FORT McCLELLAN

Anniston, Alabama

APPENDIX A

DETAILED WORK PROCEDURE ADDENDUM WORK PLAN

DECEMBER 1996

ALLIED TECHNOLOGY GROUP

Fort McClellan
Remediation of Building 3192 and Hot Cell
Methodology

ATG, Inc.

DETAILED WORK PROCEDURE

Radiological Remediation
of
Fort McClellan Hot Cell and Grounds

Anniston, AL

November 1995

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1.0 TITLE

Allied Technology Group, Inc. (ATG) Detailed Work Plan for Fort McClellan - Building 3192, IOC Project, Decontamination of Radioactive Materials Hot Cell work areas and facility grounds and components.

2.0 INTRODUCTION

This procedure details the removal of radioactive material from building materials, facility grounds, and facility structures. The materials are to be decontaminated and removed from the facility.

This plan proposes a method of remediation of the Building 3192 hot cell, building 3192, and surrounding grounds to NRC criterion for unconditional release. This entails removal of radioactive materials on the surface of and embedded into the surface of structures and piping systems.

Work on the characterization of the facility began Tuesday, November 1, 1994. Allied Technology Group, Inc. (ATG) management coordinated the project with Fort McClellan contacts for any problems that may be encountered.

3.0 PURPOSE

This plan describes the work methodology and radiological and occupational safety methods to be used while completing this work. Additionally, this plan describes the activities applicable to the removal of materials including the identification and packaging of the low-level radioactive waste removed. The radiological and occupational requirements of this plan are based on a preliminary assessment of potential hazards and may be reevaluated and modified with the concurrence of the ATG Corporate Health Physicist, or the Director of Remediation.

4.0 REFERENCES

4.1 U.S. Nuclear Regulatory Commission Division of Industrial and Medical Safety, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material (August 1987)".

4.2 U.S. Army Technical Bulletin 43-0116, "Requisition, Handling, Storage, and Identification of Radioactive Material".

4.3 NUREG/CR 2082 "Monitoring for Compliance with Decommissioning Termination Survey Criteria".

4.4 NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination", Draft June 1992.

4.5 U.S. Code of Federal Regulations, Title 10, "Energy".

4.6 U.S. Code of Federal Regulations, Title 29, "Labor".

4.7 U.S. Code of Federal Regulations, Title 40, "Protection of the Environment".

4.8 NUREG/CR 5512, "Residual Contamination from Decommissioning".

4.9 ATG Site Health and Safety Plan

4.10 NRC Reg Guide 1.86

5.0 SCOPE OF WORK

5.1 OSHA Site Health & Safety Plan (29 CFR 1910.120(b) (1)) This plan addresses the possibility of discovering isotopes not identified in the Scope of Work, technologically enhanced naturally occurring radionuclides such as ^{226}Ra and radionuclides regulated by the Nuclear Regulatory Commission. All personnel at the work site shall have passed the 40 hour basic and 24 hour site specific training and supervisory personnel shall have the 8 hour supervisory training as mandated by 29 CFR 19220.120. The plan shall require all personnel to provide evidence of current OSHA training (29 CFR 1910.120 (e) (6)) and medical certification (29 CFR 1910.120 (f)).

5.2 Project Schedule - The Project Schedule shall be dependent on the approval of the Project Detailed Work Procedure. When Allied Technology Group is notified that the work procedure has been approved, plans shall be implemented to transport personnel and equipment to the job site. For the purpose of this project schedule, Day 1 shall be the first day that personnel are on site at Fort McClellan.

6.0 RADIOLOGICAL CONTROL AND SAFETY PROGRAM

6.1 There was no indication of other than ^{60}Co in the facility. External gamma radiation surveys indicated a maximum of 290 micro-R/hour.

6.2 Surveys of the grounds outside the fenced area indicate no migration of activity from building 3192 grounds.

6.3 The surveys indicate in general that activity is located on and around the hot cell, its contents, and the shield door. The maximum level is on the crane components which have loose surface activity in the range of 100,000 dpm/100 cm^2.

6.4 All items which are removed from the facility shall require surveys to ensure there is no release of activity. These items, such as removable ceilings, piping systems (associated with clean water supply and gas supply), and removable fixtures shall be surveyed and removed prior to decontamination of the internal surfaces of the hot cell.

6.5 The shield plugs and shield shrouds shall be removed from their storage in the hot cell and packaged in plastic bags. These items shall be transferred to the decontamination trailer for removal of loose surface and fixed contamination, then surveyed for release as clean material if possible. The items of importance in this step are:

16 steel plugs within the hot cell - 2.5 ft x 6" dia.
Steel plate - 4' x 6' x 1"
16 plug shrouds (sleeves for plugs)

6.6 Paint and concrete from hot cell walls and floor has been sent for analysis of it's constituents. If there is lead in the paint, it shall be controlled separately from the waste generated from other operations.

6.7 The hot room table was removed from the cell and packaged during the characterization phase. This table is stainless steel and may be decontaminated and released as clean.

6.8 There are several items which may not be worthwhile to decontaminate due to the degree of contamination or their structure which may require significant disassembly time. These items are as follows:

Fixtures within the hot cell, crane components, window, etc.
Drain system and piping components
Electrical wiring and conduit.
Gas and water piping systems.
Hot room lights.
Cart wheels (small)
Wall plugs (4) 2 - 34" x 8" dia. 2 - 34" x 6" dia.

6.9 Many items will most likely be releasable after minimal decontamination which may be as simple as a brief wipedown. These items are as follows:

Ventilation system and components
Supply is approximately 350 square feet of surface area.
Return is approximately 280 square feet of surface area.

Piping systems from non-radioactive systems
heating, cooling, gas and water.
50' 2" pipe, 80' 1" pipe
Tank (2'x3'x1')
Gauges, pumps, valves, heater (2.5' dia x 8")
Bathroom sink
Miscellaneous fixtures and supply for shower area.

Hot room window and frame and detector system.
Hot room hatches for emergency escape.
Hot room door.
Light fixtures. Fluorescent (36), incandescent (5).
Roof trusses (length of building x 6" x 4)
Electrical boxes (11)
Hot cell control panel
Drinking fountain (cooler)
Vent grid (2'x3')

6.10 There will be radioactive waste created as a result of the remediation. An estimate is not practical at this time but materials which will most likely be waste are:

Concrete excavated from or around the drain pipes and shield shrouds.
Soil excavated from the outside areas where activity was found.
Materials which could not be decontaminated.

This may yield as much as 20 B-25 boxes (1800 cubic feet).

6.11 ATG and the Government's project personnel shall attend a project ALARA/Safety briefing provided by the Project Manager or designee and documented prior to performance of the work. This briefing shall include radiological, occupational health and safety, and provide details of the work scope to be performed.

6.12 All personnel not currently qualified as radiation workers shall be given appropriate documented training in accordance with Reference 4.6, Appendix B of this plan and certified by the Radiological Controls Supervisor.

6.13 TLD's shall be issued to all project personnel before entry into the controlled area, any spaces controlled for radiation protection.

6.14 Documented Regulatory, ALARA, and Industrial Safety briefings shall be held in accordance with reference 4.5 and Appendix B of this plan prior to mobilization onsite.

6.15 A barrier shall be erected around all work areas and they shall be properly posted for both radiological and industrial safety considerations. In order to prevent spread of activity from the building and portable decontamination room, contamination control barriers shall be positioned at the entrances to the rooms of contamination concern. This shall consist of a step-off pad, rope, signs, and an undressing area with a waste barrel for disposal of decon materials and protective clothing.

6.16 Cognizant Base authorities (i.e., Base Security, Base RSO, etc.) shall be kept apprised of the project status during all phases of operation. The Project Supervisor shall document these verbal or written reports in the daily log book.

6.17 All outside storage of radioactive material shall be contained in weather-resistant material (at a minimum 10 mil polyethylene). Covering shall overlap the ground, and all edges of the covering shall be weighted or secured to prevent loss of the cover. The area of storage shall be posted as required in accordance with reference 4.5.

6.18 All building materials removed from the facility shall be labeled and segregated into discreet and identifiable piles and stored on-site.

6.19 All building materials removed from the facility shall be segregated until surveys are performed and written approval is obtained from the Army to release the material.

6.20 Release surveys of equipment shall include direct and removable beta/gamma radiation analysis. Release limits shall be as low as reasonably achievable, but shall in no case exceed the limits set forth in Reference 4.1, 4.3 and 4.8. Personnel monitoring shall be conducted using an Ludlum Model 3 ratemeter with a 44-9 probe or equivalent. Loose surface contamination smears shall be counted using an Ludlum Model 2929, 43-10-1 probe or equivalent.

6.21 A Radiation Work Permit (RWP) shall be initiated and approved by the Radiological Controls Supervisor for all job tasks conducted on-site. The RWP shall detail all radiological and safety requirements for a particular task.

6.22 All project personnel shall provide a 24 hour urinary void sample prior to project start-up, at the end of the project, and as directed by the Radiological Controls Supervisor. The entry and exit sample shall be analyzed. The Corporate Radiological Safety Officer (RSO) shall review the results of these samples for potential intakes.

6.23 If respiratory protection is required, all on-site personnel required to work in those areas shall be qualified and have a documented fit-test as required in accordance with Reference 4.9.

6.24 A swipe survey, for loose surface contamination, shall be performed and documented on any exposed surfaces of the containers. If any loose surface contamination is determined to exceed 1000 dpm/ 100 cm^2 beta/gamma or 20 dpm/100 cm^2 alpha, the exposed portions of the containers shall be enclosed with an appropriate contamination containment material (i.e., plastic bags), a probe survey performed of the ground areas adjacent to the containers and the Project Radiological Controls Supervisor immediately notified.

6.25 The following instruments (or equivalent) shall be calibrated and maintained in accordance with the manufacturers recommendations and shall be on-site for use during the project:

Manufacturer	Instrument/Probe	Quantity
Ludlum	Model 3/44-9	4
F & J	H-9400 Hi Vol Air Sampler	1
F & J	LV-1 Air Sampler	1
Ludlum	Model 3/43-65 (alpha probe)	2
Ludlum	Model 19 - Micro-R-Meter	5

7.0 DETAILED WORK PROCEDURE

All work shall be performed in a safe and conscientious manner. The work instructions and requirements of the ATG Health and Safety Plan and Work Plan for this project shall be reviewed with the work force prior to the start of work and shall be adhered to at all times while on the work site.

The physical condition of radioactive materials contained within building materials is solid and in a fixed or loose surface state on materials. Caution shall be used during the removal of these materials and in decontamination processes to prevent spreading radioactive materials from their position of encapsulation within the building materials. Should physical deterioration and spread of activity beyond the bounds of original work scope be observed, work shall stop and the condition of the facility shall be further assessed to determine if the removal methods specified in this document and plans for the work completion are adequate and appropriate.

No personnel entry into any posted work area is anticipated, nor permitted, by other than work crews or Army RSO personnel without prior approval of the ATG Project Manager or the Fort McClellan Radiation Safety Officer.

The radionuclides and concentrations that will be encountered are documented in the characterization surveys completed during the initial site evaluation. The surface survey of the site detected no significant sources of radiation other than surface contamination inside the hot cell, in the overhead, and in soil outside the facility. It is anticipated that drain lines from the facility also contain ^{60}Co activity and only dry low level radioactive wastes will be encountered. Good radiological work practices (contamination control and exposure minimization) shall be employed at all times.

Any radiological condition which is outside the scope of this work as defined in the Work Plan or this Detailed Work Procedure shall require the immediate notification of the Project Manager or Project Health Physicist and the immediate stoppage of work in progress. The IOC Representative shall also be notified of the condition as soon as is practically possible.

7.1 Mobilization On-Site

7.1.1 Travel to site.

7.1.2 Meet with facility management for work plan brifing.

7.1.3 Set up on-site facilities (offices, etc.)

7.1.4 Train personnel in radiological controls, industrial safety, the work plan, and procedural controls.

7.1.5 Obtain entry bioassays and issue dosimetry.

7.1.6 Conduct job briefing with IOC, Base Environmental Restoration Division and ATG personnel.

7.1.7 Obtain permission from base to begin decontamination.

7.1.8 Electrician to evaluate facility for power tool use and determine need for outside power. The electrician shall verify the feasibility of using the electrical system in building 3192 for power tools.

7.1.9 Coordinate with local Hospital for emergency services.

7.1.10 A large laydown area should be established in the classroom by covering the floor with plastic. This area shall be controlled to prevent the spread of activity as items are surveyed for release as clean.

7.2 Preliminary Radiological Surveys and Sampling

7.2.1 The site characterization visit established pre-remediation surveys to establish the degree of control necessary during the remediation. Samples of contaminated materials from several locations were taken to identify the radionuclides of concern and the relative magnitude of activity in various areas. The samples taken were approximately 2000 grams in weight.

7.2.2 The Project Supervisor shall determine the approximate dimensions for the work area. This determination will be based on requirements for equipment removal, laydown space for removed materials, space for

waste containers, and personnel entry and egress. The area shall be posted as a "Radiologically Controlled Area" with the perimeter defined using boundary rope. The area utilized should be minimized for future release survey concerns.

7.2.3 Any designated laydown areas should be covered with canvas, plastic or other appropriate material prior to use of the area to prevent cross contamination of the laydown surfaces.

7.2.4 A "Step Off Pad" and frisker instrument (or equivalent) shall be established for personnel egress from the posted controlled area and shall be utilized at all times for that purpose.

7.2.5 Prior to commencing decontamination, a Sea-van with a decontamination area and HEPA ventilation will be moved to the site and provided electrical power.

7.3 Small Tasks and Work Preparation

7.3.1 Remove items, which are likely to be free of activity, from the building and survey for release as clean. This includes removal of the classroom fixtures and ceiling and disposal of insulation materials. A 100% survey of all chairs, lights, water fountain, electrical boxes, walls, flooring, and doors.

7.3.2 Remove the oil from the hot cell shield window into a 55 gallon drum. A sample of the oil should be taken and delivered to the base RSO for analysis prior to release of the oil. Remove the hot cell window and package the window for transfer to the decon trailer for cleaning and release if possible.

7.4 Decontamination of the Facility Hot Cell

7.4.1 Personnel shall ensure the work area is established and posted as directed above.

7.4.2 Remove all materials (piping systems, lights, and conduit) from the hot cell walls. Remove shields, shrouds, and steel plate from the hot cell using the hot cell crane. Package these items and transfer to the

decontamination trailer for removal of activity, survey, and release if clean.

