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**Dismantlement and Removal of Old
Hydrofracture Facility Bulk Storage Bins
and Water Tank,
Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

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DEPARTMENT OF ENERGY

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**Dismantlement and Removal of Old
Hydrofracture Facility Bulk Storage Bins
and Water Tank,
Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

Date Issued—March 1998

Prepared by
Allied Technology Group, Inc.
Oak Ridge, Tennessee
under subcontract 1GX-JWQ34V

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Environmental Management Activities at
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
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ABBREVIATIONS

ATG	Allied Technology Group, Inc.
HEPA	high-efficiency particulate air
OHF	Old Hydrofracture Facility
ORNL	Oak Ridge National Laboratory
PPE	personal protective equipment

EXECUTIVE SUMMARY

The Old Hydrofracture Facility (OHF), located at Oak Ridge National Laboratory (ORNL), was constructed in 1963 to allow experimentation and operations with an integrated solid storage, mixing, and grout injection facility. During its operation, OHF blended liquid low-level waste with grout and used a hydrofracture process to pump the waste into a deep low-permeable shale formation. Since the OHF Facility was taken out of service in 1980, the four bulk storage bins located adjacent to Building 7852 had deteriorated to the point that they were a serious safety hazard.

The ORNL Surveillance and Maintenance Program requested and received permission from the U.S. Department of Energy to dismantle the bins as a maintenance action and send the free-released metal to an approved scrap metal vendor. A 25,000-gal stainless steel water tank located at the OHF site was included in the scope.

A fixed-price subcontract was signed with Allied Technology Group, Inc., to remove the four bulk storage bins and water tank to a staging area where certified Health Physics personnel could survey, segregate, package, and send the radiologically clean scrap metal to an approved scrap metal vendor. All radiologically contaminated metal and metal that could not be surveyed was packaged and staged for later disposal. Permissible personnel exposure limits were not exceeded, no injuries were incurred, and no health and safety violations occurred throughout the duration of the project.

Upon completion of the dismantlement, the project had generated 53,660 lb of clean scrap metal (see Appendix D). This resulted in \$3410 of revenue generated and a cost avoidance of an estimated \$100,000 in waste disposal fees.

1. INTRODUCTION

This report details the decontamination and controlled dismantlement of the Old Hydrofracture Facility (OHF) bulk storage bins and water tank at Oak Ridge National Laboratory (ORNL), located in Oak Ridge, Tennessee. These inactive facilities are managed by the Surveillance and Maintenance Program. The bulk storage bins' deteriorated condition attributed to the immediate need for dismantlement because of its close proximity to Building 7852. Allied Technology Group, Inc. (ATG), performed the dismantlement of the OHF bins and water tank with consideration for the safety and protection of the surrounding environment, ATG personnel, and the general public. The project was completed without injury to personnel, without releases to the environment, and within the budget and schedule guidelines.

The project began October 1, 1997, and was completed on January 12, 1998. The personnel included three laborers, two Health Physics technicians, a Program Manager, a Project Manager, and a Health and Safety Manager. The Health and Safety Manager and, at a minimum, one certified Health Physics technician provided continuous coverage throughout the entire project. C. Reed Davis Contractors served as a subcontractor for the crane usage and rigging performed. Three riggers, a crane operator, and a flatbed truck driver were provided by the subcontractor.

1.1 SITE HISTORY

OHF is located at ORNL in Oak Ridge, Tennessee. The facility was constructed in 1963 to allow experimentation and operations with an integrated solid storage, handling, mixing, and grout injection facility. The facility had not been in use since 1980, when it was transferred under the Surveillance and Maintenance Program. OHF used a hydrofracture process that involved injection of waste materials mixed with grout and additives under pressures of 2000 psi or greater into a deep, low-permeable shale formation. The injected slurry spread along fractures and bedding planes for hundreds of feet from the injection point, forming thin solid grout sheets.

1.2 DESCRIPTION OF THE OHF BULK STORAGE BINS AND WATER TANK

The scope of the OHF project consisted of four bulk storage bins and a 25,000 gal water tank. The bins were used to store cement, fly ash, and other solids before blending with liquid low-level waste to form a pumpable grout. The bins were located directly adjacent to Building 7852. Each approximately 0.25-in.-thick mild steel vertical cylindrical bin had a conical bottom approximately 8 ft long, 12 ft in diameter, and 20 ft high at the main body. Each bin was supported more than 22 ft above the ground surface by four steel stanchions attached to concrete foundations. The steel stanchions also served as supports for electrical conduit, vents, hydraulic lines, and miscellaneous piping. At higher elevations, the bins were encircled by railings and interconnected by a catwalk. No internal radiological contamination was expected to be present. Isolated spots of radiological contamination were anticipated to be present on the outside of the bins, their supports, and the miscellaneous materials associated with the process. Visual inspections before dismantlement indicated that the bins were empty except for a thin residue of product coating the internal surface. The bins and steel stanchions were expected to weigh approximately 25,000 lb each.

The water tank sat on a concrete pad approximately 20 ft north of Building 7853 and was used to supply noncontaminated water to the injection well and pump house pumps. The stainless steel tank was approximately 0.1875-in.-thick and 21 ft high by 14 ft 4 in. diameter, and the concrete pad it rested on is 16.5 ft on each side and approximately 1 ft thick. The tank was emptied by the Surveillance and Maintenance Program before removal. No radiological contamination was expected to be encountered except for potential isolated areas on the outside of the tank. The water tank was expected to weigh approximately 15,000 lb.

1.3 DESCRIPTION OF EXISTING CONDITIONS

Several incorrect assumptions were made about the bulk storage bins and water tank. The discrepancies ranged from major, such as the amount of radiological contamination present, to minor, such as the weight of the bins and water tank. Some of the discrepancies generated work outside the original scope of the contract because of the additional time and materials required to effectively complete the project.

The bulk storage bins and their supports were expected to only have isolated spots of radiological contamination on their exterior. Upon completion of a thorough radiological survey at the staging area, a substantial amount of the exterior of bin # 3 was found to be radiologically contaminated, and the majority of the supports on all the bins were found to be radiologically contaminated. The exterior surfaces of the bins and supports were not able to be effectively decontaminated. As a result, more radiologically contaminated waste was generated than anticipated (see Appendix B). The interior of the bulk storage bins was expected to be free of radiological contamination; however, the residual product in all the bins was found to be radiologically contaminated. This necessitated the need for radiological contamination controls to be implemented and decontamination measures to be taken. This additional work required a change in the contract.

The water tank and the concrete pad it rested on were expected to be free of radiological contamination except for isolated areas on the exterior of the tank. The entire top and bottom of the water tank was determined to be radiologically contaminated as well as spots on the concrete pad. The interior of the water tank was also found to be radiologically contaminated. The interior of the water tank and the concrete pad were effectively decontaminated; however, the exterior of the water tank could not be decontaminated.

More residual product was found on the interior of the bins than anticipated, which prevented an effective radiological survey. More extensive removal efforts were required as a result of the interior being completely coated with the residual product.

The bulk storage bins weighed less than half of what was anticipated, approximately 12,000 lb each, according to estimates from the crane operator. The water tank weighed approximately 10,000 lb, based on the crane operator's estimate.

2. SCOPE OF WORK

Work performed at the OHF was conducted safely following all guidelines set forth by the U.S. Department of Energy, ORNL, ATG Operating Field Procedures, and all governing regulations.

The scope of work was as follows:

- site mobilization;
- preliminary radiological survey;
- removal of external components, including piping, conduit, and catwalks;
- removal, surveying, and dismantlement of bins;
- removal, surveying, and dismantlement of the water tank;
- decontamination of the interiors of the bins and water tank;
- packaging and labeling waste materials for final disposition; and
- demobilization.

2.1 MATERIAL REMOVAL

Components, structures, and waste materials were removed, contained, and managed as follows:

- a. Removed electrical conduit, electrical fixtures, and other loose materials.
- b. Removed the piping, equipment, supports, and other miscellaneous metals.
- c. Removed, accessed, surveyed, and recycled the stainless and carbon steel metal components.
- d. Cleaned up and disposed of all lead-based paint chips that peeled away from the structures.
- e. Segregated radiologically contaminated materials that could not be feasibly decontaminated and packaged it for final disposition.
- f. Removed and containerized residual product (flyash, grout, and cement) found within the storage bins.

The various waste streams were segregated and managed appropriately.

The materials from OHF were handled in accordance with requirements of the performance specification and Division 1, Section 01550, Waste Disposal.

2.2 DISMANTLEMENT

Dismantlement of the OHF bins and water tank began with the disassembly of the external components, including the conduit, hydraulic lines, catwalks, ladders, lighting, and other miscellaneous materials. The bins were then removed, followed by the water tank. The external components, bins, and water tank were then transported to a staging area for sizing/accessing. A

preliminary radiological survey was performed before dismantlement to determine contaminated areas and a final green tag survey was performed at the staging area to release the materials before packaging for final disposition. The highly elevated radiological background at OHF required that all removed materials be transported to a low radiological background staging area to facilitate 100% coverage during the radiological surveys.

