree, a two-year Associate Degree can be substituted with the following direct experience:

  - Participate as on-site Project Supervisor for several projects - each of more than one month duration.

PROJECT MANAGERS (PMs)

Reports to: Operations Manager (OM)

Assigned to specific projects and/or bid/proposal efforts by the OM with the concurrence of the cognizant Sr PM. The PMs will then report operationally to the cognizant Sr PM. The PM's responsibilities will generally include the following:

- Develop and coordinate planning and scheduling of project activities by means of formal project management techniques.
- Organize project staff and coordinate conduct of NRS and subcontract personnel in order to complete the assigned project in a safe, compliant, and quality manner.
- Function as the on-site manager/supervisor as dictated by the size, duration, complexity, and personnel allocation to the assigned project.
- Provide up-to-date personnel and task scheduling, project financial status, and customer service issues to the Sr PM on a regular basis. Maintain current and accurate statuses of accounts receivable and invoicing for the assigned project(s).
- Monitor project activities to assure compliance with all RII and regulatory requirements.
- Act as the day-to-day liaison between the customer representative assigned to the project and all regulatory agency representatives on site.
- Provide performance evaluation of subordinate personnel assigned to the project.
- Perform other duties as assigned by the cognizant Sr PM and/or the OM.

Qualifications:

- BS degree in Engineering or Physical Science
- Six years military or civilian experience in applicable direct supervision of technical and skilled workers.

- Four years experience having direct responsibility for on-site, day-to-day management of project or plant operations/maintenance activities.

- Flexibility/willingness to temporarily relocate for periods of several months at a time (without compensation for family move) too remote jobs sites.

RADIOLOGICAL ENGINEER

Reports to: Operations Manager

Duties:

The Radiological Engineers (REs) will be assigned to specific projects and/or bid/proposal efforts by the OM with the concurrence of the cognizant Sr PM. The REs will then report operationally to the cognizant Sr PM or PM (based on project organization). The REs will occasionally be assigned an overhead/oversight duty in direct support of the RFS Division Health Physicist's (DHP) Radiological Controls/ALARA Program and/or personnel training/qualification efforts. The OM will designate one RE as the "Lead RE" in order to closely coordinate the varied activities of the RE group. The RE's responsibilities will generally include the following:

- Evaluate the radiological safety/exposure to personnel and the environment resulting from the processes, equipment, and facilities associated with specific projects and/or bid/proposal efforts.
- Evaluate the degree of radiological hazard/risk associated with a particular situation/condition and make prudent recommendations regarding remedial action and/or shielding.
- Maintain current and comprehensive knowledge of the various regulatory requirements and guidelines governing radiological activities promulgated by the USNRC, USEPA, USDOT, USDOE, and other state/ federal agencies.
- Maintain current and accurate working knowledge of the scientific and engineering principles concerned with the following:
  - Physical measurement of different types of radiation and radioactive material
  - Establishment of quantitative relationships between radiation exposure and biological damage
  - Movement of radioactivity through various media/environments
  - Design and operation of radiologically safe equipment, processes, and facilities
- Prepare and/or review project specific radiation protection plans, procedures, and work instructions to assure compliance with the applicable state/federal regulations and RUST/NRS policies/procedures.

- Design and oversee radiological field assessments and ensure the quality and quantity of the data collected for analysis and evaluation.

- Ensure that personnel exposures associated with assigned projects are properly documented and maintained ALARA.

- Participate actively in the DHP's Radiological Program and ALARA Committee and the training/qualification of NRS personnel.

- Function (as dictated by the scope of work) as PM and/or PS (see Sections 4.1 and 4.2) for specific projects of limited duration and/or scope, reporting to the cognizant Sr PM or PM. This may include revenue producing projects or bid/proposal efforts.

- Assist Sr PMs, PMs, and/or PSs (as dictated by the scope of work) in performing any of their operational responsibilities as directed by the OM. When serving in this capacity, the REs will report operationally to the cognizant Sr PM, PM, or PS. This duty may include assistance on revenue producing projects or bid/proposal efforts.

- Assist the BDM in market research and technical sales literature development associated with radiological issues. Represent operations at various promotion demonstrations and new product reviews.

- Perform other duties as assigned.

Qualifications:

- B.S. degree in physical sciences, chemistry, biological sciences, math, or engineering (radiological health, nuclear, or health physics). MS preferred.