7.4.3 After removing all components, remove the crane assembly and package it for decontamination. Decontaminate the crane in the decon trailer practical to reduce the waste volume. Some items of the crane may not be practical to decontaminate, such as the cables. Use caution to prevent the spread of contamination from the crane surfaces as this is the most significant contamination in the facility. Remove all miscellaneous items from the hot cell, water and gas piping and valves, radiation detector, lights, and miscellaneous wiring and conduit. Package these items and transfer to the decontamination trailer for decon and release if practical.

7.4.4 Establish an enclosed work area with negative ventilation from the cell window opening. The inlet to the cell shall be from the ventilation holes in the cell roof. Cover all other openings with plastic sheet to prevent escape of dusts created in the decon operation. High volume air samples shall be taken back to back in the hot cell during the entire decon operation. Low volume air samples shall be run in adjacent spaces.

The Sponge Blast unit or a mechanical chemical decon using brushes, rags and solvent type material may be used to remove contamination. All preparatory steps will be the same. If the sponge jet is used, proceed with steps 7.4.5 and 7.4.6.

7.4.5 Place the sponge blast unit inside the cell and prepare for decontamination by covering the door and window opening (except for the vent duct) with plastic sheet to prevent the escape of wall coverings and removed materials from the room. Conduct operational checks on the sponge blaster as described in it's operating procedure. Use the sponge blaster to remove a 5' by 5' area of one of the open cell walls. Evaluate removal and discuss the results with the health physics supervisor prior to continuing. This will ensure appropriate communication of the machine operation and controls necessary to ensure contamination control. If the sponge-jet is not adequate to remove the wall surface, a mechanical scabbler will be used for removal of the wall covering from the room wall surfaces. Control all removed materials as radioactive waste. Personnel not directly

associated with support of the cell decon shall stand clear of, and outside of, the immediate work area.

7.4.6 Remove the crane rails and rail ties, decontaminate the cell walls, floor, and ceiling as possible using the sponge jet. If the sponge jet does not provide sufficient surface removal, use scabbling as necessary to remove contamination.

7.4.7 The paint in the decontamination cell has been identified as containing lead. The residue of this paint produced during decontamination must be segregated from other waste streams. A sample of this waste must be obtained and sent for full Total Contamination Leaching Process (TCLP) to help process this waste into EnviroCare of Utah or another facility able to handle mixed hazardous waste.

7.4.8 After removal of the wall covering, clean up the scrapings, and control as radioactive waste pending decision on disposal. As materials are removed, hand frisk the uncovered wall with a Beta/Gamma probe to check for elevated radiation readings.

7.4.9 If the decision is made to release materials based on discovery of no activity on the wall, all materials shall be surveyed to ensure that activity shall not be released.

7.4.10 Monitor contamination levels using the Ludlum Model 3 ratemeter and 44-9 probe, or equivalent, to identify beta/gamma emitting activity. If contamination is greater than expected levels and would present a hazard to workers doing the removal, stop the current work evolution and notify the Project Manager or Radiation Protection Supervisor..

7.4.11 After decontamination of the room is completed, package all radioactive materials & equipment used in the decontamination effort. Transport the packaged equipment and materials to the decon trailer to effect cleanup.

7.4.12 Remove, decontaminate, and survey emergency escape hatches from the hot cell roof.

7.4.13 There are two floor drains in the hot cell, one toward the center of the cell and one in the back right hand corner. Using means available,

remove concrete from the drain system. The piping system may not be completely filled with concrete and removal may be difficult. If removal of concrete for the drains is possible, use drain brushing as possible to remove contamination from the piping surfaces. If removal of concrete from the drains is not possible, use excavation tools to remove the drains taking care not to spread contamination from the pipes.

7.4.14 The hot cell door sets in a trough immediately outside the cell. This trough has at various times been contaminated and has a drain system which connects to the same drain piping as the hot cell drains. The trough and shield door rails may need decontamination, the drain will need to be removed in the same manner as the hot cell drains.

7.5 Shield Door Decontamination

7.5.1 The undersurfaces of the shield door are not accessible and have been identified as contaminated. Position the door past its open position by disabling the door microswitch and operating the door open switch to place the door in position for lifting.

NOTE: **Engineering evaluation is required prior to removal of the roofing structures to prevent possible accidental roof collapse. It may be possible to jack and block and tackle the door out of position. If this is the case, an engineering evaluation may not be necessary.**

7.5.2 Remove roof plates above the door and any structural interference in the roof. Install lift lugs into the door, lift the door from the facility, cover & secure the bottom of the door with plastic sheet to prevent spreading contamination and set the door on a prepared pad outside the building to facilitate disassembly, decontamination, and survey for release of the door.

7.5.3 Disassemble the door movement mechanisms and remove the wheels to enable transfer of these components to the decon trailer for cleaning and release.

7.5.4 Survey all door surfaces to ensure it is releasable. Position the door as desired by Fort McClellan management.

7.5.5 Ensure the building is weather tight by replacement of roof panels and structural supports or equivalent materials as necessary.

7.6 Ventilation System

7.6.1 Remove all insulation from sections of the ventilation system and perform surveys, conduct decontamination as necessary, and release after final release surveys.

7.6.2 Package all open ends of the ventilation system prior to any attempt at disassembly. When ready to remove a section, consider containment of the component prior to separation. Use a drop cloth under all potential openings, and ensure immediate containment of component internals by placing plastic sheet between the components when space is available.

7.6.3 Surveys of the blower has shown the presence of radioactive materials. Most of the other components of the system have been determined clean. Materials that are found to have identifiable contamination shall be removed, packaged, and transferred to the decon trailer. Survey and decontaminate all components as possible.

7.6.7 All equipment shall be surveyed and released, or if radioactive, decontaminated or shipped for storage or decontamination at another facility. Any ATG equipment items that do not meet the unconditional release criteria shall be packaged for shipment to the ATG facility in Richland, WA.

7.7 Outside Areas

7.7.1 Soil samples have shown the presence of activity associated with hot cell operations. These areas are identified on Figure O-1.

7.7.2 Perform a detailed radiation survey using a Micro-R meter of the excavation area. Make special note of any readings exceeding 5 micro-R/hour, on contact with any surface, above the average background radiation levels.

7.7.3 Stage an appropriate shipping container adjacent to each area. Remove the surface of the ground to a level of 24 inches. Continue to survey at this depth to identify any further contamination. Remove soil as

necessary to remeditate this area down to a level of 48 inches. Do not exceed this depth without permission of the Project Manager. Additional safety considerations are necessary below this depth.

7.7.4 Samples of removed materials obtained may be analyzed using gamma spectroscopy. Any sample indicating radioactivity levels exceeding those of the average background samples shall be considered contaminated and handled as such. Any contaminated materials shall be placed in a protective container which shall be labeled "Caution Radioactive Materials" to prevent the spread of contamination.

7.7.5 The drain system from the building passes underground from the office corner of the building. This system previously transferred liquids to a processing system in the control pit. The piping may require removal and disposal as radioactive. In order to access this system, review the building plans to identify the approximate location of the system. Take measurements with a micro-R meter to identify the pipe from above the ground surface. From approximately 10 feet away from the structure, begin excavation of the soil in the region of the pipe location. Continue excavation and sloping of the walls of the hole as necessary to allow access to the piping for removal.

7.8 Preparation of the Containers for Shipment.

This phase of the contract activities requires more detailed handling of radioactive material. A Radiation Work Permit (RWP) shall be initiated to provide written instructions to the workers specifying the necessary radiological controls that may be required to perform the work. The workers shall be briefed on this phase of the work and shall be required to comply with the RWP. The workers briefing shall be documented.

7.8.1 LSA boxes or containers may be used to package any radioactive contaminated wall coverings, and floor materials removed. All proposed packaging qualifies with the "Strong Tight Container" criteria for shipment of LSA materials.

7.8.2 Workers shall use care when moving radioactive materials to minimize the spread of contamination and minimize airborne contamination.

7.8.3 When the containers are full, the plastic inside liner will be gathered and sealed with duct tape allowing enough room to securely fit the lid on. The lid gasket shall be inspected and the lid placed in position to install the barrel ring and barrel bolt. Any excess or loose material around the containers shall be removed before the containers can be moved.

7.8.4 The Radiation Protection Supervisor shall cause to be performed and documented a contamination survey on each container and approve the removal of the container from the packaging area. The full containers from the packaging area will be placed into a staging area.

7.8.6 Containers placed in the staging area shall be prepared for shipping and burial by the Broker and the forklift operator. Each container shall be prepared for shipment and burial by completing all of the information required on the Processing Record, ATG Form 101. Completed containers shall be segregated from the others in the staging area.

7.9 Shipment of Radioactive Waste

7.9.1 Preparing the shipping manifest records and estimating the activity in each container shall be the responsibility of the Radiological Controls Supervisor and the Broker.

7.9.2 Shipping of all radioactive waste shall be in accordance with References 4.2, 4.3, 4.5, 4.6, and the receiving site license conditions.

7.9.3 Radionuclide content and concentration of the packages shall be established based on gamma spectral data, direct survey data and available historical data.

7.9.4 The loads will be based on the weights of the completed packages. Approximately 45,000 lbs. of cargo weight will be allowed on each designated shipper's truck, depending on the empty weight of the truck and trailer.

7.9.5 Each load shall be transported in enclosed vans as and "Exclusive Use Vehicle". The hazard class and number is expected to be "Radioactive Material LSA - N.O.S.", UN2912. A shipping waste class, reportable quantity and container type calculation will be performed to assure that the Department of Transportation regulations and burial site license and

acceptance requirements are met. The vehicle and trailer shall be placarded and a vehicle radiological survey performed. A copy of the shipping manifest and supporting documentation shall accompany the load to the burial site.

7.9.6 Loading of the vehicle shall be performed by the Broker and the Decontamination Technician with the aid of the forklift. The containers shall be placed on the trailer and a dolly will be used to move the containers into place. The load shall be secured from shifting during transit. The van doors shall be padlocked and a security seal attached. The padlock key shall be sent with the shipping documents. The broker shall ensure notifications for the shipment are made as necessary.

7.10 Final Release Surveys

7.10.1 Do final release surveys as necessary to remove all needs for radiological control and ensure remediation to uncontrolled status.

7.11 Demobilization

7.11.1 All material handling equipment shall be wiped clean. Any temporary fabricated enclosures will be wiped clean, any inside plastic will be carefully removed and surveyed for release.

7.11.2 Postwork radiological surveys shall be performed in a manner that will duplicate the prework radiological surveys. Material samples, area exposure rates, contamination surveys and air samples shall be taken and analyzed in approximately the same location and with the same type of instruments that the prework surveys were taken. Comparing the prework and postwork survey data will aid in evaluating that no adverse impacts have occurred.

7.11.3 Upon release of the posted work area, remove all materials/supplies and waste material from the work area. Dispose of radiologically clean waste materials as directed by the IOC Project Manager. Verify postwork surveys are satisfactory and remove site postings.

7.11.4 Obtain exit bioassays from all personnel.

7.11.5 Remove the security barrier around the area.

7.11.6 Conduct surveys to ensure free release of the office, port-o-let, etc., dismantle as required and return to vendor.

7.11.7 Site release shall be based on the following:

7.11.7.1 Soil sample results indicate no radioactivity above natural back-ground.

7.11.7.2 Micro-R radiation survey results indicating no radiation levels exceeding those of general area background. In no case shall residual radiation or radioactivity levels exceed those of Regulatory Guide 1.86, or 10 CFR 20 limits for exposure to the general public.

7.11.8 Depart site.

7.12 Final Reports

7.12.1 Prepare final Radiological and Health & Safety Report.
7.12.2 Prepare final Shipment and Inventory Schedules.
7.12.3 Prepare and submit Final Project Report.

8.0 STAFFING

The project personnel will consist of a Corporate office component and an on-site component. The Corporate component will consist of the Director, of Remediation Services, the Corporate Health Physicist and support personnel. The on-site component will consist of the IOC Project Manager, ATG Project Manager or designee, ATG Radiological Controls Supervisor and operations personnel. Project management personnel directly responsible for the project and their general duties are listed below:

8.1 IOC Project Manager

The IOC Project Manager will have overall authority and responsibility for the project. All correspondence and communication with regulatory agencies will be performed by the IOC Project Manager. He will direct the contractor's operations and be liaison between contractor and Army personnel. He will keep the base personnel abreast of project progress. He will notify the appropriate authorities of any unusual situations or problems with the project.

8.2 ATG Project Director

The Project Director is responsible for the overall project. He is to assure that the project meets the objectives and contracted commitments. He has the direct management responsibility and authority for cost, schedule, quality and technical performances of all activities in support of the project. He is ultimately responsible for the implementation of all quality related activities. The Radioactive Waste Remediation Assistant Vice President will serve as Project Director for this project and shall be referred to as such in all documents from this point forward.

8.3 ATG Project Manager

The ATG Project Manager will have overall responsibility for ATG's on-site conduct of the project and will report to the Project Director for oversight and management control. He will provide technical direction for the professional and timely completion of contracted tasks. He will be the primary point of contact with the IOC Project Manager. He is responsible for implementing and monitoring compliance with the operations plan and implementing corrective actions. Other responsibilities include; selecting project staff and assigning duties, reporting to the Project Director project budgets and schedules, identifying and resolving project specific problems. Additionally, he will prepare the following documents:

8.3.1 Report weekly, in writing, the current project status, to the Project Director.

8.3.2 Requisition the procurement of materials and services necessary for project completion.

8.3.3 Manage all on-site personnel, operations, supplies and materials.

8.3.4 Maintain the Daily Operations Log of all project activities.

8.4 ATG Radiological Controls Supervisor (RCS)

The ATG RCS will report directly to the Corporate Health Physicist (CHP) for Health and Safety standards application and for assistance in regulatory compliance and indirectly to the Project Manager or designee. He will supervise all radiological aspects of operations to ensure complete regulatory

compliance and providing on- site guidance to the decontamination technicians performing their duties. He is also responsible for movement and loading of the completed containers. Additionally, he will prepare the following documents:

8.4.1 The weekly safety and regulatory compliance report to the CHP for review. He shall also communicate, as required, with the CHP for technical and regulatory guidance.

8.4.2 Specify radiological and industrial safety requirements for all activities conducted on-site.

8.4.3 Monitor radiological controls practices and overall performance of on-site personnel and take corrective action as required.

8.4.4 Review and maintain radiological controls records including bioassay results.

8.4.5 Maintain copies of reference documents, licenses, procedures, training and qualification records, and any related project records.