2.3 DECONTAMINATION

The extent of radiological contamination found, especially on the interior of the storage bins and the water tank, was not anticipated and necessitated the need for decontamination to be performed outside the original scope of work. Limited decontamination procedures were performed to minimize the amount of radiologically contaminated waste packaged for disposal. Decontamination procedures involved the use of scrapers, shovels, high-efficiency particulate air (HEPA) vacuums, scrub brushes, and detergent. Personnel wore the necessary personal protective equipment (PPE) to prevent exposure to contamination and any potential airborne releases. Decontamination efforts proved effective on the interior surfaces but were not effective on any of the exterior surfaces. Decontamination efforts provided ORNL a cost savings by minimizing waste, thus minimizing waste containers and disposal costs, and increasing the amount of material released for recycling, which generated additional revenue.

2.4 DELAYS

Several delays were encountered over the course of the project. The subcontractor providing the crane and rigging services was initially unable to provide documentation of the necessary training to authorize work to be performed at the site. The subcontractor did not anticipate the duration of their services correctly and had planned other projects that overlapped the OHF work schedule, thus requiring the personnel to leave for several days.

Weather served as a major factor for delaying the project. Frequent and heavy rainstorms caused the job to be shut down on several occasions. The operation of welding machines was not considered safe in wet conditions. The wet conditions also posed a radiological risk because the moisture shields radiological contamination from being detected by Health Physics instrumentation. Personnel would have been unable to properly survey out of work areas, and materials could not be properly surveyed to determine if contamination was present. The snowfall that occurred at the latter end of the project also hindered the material surveying process.

Radiological contamination was found to be more prominent than anticipated and present in areas that were assumed to be free of contamination, such as the interior of the bins and water tank. Once radiological contamination was found to be present in the residual product, no other bins were breached until sampling was performed to determine if the radiological condition was naturally occurring radioactive material. Once the samples verified that the grout was not naturally occurring radioactive material, the decision had to be made whether to decontaminate the sections or dispose of nearly all the bins as radiologically contaminated waste. The decision was eventually made to minimize the amount of waste generated and that limited decontamination efforts would be performed. The radiological contamination control measures and decontamination efforts slowed the project considerably. The sampling and decision-making process also caused a considerable delay.

3. HAZARDOUS CONDITIONS

Potentially hazardous conditions were present throughout the duration of the project. Hazards included radiological contamination, lead, dust, hot work, heavy machinery, noise, heavy loads, and falls. Safety precautions were taken to minimize the risk to personnel and the environment. Removal efforts used methods that ensured contaminants were not released, either by transgression or airborne pathways, and minimized the amount of waste produced by the removal process. ATG-certified Health Physics personnel were on-site to identify radiological concerns. The Health and Safety Officer monitored for airborne contamination and ensured safe working conditions were maintained throughout the dismantlement process. Personnel were trained for the hazards present and how to effectively minimize risks and exposure.

3.1 RADIOLOGICAL CONTAMINATION

Radiologically contaminated materials were identified and marked during the preliminary survey. These materials were removed with controls in place to prevent the spread of contamination. Hooded Tyvek disposable protective clothing was required in contamination areas in addition to booties, gloves, and company-issued clothing. Direct Reading Dosimeters were worn in radiation areas. Full-face respirators were worn when the potential for airborne contamination was present. Air monitoring was established when work was being performed in the contamination areas. All personnel were required to frisk upon exit from any radiation or contamination areas and Health Physics technicians were required to survey any materials and tools that were to be removed from these areas. Health Physics technicians provided continuous coverage throughout the duration of the project. Radiologically contaminated materials were segregated from noncontaminated materials to prevent the spread of contamination and minimize the amount of waste generated. Recyclable materials were decontaminated to a limited extent to allow the materials to be free-released. Contaminated wastes were packaged in 55-gal drums, B-25 containers, or SeaLand containers. The waste containers were labeled and sealed per Waste Management guidelines.

3.2 LEAD-BASED PAINT

All work involving lead was performed in accordance with the site-specific Lead Compliance Plan. Loose paint chips that were encountered at the facility were collected and managed as required per the Resource Conservation and Recovery Act. All personnel were required to have ATG-provided Lead Awareness training and were familiar with safe-handling practices and health and safety requirements. Air samples were collected during dismantlement, and blood-lead samples were collected initially and periodically during the project and scheduled for collection upon completion of the project. Loose paint chips located around the facility or found during the dismantlement process were collected with HEPA-filtered vacuum equipment, packaged, labeled to meet ORNL guidelines, and managed appropriately. Full-face respirators, company-issued clothing, and Tyvek clothing were required when there was a potential for lead to be airborne. A negative air HEPA unit was used where feasible when hot work was performed. Personnel were required to wash their hands with D-Lead soap when leaving the work area and shower at the end of the work day.

Airborne lead concentrations did not exceed current exposure limits and blood samples indicated that personnel were effectively protected from exposure to lead.

3.3 DUST

Openings to the bins and water tank were covered to prevent the contents from becoming airborne and generating dust. During dismantlement, the contents were sprayed with a water mist, shoveled out, and placed into waste containers. HEPA vacuums were used to remove the remaining residue to prevent airborne dust when the pieces were moved. Personnel removing the contents were required to wear Tyvek clothing and full-face respirators.

3.4 HOT WORK

Fire-resistant company clothes were worn at all times and fire-resistant Tyvek clothing was worn in radiologically contaminated areas. A fire watch was stationed where a clear visual could be maintained on the personnel performing the hot work and the surrounding area. The fire watch was present during hot work and for 30 min upon completion. Personnel that served as a fire watch were trained in the proper use of a fire extinguisher. All combustibles, except the plastic used to prevent contamination from getting on the ground, were removed from the area and a fire extinguisher and water spray bottle were maintained beside the fire watch. When hot work was being performed from the manlift, a fire watch and extinguisher were in the basket with the person operating the torch, and a fire watch was on the ground with extinguishers and a radio and/or a bullhorn. Full-face respirators were worn with tinted lens covers rated for the work being performed (torch cutting or welding). No hot work was allowed until an ORNL safety and health representative issued a Hot Work Permit.

3.5 HEAVY MACHINERY

Heavy machinery used for this project included a crane and forklift. Only qualified personnel were allowed to operate the machinery. Spotters were used when either piece of equipment was in use. The swing radius of the crane was roped off to keep personnel out of the vicinity. Only the operator was allowed on either piece of machinery when it was in operation. If personnel got too close to the machinery or their loads, the load was immediately secured and the equipment shut off. Daily inspections were performed on the machinery to ensure everything, including backup alarms, were operational. Hard hats were required for personnel working around heavy machinery.

3.6 NOISE

Noise monitoring was performed around generators and heavy machinery to determine if hearing protection was needed. If noise action levels were reached, hearing protection was required of all personnel and visitors in the work area. When the air nippers were in operation, double hearing protection was required by the personnel using them.

3.7 HEAVY LOADS

Heavy loads were moved with the assistance of a forklift or a crane. The loads did not exceed the lift limit for the machinery. Personnel maintained a safe distance from the loads, did not work under a suspended load, and avoided potential pinch points. The bins and water tank were not lifted until all unnecessary personnel were cleared from the area. All chokers, slings, and other rigging equipment were rated for their intended loads and inspected before use. Only qualified riggers were allowed to rig loads for lifts. Braces were welded in place on the bin supports to keep the load from shifting when it was cut. The bins were secured in place with the crane before cutting. The person cutting the supports to the bins made the last cut so that he was clear of the load. Heavy sections of the bins or water tank were supported with the forklift when being cut and then lowered slowly to the ground. Rigging and lifts performed with a crane were performed within the guidelines set forth in the Lift Plan. Hard hats were required for personnel working around heavy loads.

3.8 FALLS

Personnel working from elevated areas, including manlifts, were required to wear fall protection (harness and lanyard). Ladders were tied off and secured when in use. Scaffolding was properly erected with handrails.

4. MOBILIZATION

Mobilization occurred before actual dismantlement. Dismantlement did not occur until the Letter To Proceed was received from the ORNL Project Manager on October 7, 1997.

- Before work began, all tools and related equipment were inventoried and screened for radioactive contamination by ATG Health Physics personnel. Upon completion of work, tools and related equipment were screened again and decontaminated if necessary.
- All personnel, including subcontractors, were provided the required training necessary to enter the site and perform work. Site-specific training covering the specifics set forth in the Project Work Plan, the Health and Safety Plan, and the Lead Compliance Plan.
- All personnel were required to have whole body and lung counts before performing work on site. Blood samples were required to provide a baseline of lead and zinc protoporphyrin levels in the body.
- Upon receipt of the Excavation/Penetration Permit, an orange barrier construction fence was erected around all work areas and properly posted for both radiological and industrial safety hazards.
- On-site facilities were set up, including first aid stations, spill kit, material safety data sheets, fire extinguishers, eye wash, hand wash area, storage areas, toilet facilities, storage trailer, and entrance and exit points to controlled areas.