- A minimum of two (2) years applicable experience.

- Good verbal and written skills.

- Must complete Base Line Training (indoctrination), 40 hour OSHA, and 8 Hour OSHA Supervisory courses.

PROJECT SUPERVISORS (PSs)

Reports to: Operations Manager (OM)

Duties:

Assigned to specific projects and/or bid/proposal efforts by the OM with the concurrence of the cognizant Sr PM. The PSs will then report operationally to the cognizant Sr PM or PM as described below. The PS's responsibilities will generally include the following:

- Function as the PM (see Section 4.1) on specific projects as dictated by their size, duration, complexity, and personnel allocation to the assigned project. In this capacity, the PS will report operationally to cognizant Sr PM.

- Assist the cognizant PM on large and/or complex projects as follows:

    - Maintain schedule and cost budgets
    - Direct supervision of day-to-day activities
    - Support bid/proposal planning, scheduling, costing and preparation.

    In this capacity, the PS will report operationally to the cognizant PM.

- Perform other duties as assigned.

Qualifications:

B.S. degree with 3 years nuclear related experience, or A.S.degree with 5 years nuclear related experience or HS diploma with 6 years nuclear experience and 2 years environmental remediation industry experience. Must have excellent verbal and writing skills.

INDUSTRIAL HYGIENIST

Reports to: RFS Director of Health & Safety

Duties:

The Nuclear Remedial Services NRS Industrial Hygienist is responsible for comprehensive Industrial Hygiene, Safety, and Environmental Health oversight of NRS with multi-location nationwide field project responsibility. Travel is required. Duties include assuring that the division practices, safety procedures, project work instructions, plans, business proposals, and site specific health and safety plans are in compliance with the occupational safety and health regulations, standards, and guidelines, including, but not limited to OSHA, ANSI and NIOSH. Responsibilities include development, implementation, and monitoring of industrial hygiene programs, advising site personnel in all areas of industrial hygiene including field monitoring, sample collection and analysis, sample data reduction, the use of exposure controls including engineering and administrative practices, and the selection and wear of personal protective equipment and clothing. The Industrial Hygienist is also responsible for performing site inspections and preparing written reports, and recommending appropriate corrective actions to management and personnel. Additionally, the Industrial Hygienist will conduct safety meetings, provide training, maintain the NRS OSHA 200 Log and 101 Forms, coordinate worker's compensation, and purchase industrial hygiene equipment. The Industrial Hygienist will work closely with the NRS Certified Health Physicist and Site Safety Officers to ensure all operations are conducted in a way that protects people, property, communities, and the environment during hazardous waste and mixed waste remedial operations.

Qualifications:

- Graduate degree in Industrial Hygiene and Safety Management, or closely related field.
- B.S. degree in Chemistry, Biology or Chemical Engineering or closely related field.
- Must possess excellent verbal and written skills, abe able to assume responsibility and work independently.

INDUSTRIAL HEALTH AND SAFETY SUPERVISOR

Reports to: Operations Supervisor

Duties:

The Industrial Health and Safety Supervisor is responsible for various field/office tasks assigned by the Project Managers/Supervisors.

- Assist in the preparation of project procedures, cost budgets, and schedules.
- Schedule, coordinate, and direct other field technician activities while assigned to a project.
- Maintain all health and safety records, assigned by the Project Manager
- Supervise the performance of all radiological control services such as work permits, control point monitoring, and air sampling.
- Supervise the performance of all industrial health services such as work permits, control point monitoring, air sampling, and confined spaces.
- Supervise waste processing services including liquid and solid waste.
- Review and approve field survey data.
- Ensure all applicable federal, state, and local regulations are complied with on various field projects.
- Advise the Project Manager/Supervisor of any abnormal condition as it occurs.
- Report on the financial status, to the Project Manager, of assigned cost accounts.
- Other duties as assigned.

Qualifications:

- Qualified as a Radiological Controls Supervisor (RCS), and
- Qualified as a Radioactive Materials Broker
- Filled the position of RCS on two projects of greater than three months in duration, or

- Certified as an Occupational Health and Safety Technician and National Registry of Radiation Protection Technologist.
- Recommended in writing by at least two supervisors for the position.
- Must have worked a minimum of two years with RUST.