8.4.6 Maintain the radiological control log and record all pertinent information in this log on an on-going basis.

8.4.7 Prevent performance of work by project personnel whenever, in his opinion, such work is inherently unsafe or is being performed in an unsafe manner. He will inform the Project Manager or designee and the CHP of stop-work decisions and shall seek expeditious resolution.

8.4.8 Inspect and assist with the shipment of radioactive materials including the shipment of any samples shipped for analysis.

8.4.9 Conduct or direct the performance of radiological and Health & Safety surveys necessary to the safe completion of project activities.

8.4.10 Train and advise site personnel as required on techniques necessary to minimize personnel exposure and the potential spread of radioactive contamination.

8.4.11 Maintain site safety and radiological controls equipment free of defects to facilitate immediate access and use.

8.5 Equipment Operator/Decontamination Technician

The Decontamination Technicians will be contractors to ATG or ATG employees from other facilities. The Equipment Operator/Decontamination Technician is a radiation worker trained and will be familiar with handling and packaging radioactive material. Worker responsibilities will include: barrel handling, fabrication and assembly duties, packaging soil and forklift operations and/or other heavy equipment.

8.6 Contract Equipment Operators

Local heavy equipment operators may be utilized for this work. They shall meet the requirements for Health and Safety as specified for all other project personnel.

9.0 RECORDS

At project completion, the ATG Project Manager or designee is responsible for the development and submittal of the Final Report. The Final Report shall be reviewed and approved by the Director, Decontamination and Decommissioning prior to submittal to the Government. The Final Report shall include all Radiological and Health & Safety survey documentation and Shipping and Inventory Schedule documentation. The Final Report shall be submitted to HQ, IOC. IOC may distribute copies as required by Government protocol.

Contractor project records shall be maintained in accordance with references 4.5, 4.6, 4.7 and 4.8.

Equipment and service needs

Frontloader and backhoe with operator- 7 days
30 Ton Crane with operator to remove door - 1 day
Boring tools and taps to cut and tap penetrations in door for eye hooks
Sponge-jet sponge blaster unit for decon of hot cell
30 gallon drum and tygon hose for draining shield window
Decon trailer with HEPA ventilation
Crew trailer with heat and electricity
Office area, work room, and counting area
4 large tables and 12 chairs in crew work area.

Copy machine
Computer and printer
Fax machine and phone line
Grass mowed
Time sheets and company forms
10 B-25 boxes for disposal of materials
Work procedures and safety procedures
Equipment and supplies for survey operations
TLD Dosimetry for crew
Protective clothing (Tyveks) - 40 pair
Gloves - 100 pair
Booties - 50 pair
Radiation detection instruments
    2 Model 3 - Alpha detectors (43-65 probe or equivalent)
    6 Model 3 - Beta/gamma detectors (44-9 probe or equivalent)
    2 Model 3 - 2 x 2 scintillation detectors (44-10 or equivalent)
    2 Model 19 gamma detectors
    2 Model 2929 counters with 500 planchettes
Soil sampling tools
Decontamination equipment - masslin, sandpaper, grinders, cutters.
High and low volume air samplers
Air sample filters
Calibration and check sources
Electrical service checkout
Emergency equipment/ safety equipment
Potable water
Stepoff-pads, safety placards, radiation signs, barrier tape
NRC form 3
Emergency alarm system

Documents

Management plan
Quality Assurance plan
Operational readiness checklist
Waste Management plan
Material Safety Data Sheets
Site Safety and Health Plan

DETAILED WORK PROCEDURE

ADDENDUM

Radiological Remediation
of
Building 3182 - 'The Military Police Museum'

Fort McClellan
Anniston, Alabama

Prepared By:

Allied Technology Group, Inc.
99A Midway Lane
Oak Ridge, TN 37830

February 1996

Fort McClellan
Remediation of Building 3182 - 'Military Police Museum'

DETAILED WORK PROCEDURE

ADDENDUM

Radiological Remediation
of
Building 3182 - 'Military Police Museum'

Fort McClellan
Anniston, AL

February 1996

Concurrence: Frank C. Whitaker _____ Date: 2/28/96
Frank C. Whitaker, ATG Project Manager

Concurrence: John W. May _____ Date: 3/4/96
John May, Ft. McClellan Representative

Concurrence: _____ Date: _____
Mike Styvaert, IOC Representative

Approval: W.G. Haney _____ Date: 2/28/96
W.G. Haney, Radioactive Waste Remediation
Assistant Vice President

Fort McClellan
Remediation of Building 3182 - 'Military Police Museum'

DETAILED WORK PROCEDURE

ADDENDUM

Radiological Remediation
of
Building 3182 - 'Military Police Museum'

Fort McClellan
Anniston, AL

February 1996

Concurrence: Frank C Whitaker
Frank C. Whitaker, ATG Project Manager
Date: 2/28/96

Concurrence: _____
John May, Ft. McClellan Representative
Date: _____

Concurrence: _____
Mike Styvaert, IUC Representative
Date: 4 Mar 96

Approval: _____
W.G. Haney, Radioactive Waste Remediation
Assistant Vice President
Date: 2/28/96

OPTIONAL FORM 99 (7-90) FRANK, LOOKS GOOD (P2 TO DARRIN)

FAX TRANSMITTAL # of pages ▶ 2

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NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

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1.0 TITLE

Allied Technology Group, Inc. (ATG) Detailed Work Plan Addendum for Fort McClellan Building 3182, 'The Military Police Museum', IOC Project USA 023-94, The Military Police Museum - Decontamination of Radioactive Material from the work area, facility grounds and components.

2.0 INTRODUCTION

This procedure details the removal of radioactive material from building materials, facility grounds, and facility structures around the Military Police Museum, Bldg. 3182, at Fort McClellan, Al. The materials are to be decontaminated and removed from the facility.

This plan proposes a method of remediation of Building 3182 and the surrounding grounds to the NRC criteria for unconditional release. This entails removal of radioactive material on the surface of and embedded into the surface of the structure and the removal of any soils surrounding the building which do not meet the NRC criteria for unconditional release.

Work on the characterization of the facility was begun by Allied Technology Group on Tuesday, November 1, 1994 and continued for one week. Actual remediation work commenced on November 6, 1995 and continued for seven week till December 22, 1995 with one holiday observed (Thanksgiving). The ATG characterization and remediation followed an initial characterization and partial remediation effort conducted by Chem-Nuclear Systems Inc. which was performed from 1983 till 1984. Some additional remediation was performed by base personnel under direction of the Radiation Safety Officer (RSO) from 1985 till the present.

All work was coordinated with John May, Fort McClellan - Health Physicist/Radiation Protection Officer and Mike Styvaert, U.S. Army IOC Point of Contact.

3.0 PURPOSE

This plan describes the work methodology to be used for remediation of Bldg. 3182, the Military Police Museum and surrounding grounds. This plan is an addendum to the original Fort McClellan Detailed Work Plan signed for approval on 11/02/95 and 11/07/95. This plan is only an addendum or supplement to the original plan. The original plan should be used to complete work remediation for Building 3182, 'the Hot Cell and Classroom', facility grounds and components and associated piping. The original Quality Assurance Plan and Health and Safety Plan signed for approval on 11/02/95 and

11/07/95 will be used with this addendum plan. The radiological and occupational requirements of this plan are based on a preliminary assessment of potential hazards and may be reevaluated and modified with the concurrence of the ATG Corporate Health Physicist or the Assistant Vice-President Radioactive Waste Remediation.

4.0 REFERENCES

4.1 U.S. Nuclear Regulatory Commission Division of Industrial and Medical Safety, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material (August 1987)".

4.2 U.S. Army Technical Bulletin 43-0116, "Requisition, Handling, Storage, and Identification of Radioactive Material".

4.3 NUREG/CR 2082 "Monitoring for Compliance with Decommissioning Termination Survey Criteria".

4.4 NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination", Draft June 1992.

4.5 U.S. Code of Federal Regulations, Title 10, "Energy".

4.6 U.S. Code of Federal Regulations, Title 29, "Labor".

4.7 U.S. Code of Federal Regulations, Title 40, "Protection of the Environment'.

4.8 NUREG/CR 5512, "Residual Contamination from Decommissioning".

4.9 ATG Site Health and Safety Plan

4.10 NRC Reg Guide 1.86

4.11 NRC Memorandum "EVALUATION OF ACCEPTABILITY OF PROPOSED DECOMMISSIONING ACTIVITIES", from John W. N. Hickey, Chief Operation Branch, Division of Fuel Cycle, Medical, Academic and Commercial Use Safety to William E. Cline, Chief Nuclear Materials Safety and Safeguards Branch Region II, dated May 06, 1987.

5.0 SCOPE OF WORK

5.1 OSHA Site Health & Safety Plan (29 CFR 1910.120(b)(1)) addresses the possibility of discovering isotopes not identified in the Scope of Work, technologically enhanced naturally occurring radionuclides such as Ra-226 and radionuclides regulated by the Nuclear Regulatory Commission. In accordance with the provisions of 29 CFR 1910.120, all personnel who may come in contact or handle these radionuclides and/or isotopes shall have passed the 40 hour basic training. Supervisory personnel shall have passed the 8 hour supervisory training. The plan shall require all personnel to provide evidence of current OSHA training (29 CFR 1910.120 (e) (6)) and medical certification (29 CFR 1910.120 (f)).

5.2 Project Schedule - The Project Schedule shall be dependent on the approval of the Project Detailed Work Procedure. When Allied Technology Group is notified that the work procedure has been approved, plans shall be implemented to transport personnel and equipment to the job site. For the purpose of this project schedule, Day 1, of the amended schedule, shall be the first day that personnel are on site at Fort McClellan.

5.3 Remediation work shall be performed on the Military Police Museum rear doorway and adjacent interior surface to reduce radiation levels to background radiation levels.

5.4 Activities within the museum must be conducted during normal operating hours due to security requirements.

5.5 A temporary working enclosure shall be constructed over the work site in the museum to protect the museum interior and collection from dust and dirt generated during the remediation. Exhaust ventilation should be established on the enclosure by means of a HEPA ventilation train.

5.6 Collect five additional soil samples on the east side of Bldg. 3192, 'the Hot Cell'. These five samples should be collected from the 15 identified 10 foot by 10 foot grids in the grid areas defined by Chem-Nuclear as E48-E52, E35-E39, and E22-E26. These samples will be taken and analyzed in conjunction with the normal soil samples taken for the final release of the site.

5.7 Four "angled" soil borings shall be taken at the interface of the Military Police Museum and the concrete apron (on the south side of the museum). The samples should be taken at depths of 1 foot, 2 feet, and 4 feet. The term "angled" is used to define the requirement that the four foot sample be taken from underneath the

Military Police Museum foundation to verify the absence or presence of radioactive contamination. Soil contamination in other areas of the site has been found to be contained within the first 12 inches of the soil.

6.0 RADIOLOGICAL CONTROL AND SAFETY PROGRAM

6.1 All the requirements and precautions identified in the original Fort McClellan Work Plan and signed for approval on 11/02/95 and 11/07/95 shall be followed.

6.2 The only isotopes of concern for release are Co-60 and/or Cs-137. These two isotopes are the only isotopes identified in previous characterizations and remediation efforts and are the only isotopes identified by NRC Correspondence dated 05/06/87 on the subject of decommissioning of this area.

6.3 The following guideline for acceptability of activities for decommissioning are restated here based on Nuclear Regulatory Commission guidance in a memo from John W.N. Hickey, Chief Operations Branch, Division of Fuel Cycle, Medical, Academic and Commercial Use Safety to William E. Cline, Chief Nuclear Materials Safety and Safeguards Branch Region II on the subject of "Evaluation of Acceptability of Proposed Decommissioning Activities (for Fort McClellan, Alabama, facility) dated 05/06/87.

6.4 External Radiation
The gamma exposure at 1 meter above the ground surface shall not exceed 10 μR/hr. above background for an area of greater than 30 feet by 30 feet and shall not exceed 20 μR/hr. above background for any discrete area (i.e., less than 30 feet by 30 feet).

6.5 Sample Contamination Levels
Concentration criteria developed for Co-60 and Cs-137 for situations in which subsurface contamination may be present, such as when burials of material have been made.

Radionuclide	Concentration Limits Above Background (pCi/gm)
Co-60	8
Cs-137	15

6.6 Where more than one radionuclide is present, the sum of the ratios of the individual radionuclide concentrations to their respective concentration limits shall not exceed 1.

6.7 All material, tools, and equipment involved in the remediation of the Military Police Museum will be surveyed to ensure that there is no release of material.

6.8 All equipment used to obtain core soil samples under the foundation will be surveyed to ensure that there is no presence of radioactive material. Equipment shall be decontaminated as necessary.

6.9 A distinct Radiation Work Permit (RWP) will be created for work involving the remediation of the Military Police Museum.

7.0 DETAILED WORK PROCEDURE

All work shall be performed in a safe and conscientious manner. The work instructions and requirements of the ATG Detailed Work Plan, Health and Safety Plan, and Quality Assurance Plan for this project shall be reviewed with the work force prior to the start of work and shall be adhered to at all times while on the work site.

The physical condition of radioactive materials contained with the building materials is solid and in an apparent fixed state of contamination. Caution shall be used during the removal of these materials and in the decontamination processes to prevent spreading radioactive materials from their position of encapsulation within the building materials. Should physical deterioration and the spread of activity beyond the bounds of the original work scope be observed, work shall stop and the condition of the facility shall be further assessed to determine if the removal methods specified in this document and plans for the work completion are adequate and appropriate.

No personnel entry into any posted work area is anticipated, nor permitted, by other than work crews or Army Radiological Safety Officer (RSO) type personnel with the prior approval of the ATG Project Manager or the Fort McClellan Radiation Safety Officer.

The initial characterization surveys of the Military Police Museum encountered fixed contamination radiation levels in the vicinity of the east doorway in the range of 100 to 130 μR/hr above background. This contamination appears to be fixed in the surface layers of the concrete. Surveys will be performed with the removal of each layer of concrete to mitigate the creation of radioactive waste.

Soil surveys in the rear (south side) of the Military Police Museum indicate contamination in the soil between the concrete apron and the building itself. This contamination is believed to be located in the first 12 inches of the soil. This has been proven to be the case in other areas on site during the first part of the remediation by Allied Technology Group. Pope Engineering or an equivalent company will be contracted to take "angled" soil borings under the Military Police Museum at 1 foot, 2 feet, and 4 feet depths. These soil samples will be analyzed by an independent certified laboratory to verify contamination levels in this area are below the release rates specified in Reference 4.11.