- The emergency contacts and phone numbers were posted as well as the Occupational Safety and Health Administration poster, exit route including assembly area, and other necessary information.
- Verification was made physically and/or by test that all utilities, including electrical services, were disconnected or rerouted. Verification was also made that all air and water lines were depressurized and disconnected before dismantlement. Power lines in the vicinity of the crane radius were insulated before dismantlement by ORNL personnel.
- The office trailer was secured by tying it down with cable to concrete highway dividers.
- The Health Physics count room was set up at the staging area.
- The Health Physics instrumentation was submitted to ORNL Instrument Calibration and certified.

5. PRELIMINARY RADIOLOGICAL SURVEY

Before material removal or dismantlement of the facility, ATG Health Physics personnel (ORNL certified and approved) performed a radiological survey to establish contamination areas and the extent of contamination present. As a result of the elevated background readings at OHF, a direct frisk survey of materials was not a feasible option. Smears on the surfaces were collected to determine if any removable contamination was present and dose rates were taken in various areas where work was to be performed. The smears, dose rates, current postings, and historical information were used to develop Radiological Work Permits (see Appendix A), establish PPE requirements, and determine monitoring required. Decontamination techniques and the dismantlement process were dictated by the results of the surveys. Boundaries were established, barriers were put in place, and the appropriate signs were posted based on the results obtained by the Health Physics technicians. The surveys were documented and submitted to ORNL for input into the plant database.

After the initial radiological survey, all work that involved exposing previously unsurveyed surfaces was performed with continuous coverage by the ATG Health Physics personnel. A daily routine survey schedule was established by the ATG Health Physics personnel. Radiological surveys were performed with hand-held ion chamber dose rate meters and Geiger-Mueller friskers or an equivalent. All instruments were in proper working order, in current calibration (see Appendix C), and response checked daily as required. Surveys were performed to identify the following radiological conditions:

- fixed surface contamination,
- loose surface contamination,
- general area dose rates,
- "hot spot" identification (radiological hot spots are defined as a radiation source that is five times the general area dose rate and/or greater than or equal to 100mrem/hour at 30cm),

- air quality, and
- free of radiological contamination.

Preliminary radiological surveys were performed again on the bins, water tank, and other miscellaneous materials when they were taken to the staging area to identify all activity or contamination.

6. OHF DISMANTLEMENT

6.1 EXTERNAL COMPONENT REMOVAL

External components including the conduit, hydraulic lines, chutes, catwalks, ladders, lighting, motors, and other miscellaneous materials were removed with power saws and torches.

- A manlift was used to access elevated areas, such as the baghouse, catwalks, and ladders. Materials removed from elevated areas were rigged to the crane, secured, cut loose from the bin, and lowered by the crane onto plastic.
- Conduit was verified deenergized and removed.
- Piping and hydraulic lines were assumed to contain residual liquids when they were cut, and proper precautions were taken. Personnel were dressed out with saranex, splash shields or full-face respirators, and rubber gloves to prevent any liquid from coming into contact with their skin. Buckets were placed under the lines or piping being cut to catch any liquid that may have been released. No liquid was found in any of the lines.
- Once all the external components were removed, they were placed on a plastic-covered flatbed with the assistance of the crane and covered with plastic.
- The removed materials were transported to the staging area, placed on plastic laydown areas with the crane, roped off with radiation boundaries, and posted as a Radioactive Material Area.

6.2 STORAGE BINS REMOVAL

The four storage bins were removed in descending order with bin # 4 being the first and bin # 1 being the last.

- With the use of a manlift, lifting lugs were welded to opposing sides on the top of each bin.
- The crane was rigged to the lugs with chokers, and tension was placed on the chokers with the crane to prevent the bin from collapsing when the supports were cut.
- A guide line was attached at a point on the bin to allow a rigger control of the load when the crane removed the bin.

- Braces were welded on each side of two support legs where the cuts were to be made. The braces allowed the support to be cut and raised but kept the legs from shifting, thus preventing an unstable or swinging load.
- The area was evacuated except for necessary personnel, which included the torch operator, fire watch, one rigger, and the crane operator.
- The two supports closest to Building 7852 were cut first to prevent a potential pinch point. The bolts holding these two supports in place on concrete foundations were cut loose, which allowed the load to remain stable but free to be lifted.
- The front supports were cut several feet higher and at the support braces put in earlier. The higher cut made it easier to lay the bin on its side when it was removed.
- Once all the cuts were made, the torch operator and fire watch were evacuated out of the area, leaving the one rigger and crane operator to remove the tank.
- The crane slowly lifted the bin out away from Building 7852, adjoining structures, and power lines. The rigger used the guide wire to lead the bin in the position needed.
- The bin was lowered horizontally onto plastic covering the ground and chocked to prevent it from shifting.
- The chokers were removed, and the bin was rigged to be lifted horizontally and placed onto the plastic-covered flatbed.
- The bin was secured on the flatbed to prevent it from shifting during transport.
- The bin was covered in plastic to prevent the release of potentially radiological contaminated materials and lead-based paint chips during transport.
- The bin was transported to the staging area, and the crane was used to remove the bin from the flatbed and place it on a plastic-covered laydown area where it was chocked to secure it from rolling.
- A radiological boundary was established around the bin and posted as a Radioactive Material Area.
- All openings to the bins were covered with plastic to prevent any airborne releases and keep rain water from getting inside.
- The remaining bins at OHF were removed in the same manner, except bin # 3, which required the lower half of the supports to be left in place because of an active ventilation system. Braces were welded on all four supports to prevent the load from shifting when it was cut.
- Remaining miscellaneous materials, such as partial supports and piping, were cut, removed, secured, and transported to the staging area for surveying and disposal.

6.3 WATER TANK REMOVAL

The water tank was removed once all the bins had been taken to the staging area. The tank had been drained, so there was no concern of a spill.

- The water tank was made of stainless steel, which did not allow lifting lugs to be welded in place with the equipment and materials available at the site. Using a torch, holes were burned into the top sections of the water tank to allow it to be rigged for removal.
- The tank was rigged to the crane, and a guide wire was put in place.
- The tank was raised slowly away from surrounding structures and power lines and lowered horizontally onto the plastic-covered ground.
- The tank was rigged to be lifted horizontally and placed on the plastic-covered flatbed.
- The tank was secured to prevent it from shifting during transport. Because it did not have any loose materials or paint, it was not wrapped in plastic like the storage bins.
- The tank was transported to the staging area, placed on a plastic-covered laydown area, and chocked to keep it in place.
- A radiological boundary was established around the tank and posted as a Radioactive Material Area.
- A radiological survey of the concrete pad that the water tank rested on determined that radiological contamination was present. With the use of scabbling, the surface was decontaminated to a lower level.

6.4 OHF FACILITY DEMOBILIZATION

Upon removal of the storage bins, water tank, and miscellaneous materials, demobilization occurred at OHF.

- The office trailer was cleaned and verified free of radiological contamination.
- Radiological postings were reposted as required.
- The HEPA vacuum was used to clean up any debris or lead-based paint chips that may have been left in the area.
- The plastic used for laydown areas was removed and disposed of in approved waste containers.
- The construction barrier fence and postings were removed.
- Equipment and machinery were transported to the staging area.

- The subcontractors tools, crane, flatbed truck, and manlift were surveyed for radiological contamination and issued a green tag.
- The key to the gate was returned to the ORNL Project Manager.

7. STORAGE BINS AND WATER TANK DISMANTLEMENT

A preliminary radiological survey of the storage bins and water tank was performed at the staging area before dismantlement. The areas were reposted as Contamination Areas before the dismantlement process and upon completion until verification radiological surveys could be performed.

7.1 STORAGE BINS DISMANTLEMENT

Bin #4 was dismantled first, followed by bins # 1, 2, and 3 in that order. Torches were used to dismantle and size the storage bins.

- The supports to the bins and remaining external components (piping, ladders, chutes, etc.) were removed.
- Before breaching each storage bin, air monitoring was performed to ensure that an explosive atmosphere was not present.
- Holes were cut in the bin for the forklift to support each section being removed. The forklift maintained tension on each section as it was cut to prevent it from falling on personnel. When the cut was completed, the forklift would lower the section onto an adjacent laydown area.
- The bins were dismantled in quarters with the top front section removed first, followed by the lower front section, the top back section, and finally the lower back section.
- Internal piping, mixers, and ladders were removed from the bins.
- Residual product on the interior of the bins was removed and packaged for disposal.
- The cut sections of the bins were direct surveyed for radiological contamination and either approved for free-release or marked for decontamination.
- Radiologically contaminated sections were decontaminated or cut away from the clean areas if decontamination methods proved ineffective.
- Sections were sized for disposal into radiologically contaminated waste containers or for placement into a recyclable metal rolloff.

7.2 WATER TANK DISMANTLEMENT

The water tank was dismantled upon completion of the storage bins dismantlement. A plasma torch was used to dismantle the water tank. Air nippers were first used in an attempt to dismantle the water tank, but proved to be ineffective.

- Before breaching the water tank, air monitoring was performed to ensure that an explosive atmosphere was not present.
- The sides of the tank were cut first. The cut was made the entire length of the tank and then approximately 4 ft up on each end of the cut. The tank was then rolled with the forklift until the top of the side cuts were close to the ground. A final cut was then made the entire length of the tank, and the section was free of the tank and resting on the ground. This method prevented the risk of a piece dropping on the person performing the cut. Approximately three-quarter of the sides were cut in this manner, with the last section remaining on top for support.
- Holes were cut in the ends of the water tank (formerly the top and bottom of the tank in its original position) for the forklift to place its forks and support the tank.
- The end supported by the forklift was then cut so that the lower half could be removed. The forklift then lowered the remaining section onto the ground. The same procedure was followed for the opposite side.
- The remainder of the tank was resting safely on the ground and able to be cut into manageable sections without the assistance of the forklift.
- Residual product on the interior of the bins was removed and packaged for disposal.
- The cut sections of the water tank were direct surveyed for radiological contamination and either approved for free-release or marked for decontamination.
- Radiologically contaminated sections were decontaminated or cut away from the clean areas if decontamination methods proved ineffective.
- Sections were sized for disposal into radiologically contaminated waste containers or for placement into a recyclable metal rolloff.

8. DECONTAMINATION

Decontamination efforts outside the original scope of work were performed to minimize the amount of waste generated. Attempts made proved highly effective on the contaminated interior area of the storage bins and water tank but were ineffective on the exterior of the sections. No liquid waste was generated during decontamination efforts because the cleaners used were absorbed into the residue product removed. The contaminated product, based on historical data, was assumed to be grout in bins # 1 and # 4, flyash in bin # 2, cement in bin # 3, and rust in the water tank.

- A dike was built to contain any potential liquid waste generated during decontamination efforts. The dike consisted of four large metal pipe sections resting on multiple layers of plastic and then covered with six more layers of plastic. The multiple layers of plastic were necessary to prevent leaks when the sharp edges of the cut sections came in contact with the dike.
- The residual product on the interior of the storage bins and water tank was sprayed with a water mist to minimize airborne particles and then shoveled into waste containers.
- The remaining residue was removed with a HEPA vacuum.
- The surfaces were scraped with metal scrapers and then vacuumed again.
- The surfaces were then cleaned multiple times with scrub brushes, water, and a strong cleaner. The HEPA vacuum was used once again on the surface.
- The surfaces were then resurveyed for radiological contamination. If contamination was still present, the contaminated area was removed with a torch.

9. WASTE PACKAGING

All waste materials were placed in approved waste containers, labeled properly, contained or sealed as required, and staged for later disposal. Waste containers consisted of one 40 ft SeaLand of radiologically contaminated metal, one partially filled 20 ft SeaLand of radiologically contaminated stainless steel, one 55-gal drum of lead-based paint, one 55-gal drum of respirator wash water, five rollofs of clean metal for recycling, six B-25 boxes (five containing used PPE and plastic and one containing residual product removed from the storage bins and water tank), and one construction debris rolloff.

- Used plastic was double-bagged, labeled with a radiological tag, and placed into B-25 boxes.
- Used PPE was double-bagged, labeled with a radiological tag and ORNL Waste Management sticker, and placed into B-25 boxes.
- Residual material removed from the interior of the storage bins and water tank were double-bagged, labeled with a radiological tag, and placed into B-25 boxes.
- Radiologically contaminated metal and potential radiologically contaminated metal was placed into SeaLand containers. A 40 ft SeaLand container was filled primarily with piping and other components that could not be surveyed internally. The remaining material placed in the 40 ft SeaLand container consisted of sections from all the bins and their supports that could not be decontaminated. A partially filled 20 ft SeaLand container contained sections from bin # 3 and the top, bottom, and small areas of the stainless steel water tank that could not be decontaminated.
- Radiologically clean metal was placed into rollofs for recycling as scrap metal; 53,660 lb of scrap metal were recycled.

- Lead paint chips were double-bagged, labeled with a radiological tag, and placed into a 55-gal drum.
- Respirator wash water was placed into a 55-gal drum.

10. DEMOBILIZATION

Partial demobilization occurred November 10, 1997, at OHF. The remaining demobilization was complete at the staging area upon completion of the project on January 12, 1998.

- The dike was disassembled, the pipes used were surveyed out, and the plastic was disposed of in approved waste containers.
- The plastic from the laydown areas was picked up and disposed of in approved waste containers.
- The laydown areas were surveyed to verify that contamination controls were effective and no radiological contamination was present.
- The equipment trailer, postings, barrier fence, and other equipment and supplies were removed from the site.
- The HEPA vacuum was used to clean up any debris or lead-based paint chips that may have been left in the area.
- Waste containers were sealed, labeled, and staged.
- The area was cleaned of debris, trash, etc.
- All equipment, tools, and rental equipment were surveyed and decontaminated as necessary.
- The storage tents were surveyed for radiological contamination and verified clean.
- Keys to the gates were returned to the ORNL Project Manager.
- All personnel were scheduled to receive exit bioassays, blood-lead sampling, and exit whole body and lung counts.

11. SUMMARY

The dismantlement of the OHF bins and water tank was successfully completed within the allotted schedule and budget. Permissible exposure limits were not exceeded, no injuries were incurred, and no health and safety violations occurred throughout the duration of the project. No spills of hazardous material or environmental releases occurred. Radiological contamination was

contained and segregated, which allowed for a large amount of material to be recycled or disposed of as clean construction debris. Multiple audits performed by regulating groups within ORNL generated many positive reviews. Coverage was provided by the ORNL health and safety group and oversight by the U.S. Department of Energy. Air monitoring verified that no exposure to radiological contamination or lead was incurred. Radiological surveys verified that no personnel contamination occurred. Toward the end of the project, ATG personnel assisted ORNL employees in the relocation and securing of the office trailer at OHF. Extra work was included and performed outside the original scope of work, including decontamination efforts and disposal of materials at the staging area for the ORNL Waste Management group. Mostly as a result of the decontamination performed on the bins and water tank, 53,660 lb of scrap metal were recycled.

APPENDIX A

RADIOLOGICAL WORK PERMITS

ORNL Radiological Work Permit		Number: AT3004-2052
Effective Date: 10/08/1997	Expires: 12/31/1997	Extended to: By:
Building: 7852		
Location Description: OHF area		
Description of Work: Walk over and surveillance entry. Non-intrusive work only of 7852 area.		
Pre-job Conditions: Prior survey indicates maximum background dose rate measures 6.5 mR/hr. This does not include areas above buildings. Ground level tank backgrounds measures 1 mR/hr. Transferable contamination levels of 401 dpm/100cm ² Alpha, 105,302 dpm/100cm ² Beta-gamma have been recorded. This also excludes the patio level. See Survey No: attached		
Anticipated Conditions During Job: Same		
Required Dosimetry: TLD, Pocket Chamber		
Required Personnel Protective Equipment (PPE): Disposable Coveralls - 1 pairs Rubber Gloves - 1 pairs Disposable Shoe Covers - 1 pairs		
Special PPE Instructions: 1. TLD and pocket dosimeter only required for radiation areas. 2. Tyvek, shoe covers and gloves required for contamination area entry.		
Radiation Protection Coverage: Intermittent		
Special Instructions: 1. No system breach is covered by this RWP. 2. PPE is to be doffed at designated C-area exit. 3. Whole body frisk upon exit from C-area, where background allows. 4. Log in on RWP sign in sheet prior to entry.		
Approvals		
Name or Title	Signature	Date
Radiation Protection	Owen, Margaret McCormick <i>M. McCormick</i>	10/08/1997
ORNL Project Manager	<i>M. Whitehead</i>	10-8-97
ATG Work Group Supervisor	<i>James D. Balling</i>	10-9-97
Other		
To use this RWP, the signature block for assigned names or titles shall contain either an electronic or hand signature.		
Issued by: Owen, Margaret McCormick		