The radionuclides and concentrations that will be encountered are documented in previous surveys performed by Allied Technology Group during their initial characterization and remediation work in the 1994-1995 time frame and by Chem-Nuclear in their initial characterization and remediation work in 1983-1985. No significant sources of radiation other than surface contamination and soil contamination have been discovered. The only isotopes of interest have been determined to be Co-60 and Cs-137. Only dry low level radioactive waste is expected to be encountered. Good radiological work practices for contamination control and exposure minimization shall be employed at all times.

Any radiological condition which is outside the scope of this work as defined in the original Fort McClellan Detailed Work Procedure or this Work Plan shall require the immediate notification of the Project Manager, Project Supervisor, or Project Health Physicist and the immediate stoppage of work in progress. The IOC Representative and Project Director shall also be notified of the condition as soon possible.

7.1 Mobilization On-Site

7.1.1 Travel to Site.

7.1.2 Meet with the base Radiological Safety Officer, John May and IOC representatives on site for the work overview and coordination meeting.

7.1.3 Re-establish on site facilities (offices, radiological controls, instruments, etc.)

7.1.4 Train personnel in radiological controls, industrial safety, the work plan, and procedural control.

7.1.5 Obtain entry bioassay and issue dosimetry.

7.1.6 Conduct job briefing with IOC, Base Radiological Safety Officer and staff, and ATG personnel.

7.1.7 Obtain permission from the base to commence work.

7.1.8 Ensure the Fort McClellan Base Army Hospital is notified by the Base Radiological Safety Officer of the recommencement of radiological work.

7.2 Establish Radiological Controls

7.2.1 Survey and ensure adequate radiological postings for Building 3192, 'the Hot Cell' are established.

7.2.2 Survey and review postings for the radioactive material storage areas on site.

7.2.3 Ensure all strong type containers and barrels are labeled and marked properly.

7.2.4 Establish work areas in the Hot Cell, Bldg. 3192 and the Military Police Museum, Bldg. 3182. The determination of the size and location of these areas will be based on equipment necessary to perform the task, equipment removal, laydown space for removed material, space for waste containers, and personnel entry and egress. The area shall be posted as a "Radiologically Controlled Area" with the perimeter defined using boundary rope. The area utilized should be minimized for future release survey concerns.

7.2.5 Any non-contaminated laydown area should be covered with canvas, plastic or other appropriate material prior to use of the area to prevent cross contamination of the laydown surface.

7.2.6 A "Step Off Pad" and frisker (RM-14/HP-210 or equivalent type instrument) shall be established for personnel egress from the posted controlled area and shall be used upon exit from these area to prevent the transfer of contamination.

7.3 Work Preparation

7.3.1 Remove and release any items which are free of radioactivity from the work areas and release if possible following the guidelines outlined in the reference 4.10, Regulatory Guide 1.86.

7.3.2 Establish any laydown areas or containments necessary to prevent the spread of contamination prior to commencing work.

7.3.3 Ensure all tools and equipment are available and operational that are necessary to perform the work task prior to commencing the work.

7.4 Core Soil Samples Under Bldg. 3182, 'The Military Police Museum'.

7.4.1 The vendor for this task will be Polk Engineering or an equivalent type vendor.

7.4.2 These personnel should sign the 'Site Registration Form' and be issued personnel monitoring.

7.4.3 A Radiation Work Permit should be prepared for this task.

7.4.4 All personnel should be briefed on the Detailed Work Plan, Health and Safety Plan, and Quality Assurance Plan that are applicable to this task. This briefing should be documented.

7.4.5 The areas on the back side of the Military Police Museum (South side) where the soil samples are to be taken will be determined by ATG Supervision based on the highest anomaly readings seen with a micro-R meter, 2" X 2" NaI(Ti) or equivalent detector.

7.4.6 These areas will be verified free of any underground interference (ie. electrical or water lines) before commencing to drill by contacting the Fort McClellan Department of Engineering and Housing (DEH) for guidance in this area.

7.4.7 The area will be set up as a Radiological Controlled Area during the drilling operation and all personnel will be briefed and signed on the appropriate RWP for this work.

7.4.8 A minimum of four angled soil borings will be obtained in the museum to concrete apron interface, at a minimum depth of four feet. Three samples at each soil boring will be obtained at 1 foot, 2 feet, and 4 feet. The term "angled" is used to define the requirement that the 4 foot sample be taken from underneath the MP Museum foundation.

7.4.9 These soil samples will be sent to Analytical Technologies, Inc. in Fort Collins, Co. or an equivalent lab. for analysis. A minimum of 500 ml for each soil sample should be collected.

7.4.10 All tools, equipment, and material will be surveyed to be free of contamination prior to release.

7.4.11 The results of the soil samples will be reviewed by ATG Supervision. Any soil samples above the release criteria of Reference 4.11 greater than 1 foot in depth will require a review and change to the work scope. Soil samples above the

criteria of Reference 4.11 at one foot or less in depth will have the soil excavated and contained in B-25 or B-12 type boxes for shipment. A new soil sample will be obtained after the soil is excavated to verify that residual soil is below the release criteria established in Reference 4.11.

7.5 Decontamination of the Military Police Museum, Bldg. 3182

7.5.1 A Radiation Work Permit will be created for this task.

7.5.2 Permission will be obtained from the Fort McClellan Radiation Safety Officer and the Military Police Museum to commence this activity.

7.5.3 A containment will be constructed around the work area of the East doorway. A boundary will be establish around this containment and this boundary will be posted as a Radiological Controlled Area. This containment will be constructed of wood framing and plastic/visqueen or some similar material. Negative pressure should be established on this containment by use of a HEPA Ventilation Train. This containment will be established to prevent the spread of contamination into the Museum or the environment during decontamination activities.

Note: The containment should be constructed in such a manner that the rear door (East door) of the museum can be shut and locked during hours when no work activities are in progress if possible.

7.5.4 Interference such as carpeting and molding will be removed and surveyed and if found free of contamination, released. If floor tile is encountered, it will be evaluated for asbestos hazard.

7.5.5 Concrete removal should begin on the areas showing contamination levels above background. Concrete can be removed by scrabbling or use of pneumatic or electric jack hammer. All material generated during this evolution should be treated as potentially contaminated material.

7.5.6 Personnel should wear respiratory protection during this evolution to protect against contamination and the possible of ingestion of internal contamination.

7.5.7 Air samples should be performed inside and outside the containment to determine airborne activity levels and verify the containment structure.

7.5.8 Once the contamination has been removed and surveys show the remaining concrete has no residual radioactivity above general background levels, tools and equipment should be surveyed and released from the area. Decontamination should be performed on these items if necessary for release.

7.5.9 The work area should be free released per the guidelines established in Reference 4.4, NUREG/CR-5849. NOTE: Higher levels may be seen at the wall/floor interface due to the wall matrix.

7.5.10 Once free release has been performed on the area the containment should be removed and the material surveyed for free release or disposed of as contaminated material.

7.5.11 Safety posting should be established in the work area if fall hazards have been created during the remediation.

7.6 Outside Surveys and Release

7.6.1 In addition to the soil samples taken and analyzed per the requirements of Section 7.7, Outside Areas, of the Fort McClellan Detailed Work Plan the following soil samples will be taken.

7.6.2 In the grid areas of E48-E52, E35-E39, and E22-E26, as identified by the Chem-Nuclear Grid System, five additional soil samples will be taken and analyzed from the 15 identified 10 foot by 10 foot grids.

FORT McCLELLAN

Anniston, Alabama

APPENDIX B

HEALTH and SAFETY PLAN

DECEMBER 1996

ALLIED TECHNOLOGY GROUP

ATG, Inc.

PROJECT HEALTH AND SAFETY PLAN

Radiological Remediation

of

Fort McClellan Hot Cell and Grounds

Anniston, AL

November 1995

Concurrence: Frank C. Whitaker Date: 11/2/95
Frank C. Whitaker, ATG Project Manager

Concurrence: John W May Date: 11/7/95
John May, Ft. McClellan Representative

Concurrence: _____ Date: _____
Mike Styvaert, IOC Representative

Concurrence: _____ Date: 11/2/95
Thomas O'Dou, ATG Corporate Health Physicist

Approval: _____ Date: 11/2/95
W.G. Haney, Radioactive Waste Remediation

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1.0 INTRODUCTION

Allied Technology Group, Inc. Project Health and Safety Plan incorporates the health and safety procedures and practices to be followed during the activities specified in the Radiological Control Procedures. This Project Health and Safety Plan will be used to support the work activities and will be verified with the guidelines specified in the ATG Corporate Health and Safety Plan. This Project Health and Safety Plan includes radiological and industrial safety concerns.

2.0 SCOPE OF WORK

Sample collection, monitoring, and work with all radioactive materials will be performed following the guidelines specified in the Radiological Characterization Plan by Allied Technology Group personnel. For the purpose of this contract, all contaminated material will be handled with radiological contamination controls in place. Phases I and II of this project involved the radiological characterization in, under, and around Building 3192. Phase III involves mobilization, site set up, the decontamination identified in Building 3192, it's contents, any contaminated soil surrounding the building, packaging of contaminated material for shipment, final termination survey for all affected areas and immediate surrounding unaffected areas, and demobilization.

No adverse impacts are expected during the performance of this contract. There will be no expected air emissions, liquid releases, personnel exposures or environmental impacts during the packaging and shipping of any contaminated material. The work tasks will be performed by trained and qualified personnel. Oversight and monitoring will be performed by trained and qualified personnel in accordance with the Health and Safety Plan procedures.

3.0 HAZARD ASSESSMENT

Hazard assessment will be evaluated in three categories; radiological hazards, industrial hazards and environmental hazards. Appropriate personnel protection equipment, monitoring devices and data acquisition will be applied for all hazards.

3.1 Exposure

The principal radiation hazards at Fort McClellan are from and Cobalt 60. It is expected that an individual performing work on this project will receive less than 30 millirem. Additional exposure to radiation will come from the reference sources used in performance tests of the radiation detection equipment and from the samples taken to assess the potential hazards. The reference sources will be used by the Radiation Protection Technician and will be maintained in a labeled and locked container. Samples taken to monitor the potential hazards will be sealed and handled appropriately and in as short

amount of time as possible. Normally, the Radiation Protection Technician will handle and analyze the samples.

3.2 Industrial Hazards

Industrial hazards for this project should be limited to mechanical failures, heavy loads, suspended loads, physical stress and high temperature exposure.

Lifting, suspending, moving and packaging of materials could cause wear and tear on the equipment or fatigue to the workers. Mechanical failure will be reduced by using equipment in near new condition and not over-loading the equipment. The equipment will need to be visually inspected by qualified personnel prior to each use to reduce the potential for failure. Personnel safety equipment will be required for field work on this project. Safety shoes and safety glasses will be required for personnel. Hard hats shall be required when overhead hazards are present.

Physical stress could occur if an individual tries to lift items that are too heavy or oversized. Individual lifting limits will be 100 lbs. maximum but should be limited to an average of 50 lbs. Items that are odd shaped or bulky will be lifted by more than one individual or by mechanical means. Accidents will be handled on a case by case basis and will be evaluated by the Project Manager to determine if preventive measures can be applied to preclude the accident from reoccurring. Complications from high temperature exposure, such as heat exhaustion, will be handled with medical treatment as deemed necessary by the Project Manager.

3.3 Environmental Hazards

Hazards to the environment could most likely occur from aberrant weather, an accident or from carelessness while performing the work tasks. Controlling the amount of unsealed material, at any given time, will reduce the extent of an environmental impact.

4.0 WORKER PROTECTION

4.1 Personnel Protection

The work on decontamination of the Hot Cell involves hazards typically present during radiation work. In general, ATG work procedures are in effect for safety of our workers and others. However, the following points may need emphasis.

4.1.1 Contamination Control

The most important tasks for contamination control are decontamination of the hot cell and removal of the building drains. It is anticipated that the total activity removed from the walls, floor, and ceiling of the cell will not exceed approximately:

$1000 pCi/100cm^2$ x (2 x 1.5m x 2.5m + 2 x 2.5m x 2.5m + 2 x 1.5m x 2.5m) x 100^2 cm^2/m^2 =1000 $pCi/100cm^2$ x 2.75E5 cm^2 = 2.75E6 pCi = 2.75 μCi

This activity does not represent a significant hazard but should not be allowed to be distributed outside the cell in order to maintain doses to personnel ALARA.

4.1.2 Industrial Safety

Industrial safety is an important consideration on this job. Several operations will involve use of heavy equipment which will require qualified operators and care in assignment of personnel in the area of this equipment during operation.

4.1.2.1 Crane operations will be conducted under contract to remove the hot cell door from its location inside the building, to outside. All personnel must be made aware when crane operations are in progress. All personnel will stand clear of these operations. When the door is lifted from the structure, no personnel not associated with the lift will remain in the building.

4.1.2.2 A front loader will be used to remove surface soil from contaminated areas outside. Only personnel associated with this operation will be in the area of the front loader while it is in motion. A lead technician will be assigned to this area to enforce safety restrictions associated with this operation.

4.1.2.3 The high pressure sponge-jet system to be used for decontamination of the hot cell sprays abrasive media at high velocity onto the item being decontaminated. Only the operator and his safety assistant will be allowed in the area of this device during decon of the cell or any other items it is used on. All personnel who operate this device will receive hands-on instruction from a qualified ATG operator. The qualified operator will certify the individual prior to any unsupervised operation of the sponge-jet system. This certification shall be noted in the project log.

4.1.2.4 Lifting operations with the hot cell crane will only be completed with one person in the cell. These operations will only be done with direct communication between the operator and the person in the cell. The hot cell crane shall only be used for lifting materials for which it was designed.

4.1.2.5 All personnel will be required to wear safety glasses, steel toe shoes, and hard hats while in any work area during work operations.

4.1.3 Respiratory Protection

Respiratory protection may be required during certain operations. All personnel assigned respiratory protection must be medically qualified, trained on the use of the equipment, and when appropriate, have qualitative fit testing. All personnel in respirators must be clean shaven. All respirators must be cleaned and checked daily. The areas where respirators may be required are: the hot cell during decontamination with the sponge-jet or scabbler, and during work on the classroom and ventilation systems during fiberglass insulation removal. Every effort shall be made to reduce the amount of airborne material.