Terminated by: *M. Owen* Date: *1-2-98*

ORNL Radiological Work Permit		Number: SAAS-2075A
Effective Date: 10/15/1997	Expires: 01/15/1998	Extended to: By:
Building: 7852		
Location Description: OHF area		
Description of Work: Dismantlement and removal of Grout Bins 1-4, water tank and associated systems or support functions.		
Pre-job Conditions: Pre-job survey indicates maximum background dose rates of 15 mR/h at lower tank areas around frame. No contamination detected. See Survey No: To be attached.		
Anticipated Conditions During Job: Whole body dose rates expected to increase at higher elevations and possible internal contamination of tanks - this RWP is designed to cover such conditions.		
Required Dosimetry: TLD, Pocket Chamber		
Required Personnel Protective Equipment (PPE): Disposable Coveralls - 1 pairs Rubber Gloves - 1 pairs Work Gloves one pr. leather Disposable Shoe Covers - 1 pairs Respiratory Protection: Full Face -Type of Cartridge: Particulate		
Special PPE Instructions: 1. Company clothing, TLD, and pocket chamber required for RA entry on this RWP. 2. Additional PPE such as APR's, coveralls, gloves, and shoe covers are required for handling, cutting, grinding, or burning of materials from OHF prior to RCT material clearance survey.		
Radiation Protection Coverage: Intermittent		
Special Instructions: 1. Log-in on RWP prior to area entry as required. 2. Dose rate not to exceed 20 mR/day/person. 3. For portions of operation that may create airborne activity - a neg. air unit is to be used in work area. 4. PPE is to be placed in proper receptacles upon exit from areas (where used). 5. Whole body frisk upon exit from CA. Contact HP if any personal contamination is detected.		
Approvals		
Name or Title	Signature	Date
Radiation Protection	Owen, Margaret McCormick <i>M. Owen</i>	01/02/1998
ORNL Project Manager	<i>M. J. Whitehead</i>	1-2-98
ATG Work Group Supervisor	<i>James D. Bell</i>	1-5-98
Other		
To use this RWP, the signature block for assigned names or titles shall contain either an electronic or hand signature.		
Issued by: Owen, Margaret McCormick		

Terminated by: _____ Date: _____

APPENDIX B

HEALTH PHYSICS SURVEYS

ORNL Radiological Survey Data

Survey Number: 1
Time: 1300

Date: 10-9-97

Surveyor Badge No.: Routine Survey (check if yes) ☐ RWP No. ATG-3004-2052

Building: 7852 Specific Location: Old Hydrofractor Facility

Description: Initial Survey performed by MM Owen to verify historical data and previous surveys, prior to the start of removal of bins and components by ATG.

Instruments Used and Calibration Due Dates: ATG 2929 cal due 5/98, ATG 100357 cal due 9-30-98, ATG 121265 cal due 9-30-98, ATG 8504Z cal due 6-19-98.

General Description of Radiological Conditions: See survey map and smear data sample sheet for complete survey of 7852 that will be occupied by ATG.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 4

Completed by (signature): [Signature]

Reviewed by (signature): [Signature]

Date: 1/12/98
Page 1 of 4

SMEAR SAMPLE DATA

NAME (HP&S)	PHONE	BLDG. NO. (HP&S)	LOCATION (SMEARS TAKEN)	DATE
Maggie Owen	NA	NA	7852 OHF	10-9-97
SMEARS NUMBERED:	RESULTS REQUIRED:	DATE COUNTED	COUNTER OPERATOR	
1 To 41	Date <u>10-9-97</u> Time	10-9-97	Maggie Owen	
GR/M ONLY ON SMEARS OVER:		REMARKS:		
20 d/mx		ATG 2929 ATG 100357 LAS denotes:		
200 d/mB		ATG 128052 ATG B504Z Large Area Smear in DPM/LAS		

a	B	LOCATION (*)	a	B	LOCATION (*)	a	B	LOCATION (*)
1	420	Bin #1 Vertical Framework	34	100	41000 LAS#3	67		
2		Generator	35	100	41000 LAS#4	68		
3		overhead pan	36	100	41000 7852 GRAVEL	69		
4	420	horizontal Framework	37		GRAVEL	70		
5	4100	Bin #1 (LAS)	38		7852 Concrete	71		
6		LAS#2	39		7852 LAS of walls	72		
7		LAS#3	40			73		
8		LAS#4	41	100	41000	74		
9	420	Bin #2 Vertical Framework	42	100	41000 LAS(1) Bin #2	75		
10		horizontal Framework	43			76		
11		Piping	44			77		
12		Piping	45			78		
13	100	Bin #2 (LAS)	46			79		
14		LAS#2	47			80		
15		LAS#3	48			81		
16		LAS#4	49			82		
17		LAS#5	50			83		
18	420	Bin #3 Vertical Framework	51			84		
19	420	horizontal Framework	52			85		
20	420	375 piping	53			86		
21	420	1000 Encased belt	54			87		
22	420	9300 Generator area	55			88		
23	420	1100 under Generator	56			89		
24	4100	1200 Bin #3 (LAS)	57			90		
25	4100	1000 LAS#2	58			91		
26	4100	1000 LAS#3	59			92		
27	4100	2000 LAS#4	60			93		
28	420	Bin #4 Vertical Framework	61			94		
29		horizontal Framework	62			95		
30		Piping	63			96		
31		Piping	64			97		
32	100	41000 Bin #4 LAS	65			98		
33	100	41000 LAS#2	66			99

ORNL Radiological Survey Data

Survey Number: 1A
Time: 0900

Date: 10-6-97

Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. N/A

Building: NA Specific Location: X-10 SWCA 5 Steam Cleaning area

Description: Direct, brush and smear survey of
gravel area outside ATG trailer. Purpose of survey
is to declare small area ok for "eating drinking Smoking"

Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98) ATG 2929 (5/98)
ATG 100502 (9-30-98)

General Description of Radiological Conditions: No fixed or transmutable
contamination detected by direct probe or large
area smear. All HAS's <100 DPM/HAS Alpha, <1000
DPM/HAS Beta-Gamma

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 1

Completed by (signature): Maggie Davis

Reviewed by (signature): Walker

Date: 1/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 2
Time: 1300

Date: 10-9-97

Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. N/A

Building: 7852 ^{area} Specific Location: break trailer @ OHF

Description: Survey to declare inside of break trailer clean from Contamination. Designate as Eating, drinking area. Also front stairs to designate as smoking area.

Instruments Used and Calibration Due Dates: ATG 2929, ATG 128052,
ATG 100357 ATG B504Z

General Description of Radiological Conditions: Disc smears taken on interior of trailer all <20 DPM/100 cm² alpha, <200 DPM/100cm beta-gamma. See smear data sample sheet for exact locations. Front stairs has all <1000 DPM/beta gamma <100 DPM /has alpha. 6/A dose rate inside trailer 0.5 mR/hr

Division or Group Needing the Survey: ATG Person-hours Spent on the Survey: 1

Completed by (signature): Maggie [Signature]

Reviewed by (signature): [Signature]

Date: 1/12/98

Page 1 of 2

SMEAR SAMPLE DATA

NAME (HP&S) Maggie Owen	PHONE NIA	BLDG. NO. (HP&S) 7852	LOCATION (SMEARS TAKEN) break trailer	DATE 10-9-97
SMEARS NUMBERED: Fr 1 To 13	RESULTS REQUIRED: Date NA Time	DATE COUNTED 10-9-97	COUNTER OPERATOR Maggie Owen	
REMARKS: G: 20 d/m α 200 d/m β		ATG-2929 ATG-100357 ATG-128052 ATG-B504Z		

α	β	LOCATION (*)	α	β	LOCATION (*)	α	β	LOCATION (*)
1	41000	Front stairs	34			67		
2		wood railing	35			68		
3		platform	36			69		
4	41000	outer door	37			70		
5	4200	Desk #1	38			71		
6		Floor	39			72		
7		door knob	40			73		
8		Desk #2	41			74		
9		lightswitch	42			75		
10		floor	43			76		
11		wall	44			77		
12		back door	45			78		
13	4200	cabinet	46			79		
14			47			80		
15			48			81		
16			49			82		
17			50			83		
18			51			84		
19			52			85		
20			53			86		
21			54			87		
22			55			88		
23			56			89		
24			57			90		
25			58			91		
26			59			92		
27			60			93		
28			61			94		
29			62			95		
30			63			96		
31			64			97		
32			65			98		
33			66			99		

ORNL Radiological Survey Data

Survey Number: 3
 Title: 1400

Date: 10-15-97

Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. ATG-30042052

Building: 7852 Specific Location: Bin # 1, 2, 3, 4 & associated pipes & Framework.

Description: _____

Radiation & Contamination survey of areas accessible by Ladder around Bins up to 10 ft.

Instruments Used and Calibration Due Dates: ATG-2929 cal due 5/98
121265 No. 10-15-97
ATG-128052 cal due 9-30-98, ATG-100357 9-30-98
ATG-B504Z cal due 6-19-98

General Description of Radiological Conditions: No transmittable Contamination detected in areas ATG workers will come into contact with Highest dose rate in work area 15mR/hr. Direct Frisk of area not possible due to high background.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 3

Completed by (signature): Margu W.

Reviewed by (signature): Carl Dalku

Date: 1/12/98
 Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 4
Time: 0800

Date: 10-16-97

Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. N/A

Building: N/A Specific Location: ER / Change trailers

Description: Incoming survey of C. Reed Davis vehicles and heavy equipment. Crane # FL-0865, Flatbed truck DC183A, Semi TN Z52060 also gang box and various cables.

Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)

ATG 2929 (5/98) ATG 100502 (9-30-98)

General Description of Radiological Conditions: All measurements < 100 DPM/LAS Alpha, < 1000 DPM/LAS Beta-gamma. No fixed contamination detected by direct probe. Disc sources taken on equipment < 20 DPM/100cm² < 200 DPM/100cm² Beta-gamma.

Division or Group Needing the Survey: ATG / ER Person-hours Spent on the Survey: 2

Completed by (signature): Maggie Quinn

Reviewed by (signature): Chubler

Date: 1/12/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 5
Time: 0800Date: 10-29-97Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. ATG-3004-205Building: 7852 Specific Location: OHEDescription: Post bin removal survey to reflect area
as left by ATG.Instruments Used and Calibration Due Dates: ATG-B5047 (6-19-98),
ATG-100357 (9-30-98), ATG-121265 (9-30-98)General Description of Radiological Conditions: All large area smears taken
on gravel <100 DPM/KAS alpha, <1000 DPM/KAS Beta-gamma.
Radiation boundaries were not affected by removal of
bins 1-4. Contamination area under remains of bin #3
remains posted as found. See Map for dose rates.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 2Completed by (signature): Maggie OwenReviewed by (signature): Ch Walker Date: 1/12/98
Page 1 of 2

Radiation Survey of 7852

Maggie Ann

HC - high Contamination Area
 RA - radiation Area
 CA - Contamination Area
 HR - High radiation Area

ORNL Radiological Survey Data

Survey Number: 116
Time: 1100Date: 10-30-97Surveyor Badge No.: 1 ☒ NA Routine Survey (check if yes) RWP No. SARS-2075Building: SWSA 5 Specific Location: DHF Water TankDescription: Massalun Survey and direct fresh
Survey of DHF water tank: Outside Survey
only.Instruments Used and Calibration Due Dates: ATG 2929 (5/98)ATG 100357 (9-30-98), ATG 125261 (9-30-98)General Description of Radiological Conditions: Massalun Survey of outside
of water tank, found no measurable contamination
Direct fresh of tank located no fixed Alpha
and fixed Beta - gamma Contamination ranging
from 1000- 300,000 DPM/100 cm²Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 20Completed by (signature): Thayne OwenReviewed by (signature): Pat WalkerDate: 1/10/98
Page 1 of 2

Water Tank

this survey does not represent
100% of tank, accessible areas only
No transference detected.

approx. 5 Locations on top of tank ranging 1-24K BG

Lid - opening on top of tank
110K BG

Tank is posted: Radioactive Material

ma
10-30-97 2

ORNL Radiological Survey Data

Survey Number: 7
me: 6800Date: 10-30-97Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SARS-2075Building: SWSA 5 Specific Location: OHE Bin # 3Description: Massalium and direct quick survey of Bin # 3
prior to disassembly. Outside survey only.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)ATG 125261 (9-30-98)General Description of Radiological Conditions: Massalium survey found no
measurable alpha contamination and 1000 DPM/100cm²
beta-gamma. Fixed contamination ranges from
1000 DPM/100cm² to 100,000 DPM/100cm² beta-gamma.
No fixed alpha detected.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 20Completed by (signature): Maggie DunneReviewed by (signature): Cal Walker Date: 1/10/98
Page 1 of 2

10-30-97 (2)
M. L. L. L.

Most of support
legs have fixed
contamination.
Beta-gamma
ranges vary 1-100K

10K on large
area

1-10K Fixed on
large area of
west side tank

Bin #3 is posted
"Contamination Area"
based on survey of
accessible areas. Large
portions of Bin #3 have
fixed contamination
and several locations
have transferable All
transferable contamination
has been contained.

1-5K
10K Fixed BG located in pipe
leading into Bin
located in various areas
on top of Bin #3.
Fixed B-G.

Bin #3

ORNL Radiological Survey Data

Survey Number: 8
ne: 740938Date: 11-4-97Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SAAS-2015Building: SWSA 5 Specific Location: OHE Bin #4Description: Massalin and direct risk survey on
outside of bin #4.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98).
ATG 125261 (9-30-98)General Description of Radiological Conditions: Massalin survey detected
no transferable contamination on outside of
bin. Fixed beta-gamma levels up to 6000 DPM/m
no alpha detectedDivision or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 20Completed by (signature): Maggie OwenReviewed by (signature): C. Walker Date: 1/12/98Page 1 of 2

M. J. Miller
11-4-97

ORNL Radiological Survey Data

Survey Number: 9
Time: 0900Date: 11-4-97Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SAAS-2075Building: SWSA5 Specific Location: OHE Bin #1Description: Direct Risk and massalin survey
of bin #1. Outside survey only. Random
disc smears.Instruments Used and Calibration Due Dates: ATG-2929 (5-98),
ATG-100357 (9-30-98), 125261 (9-30-98)General Description of Radiological Conditions: Fixed beta-gamma
contamination up to 110,000 DPM/100 cm². No
alpha detected. No transmembrane contamination
detected. 15 disc smears.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 20Completed by (signature): Maureen [unclear] / Kay McAvoyReviewed by (signature): Chad [unclear] Date: 1/12/98Page 1 of 2

Bin #1

Ray Massey 11-4-97

ORNL Radiological Survey Data

Survey Number: 10
Time: 1100Date: 11-4-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NABuilding: SWSA 5 Specific Location: White tentDescription: Routine weekly survey of white
tent used as EDS area.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),
ATG 100502 (9-30-98)General Description of Radiological Conditions: No fixed or transposable
contamination detected by direct frisks
or large area smear.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5Completed by (signature): Maggie OwensReviewed by (signature): CarrollDate: 1/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 11
ne: 1200Date: 11-18-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NABuilding: SWSA 5 Specific Location: White tentDescription: Routine massless survey of EDS tent
used by ATG.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),
ATG 100502 (9-30-98)General Description of Radiological Conditions: No transferrable
contamination detected by large area
smears. All LAS's <100 DPM/LAS Alpha,
<1000 DPM/LAS Beta-Gamma.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 0.5Completed by (signature): Maggie OwenReviewed by (signature): [Signature] Date: 1/18/98

ORNL Radiological Survey Data

Survey Number: 12Date: 11-18-97Time: 1100Surveyor Badge No.: _____ Routine Survey (check if yes) _____ RWP No. naBuilding: SWSA 5 Specific Location: C-landDescription: Survey on C-land # 3046610 prior
to entry by crew members.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)ATG 100502 (9-30-98), ATG 2029 (5-98)General Description of Radiological Conditions: No fixed or transferable
contamination detected by smear survey
or direct pick.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 1Completed by (signature): Maggie OwenReviewed by (signature): ChalkenDate: 11/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 13
One: 0900Date: 11-25-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. naBuilding: SWSA 5 Specific Location: H.P. trailerDescription: Routine survey of H.P. trailer
& radiological buffer area:Instruments Used and Calibration Due Dates: ATG-2929 (5/98)General Description of Radiological Conditions: All disc smears taken
on floor, walls, and equipment <20 DPM/100cm²
Alpha <200 DPM/100 cm² Beta-Gamma.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5Completed by (signature): Maggie OwenReviewed by (signature): Chalkin Date: 11/24/98Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 14
Time: 1400Date: 11-25-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. naBuilding: SWSA 5 Specific Location: ATG TentDescription: Routine Survey to check for Contamination
in area designated as OK for eating, drinking,
and smoking.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),ATG 100502 (9-30-98)General Description of Radiological Conditions: No transferencecontamination detected by large areasmearsDivision or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5Completed by (signature): Maggie OwensReviewed by (signature): Chad WalkerDate: 1/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 15Date: 11-26-97Time: 1430Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NABuilding: SWSA 5 Specific Location: C-areas around Bins 1-4 E Water tankDescription: Routine direct FRISK survey of ground
outside Contamination Area ropes to verify
clean. Massalin used to check for transferrable
Contamination.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),ATG 100502 (9-30-98)General Description of Radiological Conditions: No transferrable or fixed
contamination detected by large area smear
or direct frisk.Division or Group Needing the Survey: ATG / ER Person-hours Spent on the Survey: 2Completed by (signature): Maggie OwenReviewed by (signature): Carl DaltonDate: 1/15/98Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 16
Time: 0900

Date: 11-26-97

Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NA

Building: SWSA 5 Specific Location: ATG Forklift

Description: routine smear and direct frisk survey
on forklift used by ATG to transport material
out of contamination areas.