4.1.4 Personnel Dose

The whole body dose rates from the Cobalt 60 in any of the highest response areas of the site are less than 0.1 millirem per hour as measured with a micro-R meter. Therefore, as a conservative estimate of the personnel dose for the job, an individual exposed to this level of radiation for 12 hours per day for 20 days would receive a dose of (0.1*12*20) or 24 millirem. This is much lower than 10% of the annual occupational exposure limits for radiation exposure, 5 rem. Therefore external dosimetry is not required by regulation. However, as a conservative measure, ATG will require dosimetry for all project personnel.

4.1.5 Radiation Work Permit

The Radiation Work Permit (RWP) for work at the Fort McClellan Site will state the personal protective clothing that is to be required to be worn while working in specific project activities. The proposed RWP for this work is included in this plan.

4.2 Personnel Monitoring

Occupational exposure will be continually monitored for all personnel on this ATG project. Personnel monitoring for this project will be supplied by Allied Technology Group using the following procedure.

4.2.1 Occupational Exposure Guides

Allied Technology Group Administrative Control Levels per calendar year;

4.2.1.1	Whole Body	1.0 Rem
4.2.1.2	Extremities	5.0 Rem
4.2.1.3	Skin	5.0 Rem

The ATG Corporate Health Physicist shall approve any authorization for exposure above the annual control levels. This approval will only be given if the dose is necessary and shown to maintain collective dose on the project ALARA.

4.2.2 Site Registration Form

All personnel assigned to work on the project must complete a Site Registration Form, ATG Form 109, prior to starting work. Completed Site Registration Forms will be retained with the personnel exposure files.

4.2.3 Occupational Radiation Exposure History

Before an individual will be permitted to work in a controlled area, a U.S. Nuclear Regulatory Commission Form 4 must be completed and reviewed by the Project Manager or Radiation Protection Supervisor. Exposure results shall be listed on the NRC Form 4.

4.2.4 Thermoluminecent Dosimetry

TLDs shall be the permanent record of an individual's occupational radiation exposure. The TLDs used by Allied Technology Group are supplied and evaluated by a NVLAP approved vendor. All personnel assigned to the project will be issued a TLD for the job or on a monthly basis as the work requires.

The individual's name, social security number, issue date, and a date of return are to be recorded on the TLD Issue Log, (ATG Form 111a). In the event of a lost TLD, immediate notification to the Project Manager

or Radiation Protection Supervisor is required. A Lost TLD Report (ATG Form 111), will be completed and filed in the individual's exposure file. Monthly TLD results will be documented.

The NRC Form 4 will be updated when the TLD results are received and will be maintained in the individual's exposure file.

4.2.5 Radiation Work Permits

All personnel working at the Fort McClellan project must be assigned to a specific Radiation Work Permit, (ATGF-002 - Previously ATG Form 113), applicable to the job being performed. A Radiation Work Permit Sign In Sheet (ATGF-023) will be attached to each Radiation Work Permit if deemed necessary by the Project Manager or designee. All personnel assigned to a job, requiring a Radiation Work Permit, shall sign the RWP Sign In Sheet.

4.2.6 Occupational Radiation Exposure History Letter

An Occupational Radiation Exposure History Letter, (ATGF Form 047 will be completed for all personnel assigned to the job. Copies of this letter are sent to the individual and the Allied Technology Group Corporate office in Fremont, CA., within 30 days of obtaining the monitoring results.

4.2.7 Bloodborne Pathogens

Bloodborne pathogens are microorganisms in human blood that can cause disease. Although health care workers have long worked with the threat of exposure to bloodborne pathogens, exposure was viewed in a different light once AIDS was recognized.

Because the virus that causes AIDS is said to always be fatal, there has been increased concern about bloodborne pathogens in the last 15 years. AIDS, however, is not the only source of concern; other diseases caused by microorganisms include malaria, syphilis and hepatitis-B virus (HBV).

The purpose of this notice is to establish requirements with the intent to protect those employees who have a significant potential of exposure to Bloodborne Pathogens which may cause such disease's as Human Immunodeficiency Virus and Hepatitis-B Virus.

Key Definitions:

Bloodborne Pathogens: Microorganisms present in human blood that can cause disease in humans include, but are not limited to, Hepatitis-B virus (HBV) and Human Immunodeficiency virus (HIV).

Exposure Incidents: A specific eye, mouth, other mucous membrane, non-intact skin or penetrable contact with blood or other potentially infectious materials that results from performing required tasks.

Occupational Exposure: A reasonably anticipated skin, eye, mucous membrane or other penetrable contact with blood or other potentially infectious material that might result from performing required tasks.

Penetrable Contact: A Piercing of mucous membranes or the skin barrier by means of a needle stick, human bite, cut and/or abrasion.

Potentially Infectious Materials: Materials that might be present in a first-aid emergency, including blood, vomit, urine or other body fluids.

4.2.8 ATG Field Project Potential

ATG has conducted a thorough evaluation of the processes and tasks which are performed in relation to Contractual Field Projects and has determined the potential for employee exposure to be minimal. However, because of the potential for accidents and injuries resulting in the possible contact of body fluids, ATG shall require additional training. Although the likelihood of accidental exposure is minimal, the following information shall be discussed with assigned site personnel prior to work activity.

4.2.9 The following is the ATG policy for field operations.

Training: All ATG personnel who receive Basic First-Aid training and are designated as Emergency Medical Response personnel shall receive additional training in Occupational Bloodborne Pathogen awareness.

Vaccinations: All ATG personnel trained in Basic First-Aid shall be offered the Hepatitis-B series of inoculations at no cost to the individual. This shall be offered on a voluntary basis and because the risk is minimal and First-Aid treatment of others is voluntary, no statement of refusal of the vaccine shall be required. All ATG personnel who are designated and certified as Emergency Medical Technicians shall be required to receive the Hepatitis-B inoculations. This shall be at no cost to the individual.

Handling of Sharps: All ATG personnel who handle materials containing sharps shall be required to wear puncture resistant gloves. Any injuries received while working with such materials shall be reported to their immediate supervisor. In addition, personnel exposed to blood or other body fluids while aiding an injured individual, no matter how minor, shall report to their immediate supervisor. The supervisor shall then promptly log and report the incident to the Project Manager.

Protective Equipment: Protective Equipment such as gloves, masks and respiratory barriers are provided in each first-aid kit. All personnel responding to a first-aid situation in which there is a potential for exposure to blood or other body fluids are expected to use these devices for protection of both themselves and the personnel they are aiding.

4.3 Training

Individuals assigned to this project will be trained and qualified radiation workers. Training records will be supplied as part of the Project Quality Assurance Plan. Training specific to the project will be performed prior to the start of work by the Project Radiation Protection Supervisor and recorded on the Training Record, (ATGF Form 027 - Previous ATG Form 102). Requirements of the Project Detailed Work Procedure, Project Quality Assurance Plan and the Project Health and Safety Plan will be covered in the on-site training.

4.4 Decontamination

Contamination control barriers will be established and personal protective equipment will be required to minimize the potential for areas or personnel to become contaminated. In the event that personnel contamination is detected, the following procedure will be used to remove or contain the contamination.

4.4.1 Explanation

This procedure is a follow-up to the Radiation Survey Procedure which describes how a radiation worker detects personal contamination. Once detected, this procedure will explain where and how to decontaminate to acceptable levels. It further provides for ongoing documentation to assure adequate review and improvement of existing procedures.

4.4.2 Decontamination Methods

4.4.2.1 Personnel Decontamination

When contamination is found on the worker, the worker shall notify a Radiation Protection Technician immediately and inform him/her that he/she has become contaminated. The worker will indicate where he/she believes the contamination occurred, and the route taken to where the surface contamination was detected. This information will assist the Radiation Protection Technician in determining which areas to survey to avoid the contamination of other personnel. After notifying the Radiation Protection Technician, the individual who is contaminated shall, if possible, isolate the contaminated item or items by the use of clean plastic bags and remain in the personnel survey area. Any method of decontamination used will require monitoring and documentation of the results for each step in the procedure. All liquids used for decontamination purposes, will be considered contaminated and handled as radioactive waste. A spray solution of RadiacWash or equivalent mild detergent solution should be used as the primary agent to remove skin contamination. RadiacWash foam will be sprayed on the contaminated area, allowed to soak for a few minutes, then wiped clean. Radiation surveys will be performed between each wash.

NOTE: UNDER NO CIRCUMSTANCES WILL THE SKIN BE ABRADED WITHOUT DIRECT MEDICAL SURVEILLANCE. NOTIFY THE ATG PROJECT MANAGER AND THE CORPORATE HEALTH PHYSICIST SHOULD THIS BE RECOMMENDED.

Additional washing may be required if the affected area contamination levels are not reduced to below acceptable limits. If needed, lava soap, a soft brush and small amounts of water can be used with light pressure to produce a heavy lather. Only wash 3 times for about 2 minutes each. Rinse and monitor. Use care not to scratch or erode the skin. Apply lanolin or hand cream to prevent chapping. Continued washing will abrade the skin. Any additional decontamination techniques shall be approved by the ATG Health Physicist on a case by case basis.

4.4.2.2 Clothing Decontamination

When contamination is found on clothing, the worker shall immediately notify a Radiation Protection Technician and inform him of the situation, including where the worker believes the contamination occurred and the route taken to where the contamination was detected. This information will assist the Radiation Protection Technician in determining which areas to survey to avoid the contamination of other personnel. The contaminated clothing shall be removed, taking special care not to further contaminate additional clothing or personnel. The item(s) shall be surveyed to determine the degree of contamination. Depending on the source of contamination, decontamination methods such as using tape to adhere the contamination to or scraping a shoe with a knife may be used. If the contaminated item cannot be easily decontaminated without using soap and water methods, the item shall be disposed of as radioactive waste.

4.4.3 Documentation

In order to fully assess the degree of contamination, the skin dose to personnel and to critique the incidents to improve future procedures, documentation is necessary. Documentation of the event should start and continue from the initial detection of contamination to the final release. Personnel contamination will be classified in two categories, skin and clothing. A separate form shall be used for each, along with a Contamination Report Index, (ATG Form 116) to chronologically categorize all personnel contamination.

A Personnel Contamination Report, (ATG Form 117), and a Clothing Contamination Report, (ATG Form 118) shall be completed by the individual performing the decontamination and submitted to the Project Manager or Radiation Protection Supervisor for evaluation and filing. The Contamination Report Index shall be maintained by the Project RPS. The contamination reports shall be maintained in the individual's exposure file.

4.5 Bioassays

Allied Technology personnel are monitored for internal contamination on a routine basis. Whole Body Counts may be performed annually for gamma emitters. Urinalysis samples will be taken at the start and completion of the project (or the employment time) for all individuals. The samples will be analyzed for radionuclides associated with the project.

4.6 Radiological Surveys

4.6.1 Purpose

The purpose of this procedure is to set guidelines for the Allied Technology Group personnel to maintain control of the radioactive materials.

Designated work areas will be established to maintain an efficient material flow path. During the work operations, routine and periodic assessments are needed to assure that control of the radioactive material is maintained. The routine assessments are in the form of radiation surveys and periodic assessments are an accumulation of surveys and other data from other procedures. The designated areas requiring radiation surveys will be on a routine or special survey basis, depending on the work operation being performed. All surveys will be reviewed for information and accuracy by the Radiation Protection Supervisor daily.

Routine surveys are required on a daily basis in accordance with Radiation Work Permit requirements. RWP surveys are only required if work operations are to be performed in the area described on the RWP. Special surveys shall be required when the Project RPS or operation procedures deem necessary.

Types of surveys needed to make the regular assessments may include; dose rate surveys, contamination surveys or airborne contamination surveys. Individuals performing routine and special surveys will be designated by the Project RPS and will be trained in radiation survey techniques.

4.6.2 Performance Test

Radiological survey instruments are required to be calibrated at six month intervals or more frequently if indicated by the customer or required due to abnormal instrument operation. This primary calibration is performed by Ludlum Measurements, or other certified calibration laboratories. Primary calibration certificates and reference source certificates will be supplied with all radiological survey equipment. When the count rate and dose rate meters are returned from calibration, a reference check shall be performed prior to placing the instrument in use with one or more of the designated reference sources.

The reference tests will be performed using sources that are intact and appropriate to evaluate instrument response. A performance check

shall be performed on meters that are in use prior to each day and intermittently during continuous use.

4.6.3 Dose Rate Surveys

Routine dose rate surveys will give the radiation worker and supervisory personnel an indication of the amount of external occupational radiation exposure the worker will receive while performing routine work operations. Special dose rate surveys are needed to determine the disposition of radioactive material or if engineering controls are needed to reduce the exposure to the worker. Routine and special dose rate surveys shall be performed using the Ludlum Model 19 or equivalent micro R meter. Prior to using a meter, the individual performing the survey shall verify that the meter is in calibration and the batteries are in good working condition and that the meter performance test has been completed. While performing dose rate surveys, consideration must be given to the types of radiation that are present in the work area so that hazards to personnel in the work area can be identified. Occupational external radiation doses to personnel are attributable to gamma rays and beta particles. usually the gamma ray contribution is the greatest. Dose rates from beta particles are usually more limiting as an extremity hazard for close work with contaminated equipment or radioactive material. Documentation of the survey results shall be recorded as mR/hr (millirem/hr). General work area dose rates will be recorded on the Radiological Survey Form, (ATGF Form 001 - Previous ATG Form 124).

4.6.4 Contamination Surveys

Radioactive contamination surveys are an important part of the radiation protection program. Based on results of radioactive contamination surveys that are performed in the various work areas, assessments can determine the controls for radioactive material and to establish radiation protection requirements for personnel working in an area or on equipment.

There are two basic types of radioactive contamination; fixed and smearable (removable). Radioactive contaminants are only external exposure hazards as long as the contamination remains fixed. Smearable radioactive contaminants represent both external and internal exposure hazards. Routine contamination surveys are primarily conducted to determine smearable levels while special contamination surveys are for smearable and fixed.

Usually contamination surveys are performed in conjunction with dose rate surveys. Documentation of contamination survey results will be recorded on the Radiological Survey Form by the individual performing the survey. All smear results will be recorded in disintegrations per minute per 100 square centimeters (dpm/100 cm^2) unless otherwise indicated on the Radiological Survey Form. A drawing of the survey area or item shall be completed by the surveyor. The individual survey point shall be numbered and the number circled, indicating a smear location on the drawing. Principally, radioactive contamination consists of beta-gamma emitters.

Alpha survey results will be recorded with an "A" or "Alpha" while beta-gamma survey results will be assumed. Smear surveys are performed by wiping a surface (floor, wall, tool, tank, etc.) with a disposable smear pad, using moderate but even pressure, and wiping an area of 100 cm^2 (approximately 4" x 4").