Instruments Used and Calibration Due Dates: ATG 2929 (5/98),
ATG 100357 (9-30-98), ATG 100502 (9-30-98)

General Description of Radiological Conditions: all disc smears <20 DPM/100cm²
alpha, <200 DPM/100cm² beta-gamma. All random
direct frisk <100 DPM/100cm² alpha, <1000 DPM/100cm²
beta-gamma.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 1

Completed by (signature): Maggie Owen

Reviewed by (signature): Chad Walker Date: 1/12/98

Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 17
Time: 0800Date: 12-1-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. naBuilding: SWSA 5 Specific Location: RBA in white tentDescription: Disc smear survey of RBA in white tent
used to store radioactive material.Instruments Used and Calibration Due Dates: ATG 2929 (5/98)General Description of Radiological Conditions: All disc smears ≤ 20 dpm/100cm²
Alpha, ≤ 200 dpm/100 cm². Beta-gamma.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 0.5Completed by (signature): Maggie OwenReviewed by (signature): Carl OakesDate: 1/12/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 18
Time: 1600Date: 12-1-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NABuilding: SWSA5 Specific Location: White tentDescription: Massalin and direct fresh survey of
large white tent used as eating, drinking
smoking area.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),
ATG 121265 (9-30-98)General Description of Radiological Conditions: No fixed or transferable
contamination detected by survey of EDS
area. All h/s's <100 DPM/h/s alpha, <1000 DPM/h/s
beta-gammaDivision or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5Completed by (signature): MaquellReviewed by (signature): Chidell Date: 1/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 19
One: 0900Date: 12-8-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NABuilding: SWSA 5 Specific Location: White tentDescription: Routine Massedian Survey of large white
tent used by ATG as eating, drinking &
smoking area.Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)
ATG 121265 (9-30-98)General Description of Radiological Conditions: No transuranic
contamination detected by large area
smears.Division or Group Needing the Survey: ATG / ER Person-hours Spent on the Survey: .5Completed by (signature): Maggie W.Reviewed by (signature): Chad BakerDate: 1/12/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 20 (Survey # out of order due) Date: 12-16-97

Time: 0830 to late entry

Surveyor Badge No.: Routine Survey (check if yes) ☒ RWP No. NA

Building: 5W5A5 Specific Location: White tent

Description: Routine Measurement Survey of large

White tent used by ATG as waiting, drenching

Smoking area.

Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),

ATG 121265 (9-30-98)

General Description of Radiological Conditions: No transmutable.

Contamination detected by large area

Survey

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5

Completed by (signature):

Reviewed by (signature):

Date: 1/12/98 Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 21Date: 12-9-97Time: 1300Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SAAS 2015Building: N/A Specific Location: X-10, SWSA 5, OHF bins 1 & 4Description: Disc smear and direct fresh survey of all metal placed in roll-off #1.Instruments Used and Calibration Due Dates: ATG 2929 (5/98), ATG 100356 (4-7-98)ATG 100357 (9-30-98) ATG 121265 (9-30-98)

General Description of Radiological Conditions: Contents of roll-off #1 are a combination of metal from the upper levels of bins 1 & 4 and auxiliary structural supports from all four bins. This metal meets DOE 5400.5 standards for unrestricted release

4 material All disc smears < 20 DPM/100cm² alpha, < 200 DPM/100cm² Beta-gamma.

Direct fresh < 100 DPM/100cm² alpha, < 1000 DPM/100cm² Beta-gamma.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 40Completed by (signature): Maggie Dumas See GT# 343596Reviewed by (signature): James P. BelliniDate: 12-11-97Page 1 of 1

SMEAR SAMPLE DATA

NAME (HP&S) <u>Maggie Owen</u>	PHONE <u>N/A</u>	BLOG. NO. (HP&S) <u>SW68A5</u>	LOCATION (SMEARS TAKEN) <u>Bin #1 sheet metal</u>	DATE <u>12-5-97</u>
SMEARS NUMBERED: F <u>1</u> To <u>53</u>	RESULTS REQUIRED: Date <u>N/A</u> Time	DATE COUNTED <u>12-5-97</u>	COUNTER OPERATOR <u>Maggie Owen</u>	
G <u>20</u> ONLY ON SMEARS OVER: <u>200</u> d/m α <u>200</u> d/m β		REMARKS: <u>ATG 2929 cal due 5/98</u> <u>Smeears taken on sheet metal for Green tar</u>		

a	β	LOCATION (*)	a	β	LOCATION (*)	a	β	LOCATION (*)
1	20	Bin #1	34	20	Sheet metal ④	67		
2		Sheet metal ①	35			68		
3			36			69		
4			37			70		
5			38			71		
6			39			72		
7			40			73		
8			41			74		
9			42			75		
10			43			76		
11			44		Sheet metal ⑤	77		
12		Sheet metal ②	45			78		
13			46			79		
14			47			80		
15			48			81		
16			49			82		
17			50			83		
18			51			84		
19			52			85		
20			53	20	#5	86		
21			54			87		
22		Sheet metal ③	55			88		
23			56			89		
24			57			90		
25			58			91		
26			59			92		
27			60			93		
28			61			94		
29			62			95		
30			63			96		
31			64			97		
32			65			98		
33	20	#3	66			99		

ATG INC.

APPLIED TECHNOLOGY GROUP

Material Release Certification

The scrap metal referenced below originated from the dismantlement of the Old Hydrofracture bins and water tank at ORNL, performed by ATG, Inc., under Subcontract Number 1GX-JWQ34V, Supplemental Agreement No. 6. A 100% surface survey of the scrap metal was provided by a Radiation Control Technician qualified in accordance with 10 CFR 835. The metal was surveyed, segregated, and staged for final disposition. The metal staged for recycle from the area designated below has been confirmed to meet DOE 5400.5 standards for unconditional release and is packaged for transport to Southern Salvage. See supporting survey data and qualifying documentation.

OHF Bin / Tank Identity Bins # 124 (see attachment for details)

Roll-Off Bin / Load Number 1

Certified By: Margaret Owen, RCT
Name Printed, Title

Margaret Owen 12-9-97
Signature, Date

Organization: ATG, Inc.

SMEAR SAMPLE DATA

NAME (HP&S)	PHONE	BLDG. NO. (HP&S)	LOCATION (SMEARS TAKEN)	DATE
Maggie Owen	WA	SWSA 5	Bin #4	12-3-97
SMEARS NUMBERED:	RESULTS REQUIRED:	DATE COUNTED	COUNTER OPERATOR	
F 1 To 66	Date Time	12-3-97	Maggie Owen	
REMARKS:				
Results recorded on disc smears only. Greentagged				
All LASS <100 DPM/LAS Alpha				
<1000 DPM/LAS Beta-gamma				
ATG 2929 metal				

a	B	LOCATION (*)	a	B	LOCATION (*)	a	B	LOCATION (*)
1	<200	Sheet metal	34	<200	Bin #4 Panel 4	67		
2		Bin #4 Panel	35			68		
3			36			69		
4			37			70		
5			38			71		
6			39			72		
7			40			73		
8			41			74		
9			42			75		
10			43			76		
11			44	<200		77		
12			45		Support beams	78		
13			46		metal parts	79		
14			47			80		
15		Bin #4 Panel 2	48			81		
16			49			82		
17			50			83		
18			51			84		
19			52			85		
20			53			86		
21			54			87		
22			55			88		
23			56			89		
24			57			90		
25			58			91		
26			59			92		
27		Bin #4 Panel 3	60			93		
28			61			94		
29			62			95		
30			63			96		
31			64			97		
32			65			98		
33	<20	<200	66	<20	<200	99		

ORNL Radiological Survey Data

Survey Number: 22Date: 12-17-97Time: 1500Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SAAS-207Building: SWSA 5 Specific Location: DHF bins 1 & 2Description: Disc smear and direct fresh survey of
all metal placed in roll-off #2Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)ATG 121265 (9-30-98), ATG 100356 (4-7-98)Iudium # 2929-131370 (10-98)General Description of Radiological Conditions: Contents of roll-off #2 area combination of scrap metal from bins 1 & 2.Primarily, the body of bins 1 & 2, with 2 insideand some structural support. All metal meetsDOE, 5400.5 standards for unconditional release of material. Alldisc smears < 20 DPM/100 cm² Alpha. See Bin Tag # 343598< 200 DPM/100 cm² Beta-gamma & alpha, < 1000 DPM/100 cm² Beta-gamma.Division or Group Needing the Survey: ATG / ER Person-hours Spent on the Survey: 40Completed by (signature): Maqye OwenReviewed by (signature): John L. WhitfordDate: 12-18-97Page 1 of 1

ATG INC.

ALLIED TECHNOLOGY GROUP

Material Release Certification

The scrap metal referenced below originated from the dismantlement of the Old Hydrofracture bins and water tank at ORNL, performed by ATG, Inc., under Subcontract Number 1GX-JWQ34V, Supplemental Agreement No. 6. A 100% surface survey of the scrap metal was provided by a Radiation Control Technician qualified in accordance with 10 CFR 835. The metal was surveyed, segregated, and staged for final disposition. The metal staged for recycle from the area designated below has been confirmed to meet DOE 5400.5 standards for unconditional release and is packaged for transport to Southern Salvage. See supporting survey data and qualifying documentation.