Instrumentation to be used for fixed beta-gamma contamination surveys shall consist of a thin window GM probe, a Ludlum Model 44-9 or equivalent, attached to a count rate meter, a Ludlum Model 3 or equivalent. Care must be taken to avoid damage to the probe. Instrumentation to be used for fixed alpha surveys shall consist of a zinc sulfide alpha probe, Ludlum Model 43-5 or equivalent, attached to a Ludlum Model 3 (or equivalent meter/probe combination).

Evaluating smears for radioactivity should be performed using a Model 2929 Dual Channel Scaler or equivalent. The smear pads shall be placed in a planchet positioning the planchet inside the sample tray. The smears will be counted for 2 minutes. The total indicated counts per minute, minus the background counts per minute, multiplied by the efficiency factor, will equal the disintegrations per minute of the smear area.

$$A_s = \frac{(C_s - C_b)}{Eff}$$

where:
A_s = Smear Activity (dpm)
C_s = Sample Count Rate (cpm)
C_b = Background Count Rate (cpm)
Eff = Instrument Efficiency (c/d)

Personnel contamination surveys shall be performed by any individual exiting from a contamination controlled area. The background count rate in these areas shall be less than 200 cpm. A fixed frisking point shall be established by the step off pad area. Instructions for personnel

surveys will be posted by the friskers. In addition to personnel, all items leaving a contamination area shall be surveyed and will be free of contamination upon release.

Any time a vehicle exits a contamination controlled area, a smear survey shall be performed on the tires, and forks if applicable.

All items with smearable contamination levels below 1000 dpm/100 cm^2 will be considered non-contaminated. All items with smearable contamination greater than 1000 dpm/100 cm^2 shall be considered contaminated and must be handled appropriately. All items surveyed for unconditional release from the restricted area shall be less than the following limits:

4.6.4.1 Smearable beta-gamma <1000 dpm/100 cm^2

4.6.4.2 Smearable alpha <20 dpm/100 cm^2

4.6.4.3 Fixed beta gamma Not more than 15,000 dpm/100 cm^2 or 5,000 dpm/100cm^2 averaged over 1 square meter.

Documentation of acceptable survey results shall be performed on the Unconditional Release Record, (ATG Form 010).

If contamination survey results indicate a release of material or breach of containment barriers, a special environmental survey shall be performed to evaluate the levels and extent of the spread of contamination. Results of the special environmental survey shall be immediately reported to the ATG Health Physicist.

4.6.5 Airborne Contamination Surveys

Airborne contamination surveys are a convenient method of determining the amount of radioactive material suspended in air at the time of the sample. Air sampling must be performed in conjunction with specific aspects of work operations to achieve representative results. Because of this, quantities and frequencies of air samples cannot always be predetermined. There will be no classification as to routine and special air sample surveys.

All air samples will be issued an identification number. The Radiation Protection Technician will maintain the Air Sample Identification Record, (ATGF Form 048), to account for all air samples taken. All air samples will be documented on the Air Sample Data & Analysis Form, (ATGF 030), for the specific day and time of day the air sample was

taken. The RWP will determine the minimum quantities needed to make a thorough evaluation.

Airborne contamination surveys consist of two components, sampling and analysis. Each component is unique and need certain guidelines to ensure uniformity of results. Any deviation from the guidelines shall be noted to aid in the overall evaluation.

4.6.5.1 Sampling

Air samplers are instruments that pull a known quantity of air through a filter media at a known rate. The airborne contaminants are trapped on the filter media for future evaluation. The air filter media will be F&J Specialty, Inc. #FP47 or equivalent filters capable of collecting particles with a diameter of 0.3 micrometers at an efficiency of 99%.

Air samplers are calibrated on an annual basis. Air samplers are calibrated to ensure the quantity of air pulled through filter media is known. Air samplers are not to be used if the calibration has expired. Prior to use, an inspection of the air sampler shall be performed to ensure the rotometer is functioning, clean filter media is used and the calibration is current.

For sample collection, the air sampler head, which holds the filter media, should be placed to represent the breathing zone of the workers in the respective work area.

Starting time, starting flow rate, time off, and ending flow rate are to be recorded and maintained with the filter media for analysis. A minimum of 100 cubic feet of air must be pulled through the filter media to obtain an adequate representative air sample. The air samplers will operate continuously throughout the work day.

All samples shall be removed from the sampler head very carefully to prevent loss of sample material. The samples will be separately packaged to prevent damage and ensure proper evaluation of sample activity at the analysis station.

4.6.5.2 Analysis

Counting instrumentation shall consist of a Ludlum Model 2929 Dual Channel Scaler or equivalent, attached to a Model

43-10-1 probe or equivalent. The probe shall be placed in a shielded area and be positioned over a slide tray for planchettes.

For routine air sample counting, the shielding area background shall not exceed 50 counts per minute. Counting background and counting efficiency data shall be recorded on the Air Sample Data & Analysis Form (ATGF Form 030). Supporting data required to obtain air sample results shall also be recorded on ATGF Form 030.

Information required includes; date, counter background, counter efficiency, sample identification and location, time the sample was started and stopped, average flow rate, count start time, total count time, and total counts of the counter. Calculated results will be recorded in microcurie per cubic centimeter (uCi/cc), unless otherwise indicated.

Samples shall be carefully removed from the packaging to prevent loss of sampled material. Counting a sample consists of placing the filter paper in a planchet and positioning the planchet directly under the counter probe. Counting time will be five (5) minutes unless rapid evaluations are needed for unusual situations. A rapid evaluation could be assessed by using a count rate meter, but must be approved by the Project Manager or Radiation Protection Supervisor. All air sampler filter papers will be submitted to the Radiation Protection Supervisor when initial sample results have been obtained.

The following formula shall be used to calculate the results of the air samples:

$$\{Tc/Tc_t\} - Bkg = Ccpm$$

$$\frac{Ccpm}{Ns_t \times Fl_r \times Eff \times Fe \times 2.22E6 \times 2.83E4}$$

Where: Tc = Total Counts
Tc_t = Total Count Time
Bkg = Background Counts per minute
Ccpm = Corrected counts per minute
Ns_t = Net Sample Collection Time
Fl_r = Sample Flow Rate
Eff = Instrument Detection Efficiency
Fe = Filter Collection Efficiency

2.83E4 = Conversion Factor for cubic feet to milliliter

4.6.5.3 Action Levels

Action Levels of air sample results cannot always be readily attainable. All situations must be considered along with follow-up sampling and counting to aid in the final assessment. A background air sample station shall be established to aid in determining the work area airborne contamination levels. The background air sample results shall be subtracted from the work area air sample results to determine the corrected work area airborne contamination levels when practical.

If the work area (without respirators) airborne contamination exceeds 1.0×10^{-9} uCi/cc above background, a stop work condition shall exist and all workers shall leave the work area immediately. Follow-up sampling shall be performed and evaluated prior to allowing work to continue. All air samples with results greater than 3.0×10^{-10} uCi/cc shall have a half life determination performed. The half life determination formula used is:

$$T_{1/2} = \frac{-0.693 \times t}{\ln (Ccpm_2/Ccpm_1)}$$

where: $T_{1/2}$ = Sample half-life (min)
t = Decay time between $Ccpm_1$ and $Ccpm_2$ (min)
$Ccpm_1$ = Corrected count rate at the start.
$Ccpm_2$ = Corrected count rate at the end.
ln = natural logarithm

If the half-life of the radionuclides on the filter paper is less than 75 minutes then short lived radionuclides of the Radon-222 family are assumed to be present. Control measures should minimize the concentration that personnel are exposed to, to minimize internal dose. If the half-life of the radionuclides on the filter paper is greater than 75 minutes a more thorough assessment is required and the results brought to the attention of the Project RPS.

5.0 SAFETY RULES

5.1 Purpose

The purpose of the safety rules section is to provide a code of conduct which will allow for a smooth operation of the job site with as little time loss as possible due to violation of Safety Rules and Regulations. The safety rules apply to both the workers assigned to the project and visitors.

5.2 General Rules

Compliance with the Safety Rules is considered a condition of employment, and as such, disciplinary action may be taken for violations as necessary. Safety rule violation and disciplinary action will be determined by Allied Technology Group management. All workers have the responsibility to report safety violations to their superior.

5.3 Safety Rules

The following safety rules have been compiled and reviewed by Allied Technology Group management and will be accepted by all employees prior to employment. A copy of the Safety Rules and Regulations will be posted at the job site and will be made available to any employee requesting a personal copy.

5.3.1 Employees must be in working clothes and ready for work at the designated starting time.

5.3.2 Employees may take lunch breaks only during designated times and must eat in the assigned area while on the job site. There will be no smoking, eating or drinking while handling any hazardous materials.

5.3.3 Personnel will not quit work before the time designated for the conclusion of the work shift. There will be sufficient time allocated for removal of protective clothing or work clothes.

5.3.4 Employees must report to work each regularly scheduled work day. One hour call in time will be allowed to notify your superior of an absence. Excessive absentees will not be tolerated.

5.3.5 No employee will report to work under the influence of alcohol or drugs. Likewise, it is forbidden to carry or use alcohol or drugs on the job site or company property.

5.3.6 Personnel must comply with both verbal and written instructions from a supervisor or foreman.

5.3.7 All personal work injuries must be reported to the Project Manager.

5.3.8 All unsafe conditions, or unsafe acts must be reported to the Project Radiation Protection Supervisor or the Project Manager.

5.3.9 Any required personal protective devices and clothing must be properly worn by all personnel while on the job site.

5.3.10 Radiological monitoring equipment such as air samplers must not be tampered with or altered.

5.3.11 Good housekeeping by all personnel is considered mandatory.

5.3.12 Employees will not engage in malicious horse play, practical jokes or mischief while on the job site.

5.3.13 Fighting or attempting bodily injury to another employee while on the job site is not permitted.

5.3.14 Carrying a concealed weapon on the job site is expressly forbidden.

5.3.15 Falsifying company records or falsifying data will not be tolerated and will result in disciplinary action.

5.3.16 Equipment marked "Out Of Service" shall not be used.

5.4 Disciplinary Actions

The following steps will be administered in a fair and nondiscriminatory manner:

5.4.1 All Disciplinary actions will be documented and maintained in the employee's personnel file.

5.4.2 Supervisory personnel are responsible for giving appropriate and specific safety instructions and are responsible for assuring that the instructions are clearly understood.

5.4.3 A violation of the safety rules will be promptly corrected. The violations will be documented by the Project Manager and the employee will be given a copy of the written violation report.

5.4.4 Individual safety rule violations will be assessed on their merit with appropriate consideration given to the seriousness of the violation, the effect on the other employees, the employee's prior work record and previous safety violations. Any disciplinary action to be taken will be approved by the Project Director.

5.4.5 There may be some situations where the safety rule violation is so serious that modification or total disregard of the steps may be warranted. In these situations the employee may be suspended or terminated. It is suggested that in cases of this type, the employee be suspended pending the outcome of a full investigation of the incident and the employee's previous safety history. When this method is followed, the results of the investigation should determine the severity of the discipline to be administered.

6.0 STOP WORK CONDITIONS

During the performance of this contract, certain conditions may be encountered that will require specific work tasks to be immediately halted. Conditions such as; discovery of explosive materials, excessive contamination levels in a non-controlled environment, high wind speeds, extreme high or low temperatures, severe storms or flash floods. Depending on the specific work task that is being performed at the time on such an adverse condition, work may be halted until a safe condition exists to restart the task.

If time permits, the Project Manager will communicate with the Government representative to determine the appropriate action to be taken at a given time. The following guidelines will be used to aid in determining stop work conditions.

6.1 Excessive Contamination Levels in non controlled areas means that contamination levels in excess of 1000 dpm/100 cm^2 have been detected in non contamination controlled areas. All work tasks will immediately be halted and a concerted effort will be made to clean the affected area. The Radiation Protection Supervisor or Project Manager will be immediately notified of such conditions and work will not restart without his approval.

6.2 High Wind Speed means a steady wind speed in excess of 25 mph or wind gusts of 40 mph that seem to be ongoing throughout the day. Unsealed sources of radioactive material may be spread to non controlled areas if wind speeds are excessive. The soil packaging activity will be performed inside a sheltered area but may still be affected by steady winds or wind gusts. If excessive winds are encountered, the soil packaging activity will cease and the soil containers will be sealed and the remaining soil covered with plastic. Other work activities may be halted at the discretion of the Project Manager.

6.3 Extreme High Temperatures means in excess of 105 degrees. Heat stress to the workers may occur. When high temperatures are occurring, specific work tasks that are hampered will be halted. Work tasks that require physical work or work tasks that protective clothing is required may be affected. The RPS and/or Project Manager will evaluate the conditions and determine if work tasks will be halted.

6.4 Severe Storms or Flash Floods could cause all work tasks to be halted. Water damage to the controlled areas and barriers will cause all work tasks to be halted until the areas can be repaired. Should these type of conditions occur, the equipment and areas will be secured and evacuated. Prior to the restart of work, the Project Manager will receive approval from the contract administrator or the ATG Health Physicist.

6.5 Natural Disasters will be handled on a case by case basis. Depending on the type and magnitude of the disaster, work operations will be determined by the Project Manager.

7.0 ACCIDENT REPORTING

7.1 Insurance

Allied Technology Group's Worker Compensation Carrier has the responsibility for the following:

7.1.1 Making sure that every claimant is entitled to a fair investigation of his/her claim and a prompt decision as to its merit.

7.1.2 Determining how much a particular liability case is worth and negotiating a settlement within that range.

7.1.3 Making sure that cases of no liability, tenuous liability or those tainted by fraud are vigorously resisted.

7.1.4 Consulting with the company's Controller on all claims requiring settlement in excess of $5,000.00.

7.1.5 Consulting with the company's President or Vice President on all claims requiring settlement in excess of $10,000.00.

7.1.6 Maintaining the risk management reporting system, the risk detail report and forwarding monthly report updates to the company's President or Vice President.

7.2 Accident or Injury Reporting Requirements

To make sure that each incident is properly and appropriately reported and recorded, the Foreman's Report of Injury, (ATG Form 133) is required. Foreman's Report of Injury will provide all of the information to generate the employees first report of an injury. It can also be used as the company's medical authorization. The Foreman's Report of Injury must be completed in detail for every accident, injury or illness which occurs to an Allied Technology Group employee, visitor or subcontractor either in connection with or on company property or on a contracted job site. Every effort should be made to complete this form as quickly as possible following notification of the incident. The injured worker's foreman is responsible for completing this form. Once completed, the form should be reviewed and signed by the Project Manager and Project Director and a copy forwarded to the insurance carrier.

7.3 Employee's First Report of Injury

Each state within the United States has either developed its own Employer's First Report of Injury Form or has indicated a willingness to accept a suitable substitute. Generally where a state does not have its own form, the substitute is that form used by the employer's Workman's Compensation Carrier. Every state requires some type of injury notification.

The Project Director shall report immediately by telephone, or in writing, to the nearest District Office of the Division of Occupational Safety and Health any serious injury, accident or death of an employee. "Immediately" is defined for this purpose to mean as soon as practical but no longer than twenty four hours after the employer knows of or should have known of the death, illness or serious injury. Serious injury or illness is defined and shall be judged by Section 300 (H), Title 8, California Administrative Code.

The Project Director will notify the nearest office of the Division of Occupational Safety and Health whenever a State, County, or Local Fire or Police Agency is called to an accident involving and employee that has suffered a serious injury, illness or death.

7.4 OSHA Forms

The OSHA Form 200 Log and Summary of Occupational Injury and Illness along with the OSHA Form 101, Supplementary Record, will be completed and maintained at the Allied Technology Group corporate office in Fremont, CA. The corporate office has the responsibility to record and report OSHA reportable incidents. The forms will be made available on request.

8.0 HAZARD COMMUNICATION PROGRAM

8.1 Purpose

The purpose of this written Hazard Communication Program is to comply with the requirements of the Code of Federal Regulations, Title 29, Part 1910.1200, "Hazard Communication". This program is site specific.

8.2 Policy

Allied Technology Group as an employer engaged in a business within the Standard Industrial Classification, Codes 20 through 39, where chemicals or hazardous materials are either used or are produced for use. This program will assure that the hazards of all chemicals found in the work place will be evaluated and that information concerning their hazard will be transmitted to all affected employees.

The known hazard that will be handled on this project will be radioactive material. The hazard has been evaluated in the Project Health and Safety Plan. Communication to the employees will be handled in the project training and verified through the Project Quality Assurance Plan. Identification of the hazard is required by posting radiological controlled areas and labeling containers or items that contain radioactive material in accordance with 10 CFR 20.

Any currently unknown hazards will be handled in the same manner when they are encountered. Material Safety Data Sheets will be distributed and the material will be properly labeled. The Project RPS will be responsible for conducting the evaluation, communication and identification.

9.0 FORMS

Radiation Work Permit (RWP)	ATGF-002
Unconditional Release Record	ATGF-010
RWP Sign In Sheet	ATGF-023
Training Record	ATGF-027
Air Sample Data & Analysis	ATGF-030
Occupational Radiation Exposure History	ATGF-047
Air Sample Identification Record	ATGF-048
U.S. NRC Form 4	
U.S. NRC Form 5	
Lost TLD Report	ATG Form 111
TLD Issue Log	ATG Form 111a
Personnel Radiation Exposure Record	ATG Form 112

Contamination Report Index	ATG Form 116
Personnel Contamination Report	ATG Form 117
Clothing Contamination Report	ATG Form 118
Foreman's Report of Injury	ATG Form 133
OSHA Form 200 Log and Summary of Occupational Injury and Illness	

FORMS

RADIATION WORK PERMIT (RWP)

RWP #:_____ ☐ Regular ☐ Extended

SECTION I

Contract #	Date: / /	Time:

Location/Project:

Exposure Category: ☐ D&D ☐ Demolition ☐ Waste Processing ☐ CHAR

Job Description:_____

_____

_____

Estimated Start Date: / / Estimated End Date: / /

SECTION II

Existing Radiological Conditions:

Radiation Survey No._____ Airborne Survey No._____ Contamination Survey No._____

Existing General Area Radiation Level(s): β γ N	Existing General Contamination Levels:	Airborne DAC Level(s):
_____ mR/hr/γ _____ mrad/hr/corrected β _____ mrem/hr/N	_____ dpm/100cm^2 $\beta\gamma$ _____ dpm/100cm^2 α	α _____ % P $\beta\gamma$ _____ % P _____ % H_3
Existing Maximum Radiation Level(s): β γ N	**Existing Maximum Contamination Level(s)**	**Hot Particle?**
_____ mR/hr/γ _____ mrad/hr/corrected β _____ mrem/hr/N	_____ dpm/100cm^2 $\beta\gamma$ _____ dpm/100cm^2 α	☐ Yes ☐ No

Remarks:_____

_____

_____

SECTION III

Radiological Limits:

Maximum Allowed WB Exposure Rate γN: _____ mr/hr or mrem/hr

Corrected β: _____ mrad/hr Maximum Extremity Exposure Rate: _____ mr/hr

Maximum Allowed Contamination Level $\beta\gamma$: _____ dpm/100cm^2 α: _____dpm/100cm^2

Maximum Allowed Airborne Concentration Level: _____ % DAC

Remarks: _____

_____

Industrial Hygiene/Safety Concerns: _____

_____

RADIATION WORK PERMIT (RWP)

RWP #:_____ ☐ Regular ☐ Extended

SECTION IV

WORKER REQUIREMENTS

CLOTHING:	DOSIMETRY:	INSTRUCTIONS:	RESPIRATORY:
☐ Coveralls ☐ Lab Coat ☐ Cloth Hood ☐ Paper Coveralls ☐ Plastic Suit ☐ Plastic Booties ☐ Rubber Shoe Covers ☐ Canvas Shoe Covers ☐ Cotton Gloves ☐ Rubber Gloves ☐ Leather Gloves ☐ Beta Goggles/Face Shield ☐ Extra ☐ Other Clothing _____ _____ Stay Time (Heat Stress, Radiaton, Exposure Limits, etc.): _____ hrs.	☐ TLD ☐ Film Badge ☐ SRD ☐ Standard ☐ Elbows ☐ Gonad Pack ☐ Hot Cell Entry ☐ Extremity ☐ Head Pack ☐ Special ☐ Knees ☐ Varying Field ☐ Upper Field ☐ Ground Field ☐ Alarming Dosimtery ☐ None	☐ Contact HP for Line Breaks ☐ Protect Cuts ☐ Pre-Job Briefing ☐ Post-Job Briefing ☐ Contact HP Prior to Work in New Areas ☐ Modesty Required ☐ Site Specific Instructions ☐ Equipment Monitor at Job End ☐ Clean Up Work Area During and After Job ☐ Eating, Drinking, Smoking, Chewing Prohibited ☐ Frisk Upon Exiting Contaminated Area ☐ Have Prescribed HP Coverage or Stop Work ☐ Exit Area Immediately Upon Emergency or Injury. Notify HP Immediately	☐ FFNP ☐ FFAL ☐ SCBA ☐ PAPR ☐ Dusk Mask ☐ Half Face ☐ Bubble Hood ☐ _____ Cartridges: ☐ Particulate ☐ Vapor ☐ Combination ☐ Other ____ _____ _____

Special Instructions: _____

_____

_____

SECTION V

Health Physics Requirements

1. Job Coverage: ☐ Continuous ☐ Intermittent ☐ Start ☐ End of Job
2. Air Sampling: ☐ General Area ☐ Breathing Zone ☐ Lapel ☐ AgZ
   ☐ Tritium/C-14 ☐ Particulate ☐ Charcoal ☐ LoVol ☐ HiVol
3. Exposure Rate Surveys: ☐ Start of Job ☐ Continuous Monitoring ☐ Area Monitoring
   ☐ Intermittent Monitoring ☐ End of Job
4. Contamination Surveys: ☐ Start of Job ☐ Continuous Monitoring
   ☐ Intermittent Monitoring ☐ End of Job
5. Is the ALARA Consideration Complete and Attached? ☐ Yes ☐ No Why? _____
6. Other: _____

SECTION VI

Personnel Authorized to Perform Work & Acceptance of Responsibility
*My signature verifies that I have read and fully understand the RWP Requirements

Date	Name (Print)	Signature*	SSN	HPS Initials	Year Dose to Date (Rem)				
					TEDE	TODE	I DE	SDE WB	SDE EX

H	Approvals/Reviews	I	Termination
Technician Generating RWP: Date/Time:		Date: Time:	
Industrial Hygiene Approval: Date/Time:		Health Physics Rep:	
HP Supervisor Approval: Date/Time:		Reason: ☐ Job Complete ☐ RWP Revision	
RSO Manager Approval: Date/Time:		HP Supervisor Review:	

UNCONDITIONAL RELEASE OF EQUIPMENT OR ITEMS REPORT

ATGS #:	DATE:

PROJECT/LOCATION:

DESCRIPTION OF EQUIPMENT OR ITEMS:

SURVEY EQUIPMENT:

MODEL NO:	S/N:	BKRD:	EFF:	CAL DUE DATE:
MODEL NO:	S/N:	BKRD:	EFF:	CAL DUE DATE:
MODEL NO:	S/N:	BKRD:	EFF.	CAL DUE DATE:

CONTAMINATION LEVELS:

	dpm/100 cm^2 $\beta\gamma$	REMOVABLE
	dpm/100 cm^2 α	REMOVABLE
	dpm/100 cm^2 $\beta\gamma$	FIXED
	dpm/100 cm^2 α	FIXED

THIS IS TO CERTIFY THAT THE ABOVE DESCRIBED EQUIPMENT OR ITEMS HAS BEEN SURVEYED AND FOUND TO BE WITHIN ACCEPTABLE SURFACE CONTAMINATION LEVELS FOR UNCONDITIONAL RELEASE AS REQUIRED BY NUCLEAR REGULATORY GUIDE 1.86.

HEALTH PHYSICS TECHNICIAN:	DATE/TIME:

DISPOSITION OF EQUIPMENT OR ITEMS:

REVIEWED BY:	DATE:

RWP SIGN-IN SHEET

NOTE: **1. All personnel signing in on this RWP Sign-in sheet must have signed Section VI of the RWP.**
2. All persons entering the RWP areas must log in and out.

RWP#:	Location / Project	Date
Job Description:		

Date	Name (Print)	Signature	Social Security Number	Time		SRD Reading (mR)		Respirator Worn?		HP Comments
				In	Out	In	Out	Yes	No	

TRAINING RECORD

TRAINING DATE:	INSTRUCTOR:
LOCATION:	TOTAL CLASS HOURS:

TRAINING COURSE TITLE:

SCOPE OF TRAINING:

NAME OF STUDENT	SOCIAL SECURITY NO.	SIGNATURE

TRAINING APPROVED BY (Project Director):

AIR SAMPLE DATA AND ANALYSIS

FORM ATGF-030

INSTRUCTION 1: Complete the following information concerning the sample:

Project/Location:_____

A/S ID Number:_____ RWP Number:_____ ATGS Number:_____

Date Start:_____ Date Stop:_____

Time Start:_____ Time Stop:_____ Total Time:_____ minutes

Sample Location:_____

Sample Type: ☐ Breathing Zone ☐ General Area ☐ Other:_____
☐ High Volume ☐ Low Volume ☐ Lapel/Personal

Comments:_____

Technician Performing Sample:_____ Date:_____

INSTRUCTION 2: Complete the following information concerning sampling equipment and counting equipment:

Type Sampler:_____ Type Counter:_____

Sampler I.D.:_____ Counter I.D.:_____

Cal. Date:_____ Probe I.D.:_____

Cal. Due Date:_____ Cal. Date:_____

Flow Rate Start:_____ ☐ cfm ☐ lpm Cal. Due Date:_____

Flow Rate Stop:_____ ☐ cfm ☐ lpm Count Time:_____minutes

Alpha Eff:_____

Average Flow Rate:_____ ☐ cfm ☐ lpm Beta/Gamma Eff:_____

Alpha Background:_____

Beta/Gamma Background:_____

Technician Performing Count:_____ Date: _____

INSTRUCTION 3: Calculate the alpha and beta-gamma MDA values:

$$\text{MDA } \frac{\mu Ci}{ml} = \frac{2.71 + 3.29\sqrt{R_B t_{S+B}(1 + t_{S+B}/t_B)}}{2.22E6 \cdot E \cdot V \cdot t_{S+B}}$$

where:

V	=	Sample Volume in ml
E	=	Counter Efficiency
R_B	=	Background Count Rate (cpm)
t_{S+b}	=	Sample Counting Time (min)
t_B	=	Background Counting Time (min)

Alpha MDA = _____ Beta-Gamma MDA = _____

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 4: Upon completion of the end of sampling period, perform the initial count of the sample within 15 minutes:

Time Counted	Gross Counts	Count Period ÷	Gross CR =	Bkgrnd CR -	Net CR =	CF ÷	EFF. cpm / dpm ÷	dpm / µCi ÷	Activity =
α	cts	min	cpm	cpm	cpm	.67		2.22E+6	µCi
βγ	cts	min	cpm	cpm	cpm	.95		2.22E+6	µCi

Technician Performing Initial Count:_____ Date:_____

INSTRUCTION 5: Calculate the Total Sample Volume:

Total Sample Run Time		Sample Average Flow Rate		Total Volume
_____ minutes	X	_____ cfm X 2.83E+4	=	_____ ml
		_____ lpm X 1.0E+3		

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 6: Determine the Initial Airborne Concentration:

Initial Activity		Volume		Initial Activity
α _____ µCi X FR	÷	_____ ml	=	_____ µCi/ml α
βγ_____ µCi X FR	÷	_____ ml	=	_____ µCi/ml βγ

FR = Filter Ratio (4" Filters = 3.0) (2" Filters = 1.0)

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 7: If either the Alpha/Beta-Gamma activity exceeds 10% of the DAC value of the known radionuclide(s) of concern, then a recount of the sample is required after a 3 hour decay period to allow the short lived Radon daughters to decay.

Time Counted	Gross Counts	Count Period ÷	Gross CR =	Bkgrnd CR -	Net CR =	CF ÷	EFF. cpm / dpm ÷	dpm / µCi ÷	Activity =
α	cts	min	cpm	cpm	cpm	.67		2.22E+6	µCi
βγ	cts	min	cpm	cpm	cpm	.95		2.22E+6	µCi

Technician Performing 3 Hour Count:_____ Date:_____

INSTRUCTION 8: Determine the airborne concentration following 3 Hr. decay and utilizing volume data in Instruction 5:

3 Hr. Decayed Activity		Volume		3 Hr. Decayed Activity
α _____µCi X FR	÷	_____ml	=	_____µCi/ml α
βγ _____ µCi X FR	÷	_____ml	=	_____µCi/ml βγ

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 9: Determine the half-life of the radionuclide(s) using the following formula:

$$T\frac{1}{2}\ (\text{min}) = \frac{-.693\ (t)}{\ln \frac{\text{Final Activity}}{\text{Initial Activity}}}$$

t = elapsed time between counts in minutes

t½ α = _____

t½ βγ = _____

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 10: If either the Alpha/Beta-Gamma activity exceeds 10% of the DAC value of the known radionuclide(s) of concern following the 3 hour decay, then a 20 hour decay count of the sample is required to remove the Thoron component of the sample.

INSTRUCTION 11: Decay sample for 20 hours and then recount the sample:

Time ounted	Gross Counts	Count Period ÷	Gross CR =	Bkgrnd CR -	Net CR =	CF ÷	EFF. cpm / dpm ÷	dpm / µCi ÷	Activity =
α	cts	min	cpm	cpm	cpm	.67		2.22E+6	µCi
βγ	cts	min	cpm	cpm	cpm	.95		2.22E+6	µCi

Technician Performing 20 Hour Count:_____ Date:_____

INSTRUCTION 12: Using the 3 hour and the 20 hour activity, determine the long-lived activity due to alpha:

$$A_{LL}^{\alpha} = \frac{A_{20}^{\alpha} - A_3^{\alpha}\,(e^{-0.0655(\Delta T)})}{1 - e^{-0.0655\,(\Delta T)}}$$

where:

A_{LL}^{α}	=	long-lived activity which emits alpha
A_{20}^{α}	=	20 hour decayed activity due to alpha
A_3^{α}	=	3 hour decayed activity due to alpha
0.0655	=	Pb-212 decay constant; since Bi-212 is in transient equilibrium with the Pb-212 and Po-212 is in secular equilibrium with the Bi-212, it is also Po-212's decay constant.
ΔT	=	elapsed time between the 3 hour decay period midpoint and the 20 hour decay period midpoint in hours

$$\alpha\, A_{LL}\mu Ci = \frac{A_{20}\mu Ci - A_3\mu Ci\,(e^{-0.0655\,(hrs)})}{1 - e^{-0.0655\,(hrs)}}$$

$$= \frac{\_\_\_\_\_\,\mu Ci - \mu Ci\,(e^{-0.0655\,(-\_\_\_\_hrs)}}{1 - e^{-0.0655(\_\_\_hrs)}}$$

$$= \_\_\_\_\_\,\mu Ci$$

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 13: Using the value of alpha long-lived activity from Instruction 12, calculate the beta long-lived activity:

_____ $\beta\ A_{LL}\mu Ci = (\alpha\ A_{LL}\mu Ci)\ (0.67)$

where 0.67 is:

Nuclide	T½	Ci	Emission	Yield	Energy
Th-232	1.4E+ 10 yr.	1.	Alpha	100%	4.01 Mev
Ra-228	5.75 yr.	.9446	Beta	100%	0.05 Mev
Ac-228	6.13 hr.	.9446	Beta	100%	2.11 Mev
Th-228	1.91 yr.	.9171	Alpha	100%	5.4 Mev
Ra-224	3.62 day	.9169	Alpha	100%	5.5 Mev
Rn-220	55 sec.	.9169	Alpha	100%	6.3 Mev
Po-216	0.15 sec.	.9169	Alpha	100%	6.8 Mev
Pb-212	10.6 hr.	.9169	Beta	100%	0.6 Mev
Bi-212	60.6 min	.9169	Beta	100%	2.25 Mev

Total long-lived alpha activity = 1 + .917 + .917 = 2.83 $\frac{1.89}{2.83}$ = 0.67

Total long-lived beta activity = .945 + .945 = 1.89

Technician Performing Calculation:_____ Date:_____

INSTRUCTION 14: Calculated the long-lived activity concentrations from the values determined in Instructions 12 and 13:

$\frac{A_{LL}{}^{\alpha}\mu Ci}{\text{volume}}$ = _____ μCi/ml $[A_{LL}{}^{\alpha}]$

$\frac{A_{LL}{}^{\beta}\mu Ci}{\text{volume}}$ = _____ μCi/ml $[A_{LL}{}^{\beta}]$

If: $[A_{LL}{}^{\alpha}] > 1E\text{-}13\ \mu Ci/ml$

$[A_{LL}{}^{\beta}] > 2E\text{-}10\ \mu Ci/ml$

Then:
- Report this to the HP Supervisor Immediately
- Post the area as Airborne Radioactivity Area
- Calculate and record DAC Hours for the affected individuals
- Send the sample out for an isotopic analysis

Technician Performing Calculation:_____ Date:_____

HP Supervisor Review:_____ Date:_____

Allied Techn gy Group, Inc.
47375 F .ont Blvd.
Fremont, California 94538
(800) 227-2840

OCCUPATIONAL RADIATION EXPOSURE HISTORY
Exposure Year 1994

Name:_____ Social Security Number:_____

Address:_____ Date of Birth:_____

City:_____ State:_____ Zip:_____

The Occupational Radiation Exposure listed below was received by the above individual while assigned by Allied Technology Group, Inc.

Project/Location Monitored	Monitoring Method TLD/Film Badge	Record/Estimate	NRC License Number(s):

Abbreviations: NC - Not Calculated ND - None Detected NM - Not Monitored SA - See attached

Monitoring Period		Deep-Dose Equivalent			Shallow-Dose Equivalent		LDE	CEDE	CDE	TEDE	TODE
From	To	X or γ	Neutron	Total DDE	Skin SDE, WB	Extremity SDE, ME	Lens	$H_{E,50}$	$H_{T,50}$	DDE+ CEDE	DDE+ CDE

THIS REPORT IS FURNISHED TO YOU UNDER THE PROVISIONS OF THE NUCLEAR REGULATORY COMMISSION REGULATION 10 CFR PART 20 TITLED "STANDARDS FOR PROTECTION AGAINST RADIATION". YOU SHOULD PRESERVE THIS REPORT FOR FURTHER REFERENCE. ALL DOSE EQUIVALENT VALUES ARE REPORTED IN MILLIREM.

Radiation Safety Officer:_____ Date:_____

AIR SAMPLE IDENTIFICATION RECORD

Project/Location:_____ Page ____ of ____

Sample ID	Date	Location	Initial Count βγ Results In μCi/ml	Initial Count α Results In μCi/ml	Decayed Count βγ Results In μCi/ml	Decayed Count α Results In μCi/ml	# of Hours Decayed

PAGE ____ OF ____

NRC FORM 4
(6-92)
10 CFR PART 20

U.S. NUCLEAR REGULATORY COMMISSION

CUMULATIVE OCCUPATIONAL EXPOSURE HISTORY

APPROVED BY OMB NO. 3150-0005
EXPIRES:

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: MINUTES. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0005), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

1. NAME (LAST, FIRST, MIDDLE INITIAL)	2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX: MALE ☐ FEMALE ☐	5. DATE OF BIRTH

6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE
6. MONITORING PERIOD		7. LICENSEE NAME		8. LICENSE NUMBER		9. RECORD ☐ ESTIMATE ☐ NO RECORD ☐	10. ROUTINE ☐ PSE ☐
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODE

19. SIGNATURE OF MONITORED INDIVIDUAL	20. DATE SIGNED	21. CERTIFYING ORGANIZATION	22. SIGNATURE OF DESIGNEE	23. DATE SIGNED

NRC FORM 4 (6-92)

PAGE ____ OF ____

NRC FORM 5
(6-92)
10 CFR PART 20

U.S. NUCLEAR REGULATORY COMMISSION

OCCUPATIONAL EXPOSURE RECORD FOR A MONITORING PERIOD

APPROVED BY OMB NO. 3150-0006
EXPIRES:

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: MINUTES. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0006), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

1. NAME (LAST, FIRST, MIDDLE INITIAL)	2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX ☐ MALE ☐ FEMALE	5. DATE OF BIRTH

6. MONITORING PERIOD	7. LICENSEE NAME	8. LICENSE NUMBER(S)	9A. ☐ RECORD ☐ ESTIMATE	9B ☐ ROUTINE ☐ PSE

INTAKES

10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN μCi

DOSES (in rem)

DEEP DOSE EQUIVALENT	(DDE)	11
EYE DOSE EQUIVALENT TO THE LENS OF THE EYE	(LDE)	12
SHALLOW DOSE EQUIVALENT, WHOLE BODY	(SDE,WB)	13
SHALLOW DOSE EQUIVALENT, MAX EXTREMITY	(SDE,ME)	14
COMMITTED EFFECTIVE DOSE EQUIVALENT	(CEDE)	15
COMMITTED DOSE EQUIVALENT, MAXIMALLY EXPOSED ORGAN	(CDE)	16
TOTAL EFFECTIVE DOSE EQUIVALENT *(BLOCKS 11 + 15)*	*(TEDE)*	17
TOTAL ORGAN DOSE EQUIVALENT, MAX ORGAN *(BLOCKS 11 + 16)*	*(TODE)*	18

19. COMMENTS

20. SIGNATURE -- LICENSEE

21. DATE PREPARED

LOST BADGE REPORT

REPORT DATE:	REPORT TIME:
INDIVIDUAL'S NAME:	BADGE NUMBER:
DATE BADGE LOST:	TIME BADGE LOST:
LOCATION IF KNOWN:	
APPLICABLE RWP NUMBER:	

EXPOSURE CALCULATION

1.	Exposure from dosimeter readings: (Total from date issued) through_____ (Date)	=	_____ mrem
2.	Current dosimeter reading: (If more than one dosimeter, use highest reading	=	_____ mrem
3.	If individual was not wearing a dosimeter, or lost his dosimeter, assign highest exposure received by workers in the same area. If none, use dose rate x time in area for the same period.	=	_____ mrem
4.	Total estimated exposure to be assigned:	=	_____ mrem

THE METHOD USED TO ESTIMATE MY EXPOSURE AND THE ESTIMATED EXPOSURE ASSIGNED TO ME ARE ACCEPTABLE.

Employee's Signature	Date:
Calculated By:	Date:
R.S.O. Approval:	Date:

Form 5 Updated: ☐ YES ☐ NO	Report Voided (Not Necessary) ☐
Reason:	

BADGE ISSUE LOG

PROJECT / LOCATION:				BADGE SERIES NO:	
BADGE NO.	NAME	SOCIAL SECURITY NUMBER	NRC FORM 4 COMPLETE Y/N	PERIOD MONITORED FROM/TO	DATE OF BIRTH

1995 RADIATION EXPOSURE RECORD

NAME:	
SOCIAL SECURITY NO:	BIRTH DATE:
EXTREMITY BADGE NO:	LM BADGE NO:
LIFETIME WHOLE BODY EXPOSURE:	

	WHOLE	SKIN	EXTREMITIES		LIFETIME HIGHEST WHOLE BODY
			LEFT	RIGHT	
JANUARY					
FEBRUARY					
MARCH					
QUARTER TOTALS					
APRIL					
MAY					
JUNE					
QUARTER TOTALS					
JULY					
AUGUST					
SEPTEMBER					
QUARTER TOTALS					
OCTOBER					
NOVEMBER					
DECEMBER					
QUARTER TOTALS					
ANNUAL TOTALS					

CONTAMINATION REPORT INDEX

DATE	DATE	TYPE CLOTHING PERSONNEL	LOCATION OF CONTAMINATION	COMMENTS

PERSONNEL CONTAMINATION REPORT

NAME	DATE
LOCATION WHERE CONTAMINATION OCCURRED:	RWP#

EXTENT OF CONTAMINATION:	
A. INITIAL SURVEY RESULTS:	
B. SURVEY RESULTS AFTER DECONTAMINATION:	
C. RELEASE SURVEY RESULTS:	

SKIN DOSE EVALUATION:

A. Maximum contamination level conversion from dpm to mrad/hr maximum skin dose rate

_____ dpm (4,000 dpm/mrad/hr) = _____ mrad/hr.

B. Maximum skin dose rate Total time skin contaminated

Total maximum skin dose _____ mrad/hr x _____ hr* = _____ mrad**.

* If skin contamination cannot be removed, assume a residence time of 48 hours. Contact the Radiation Safety Officer in all cases where skin contamination cannot be reduced below 1000 dpm.

** If 75 mrad, contact the Radiation Safety Officer. (75 mrad is equivalent to 75000 cpm on the skin for 4 hours.)

RADIATION SAFETY OFFICER COMMENTS:

SIGNATURE (TECHNICIAN)	DATE
SIGNATURE (INDIVIDUAL)	DATE
SIGNATURE (SUPERVISOR)	DATE

CLOTHING CONTAMINATION REPORT

NAME:	BADGE NO.:
WORK AREA:	
DATE OF OCCURRENCE:	TIME OF OCCURRENCE:
LOCATION WHERE CONTAMINATION OCCURRED:	
JOB BEING PERFORMED:	
WAS WORK COVERED BY RWP? ☐ YES OR ☐ NO	IF YES, RWP#
ANTI-C's WORN? ☐ YES OR ☐ NO	
DESCRIBE:	
EXTENT OF CONTAMINATION, INCLUDING APPROXIMATE AREA:	
CAUSE OF CONTAMINATION:	
METHOD OF DECONTAMINATION:	
RADIATION PROTECTION COMMENTS:	
SURVEY SECTION:	
A. INITIAL SURVEY RESULTS:	
B. AFTER DECONTAMINATION:	
C. RELEASE SURVEY RESULTS:	
HEALTH AND SAFETY OFFICER	DATE
INDIVIDUAL'S SIGNATURE	DATE

FOREMAN'S REPORT OF INJURY OR ILLNESS

EMPLOYER'S NAME:				
EMPLOYER'S ADDRESS:				
WORK LOCATION:				
WORK LOCATION ADDRESS:				
EMPLOYEE'S NAME:			DATE OF BIRTH:	
EMPLOYEE'S ADDRESS:				
MARITAL STATUS:	SINGLE	MARRIED	WIDOWED	DIVORCED
IS THIS A WORK RELATED INJURY OR ILLNESS? ☐ YES OR ☐ NO				
DATE OF OCCURRENCE:		TIME OF OCCURRENCE:		
ACCIDENT OR ILLNESS DESCRIPTION:				
IS THIS A LOST TIME ACCIDENT OR ILLNESS? ☐ YES OR ☐ NO				
IS THIS AN OSHA RECORDABLE ACCIDENT OR ILLNESS? ☐ YES OR ☐ NO				
WAS MEDICAL TREATMENT NECESSARY? ☐ YES OR ☐ NO				
FOREMAN'S SIGNATURE			DATE	
REVIEWED BY			DATE	