OHF Bin / Tank Identity Bins #1 & 2 (see attachment
for details)Roll-Off Bin / Load Number 2Certified By: Maggie Owen, RCT
Name Printed, TitleMaggie Owen 12-17-97
Signature, DateOrganization: ATG, Inc.

ORNL Radiological Survey Data

Survey Number: 23Date: 12-17-97One: 1530

Surveyor Badge No.: _____

☒ Routine Survey (check if yes)RWP No. N/ABuilding: SWSASSpecific Location: H.P. trailer

Description: Routine Massalun Survey of H.P.
trailer used as control point, posted
Radiological Buffer Area.

Instruments Used and Calibration Due Dates: ATG-100357 (9-30-98)ATG-121265 (9-30-98)General Description of Radiological Conditions: No transferable

contamination detected by large Area Smears.
All has's <100 DPM/has alpha, <1000 DPM/has beta-
- gamma.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5Completed by (signature): Maggie OwenReviewed by (signature): ChadlerDate: 1/12/98

Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 24
Time: 0800Date: 12-29-97Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. N/ABuilding: SWSA 5 Specific Location: White tentDescription: Massalun survey of large white tent
used by ATG for eating, drinking, smoking
areaInstruments Used and Calibration Due Dates: ATG 100357 (9-30-98),
ATG 121265 (9-30-98)General Description of Radiological Conditions: No transference
contamination detected by HAS. All has's
< 100 DPM/HAS Alpha, < 1000 DPM/HAS Beta-gamma.Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: .5Completed by (signature): Maggie OwenReviewed by (signature): Chad WalkerDate: 1/12/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 25
 Time: 0900

Date: 12-30-97

Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SAAS-2075

Building: NA Specific Location: SWSA5, OHF bins 2 & 3

Description: Disc smear and direct push survey of all
metal placed in roll-off #3. See GT # 343597

Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)

ATG 121265 (9-30-98) Ludlum 2929, SERIAL # 131370
(10-98)

General Description of Radiological Conditions: Contents of roll-off #3 are a combination
of scrap metal from bins 2 & 3, with some support and cone
parts. All metal meets DOE 5400.5 standards for unconditional
release of material. All disc smears $\leq 20 \text{ DPM}/100 \text{ cm}^2$ alpha, $\leq 80 \text{ DPM}/100 \text{ cm}^2$
- beta gamma. All direct push $\leq 100 \text{ DPM}/100 \text{ cm}^2$ alpha, $\leq 1000 \text{ DPM}/100 \text{ cm}^2$
- beta gamma.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 80

Completed by (signature): Maggie Owen

Reviewed by (signature): My Whithead Date: 12-30-97

Cal Oakes

1/2/98

Page 1 of 3

ATG INC.

ALLIED TECHNOLOGY GROUP

Material Release Certification

The scrap metal referenced below originated from the dismantlement of the Old Hydrofracture bins and water tank at ORNL, performed by ATG, Inc., under Subcontract Number 1GX-JWQ34V, Supplemental Agreement No. 6. A 100% surface survey of the scrap metal was provided by a Radiation Control Technician qualified in accordance with 10 CFR 835. The metal was surveyed, segregated, and staged for final disposition. The metal staged for recycle from the area designated below has been confirmed to meet DOE 5400.5 standards for unconditional release and is packaged for transport to Southern Salvage. See supporting survey data and qualifying documentation.

OHF Bin / Tank Identity Bins # 2 & 3 (SEE attachment for details)

Roll-Off Bin / Load Number 3

Certified By: Maggie Owen, RCT
Name Printed, Title

Maggie Owen / 12-30-94
Signature, Date

Organization: ATG, Inc.

SMEAR SAMPLE DATA

NAME (HP&S) <u>Maqqe Owen</u>	PHONE <u>NA</u>	BLDG. NO. (HP&S) <u>SWSA 5</u>	LOCATION (SMEARS TAKEN) <u>Bin #1 & 3</u>	DATE <u>12-17-97</u>
SMEARS NUMBERED: From <u>1</u> To <u>63</u>	RESULTS REQUIRED: Date _____ Time _____	DATE COUNTED <u>12-17-97</u>		COUNTER OPERATOR <u>Maqqe Owen</u>
GR/M ONLY ON SMEARS OVER: <u>20</u> d/m α <u>200</u> d/m β		REMARKS: <u>Scrap metal from bins 2 & 3, loaded unto</u> <u>roll-off #3</u> <u>Ludlum 2929 Serial # 131370</u> <u>ATG 121265 ATG 100357</u>		

α	β	LOCATION (*)	α	β	LOCATION (*)	α	β	LOCATION (*)
1 <u>20</u>	<u>200</u>	<u>Sheet Metal</u>	34 <u>20</u>	<u>200</u>	<u>Sheet Metal</u>	67		
2			35			68		
3			36			69		
4			37			70		
5			38			71		
6			39			72		
7			40			73		
8			41			74		
9			42			75		
10			43			76		
11			44			77		
12			45			78		
13			46			79		
14			47			80		
15			48			81		
16			49			82		
17			50			83		
18			51			84		
19			52			85		
20			53			86		
21		<u>Sheet Metal</u>	54		<u>Misc parts</u>	87		
22			55		<u>Cone</u>	88		
23			56			89		
24			57			90		
25			58		<u>Beam A</u>	91		
26			59			92		
27			60		<u>Beam B</u>	93		
28			61			94		
29			62			95		
30			63 <u>20</u>	<u>200</u>		96		
31			64			97		
32			65			98		
33 <u>20</u>	<u>200</u>		66			99		

ORNL Radiological Survey Data

Survey Number: 26
Time: 1330

Date: 1-5-98

Surveyor Badge No.: Routine Survey (check if yes) ☐ RWP No. SAAS-2075

Building: SWSA 5 Specific Location: Bin # 3

Description: Direct, fresh and disc smear survey of
scrap metal from OHF Bin # 3.

Instruments Used and Calibration Due Dates: ATG-100356 (4-7-98)

ATG 121365 (9-30-98) ATG 2929 #131370 (10-98)

ATG (100357) (9-30-98)

General Description of Radiological Conditions: 100% survey of scrap metal from
Bin # 3 loaded into roll-off # 4 found no fixed or transference
contamination All metal meets DOE 5400.5 standards for unconditional
release of material All disc smears < 20 DPM/100cm² alpha < 300 DPM/100cm² beta &
All direct fresh < 100 DPM/100cm² alpha < 1000 DPM/100cm² beta - gamma

Division or Group Needing the Survey: ATG / ER Person-hours Spent on the Survey: 80

Completed by (signature): [Signature]

Reviewed by (signature): [Signature] Date: 1-5-98

Page 1 of 3

GT# 334926

HEALTH PHYSICS MATERIAL TRANSFER CLEARANCE

TAG NUMBER

GT 334926

SURVEY INFORMATION

BUILDING

SWSA 5

ROOM NO.

REQUESTED BY

Whitehead (ER) (ER)

DIVISION

DESCRIPTION OF MATERIAL/REMARKS

Roll # 4

Scrap metal

SURFACE CONTAMINATION

CHECK
IF NONE
DETECTED

MAX. FIXED-REMOVABLE ALPHA

<100

dpm/100cm²☒

REMOVABLE ALPHA

<20

dpm/100cm²☒

MAX. FIXED-REMOVABLE BETA/GAMMA

<1000

dpm/100cm²☒

REMOVABLE BETA/GAMMA

<200

dpm/100cm²☒

HEALTH PHYSICS INSTRUMENTS USED

Alpha Instrument I.D.

ATG-2929
ATG-100357

Beta/Gamma Instrument I.D.

ATG-2929
ATG-121265
ATG-100357

SURVEY COMPLETED

DATE

1-5-98

BY (NAME and BADGE NUMBER)

M. Owen

VOID AFTER

90 Days

UCN-148 (123 7-84)

ATG INC.

ALLIED TECHNOLOGY GROUP

Material Release Certification

The scrap metal referenced below originated from the dismantlement of the Old Hydrofracture bins and water tank at ORNL, performed by ATG, Inc., under Subcontract Number 1GX-JWQ34V, Supplemental Agreement No. 6. A 100% surface survey of the scrap metal was provided by a Radiation Control Technician qualified in accordance with 10 CFR 835. The metal was surveyed, segregated, and staged for final disposition. The metal staged for recycle from the area designated below has been confirmed to meet DOE 5400.5 standards for unconditional release and is packaged for transport to Southern Salvage. See supporting survey data and qualifying documentation.

OHF Bin / Tank Identity Bin # 3Roll-Off Bin / Load Number 4Certified By: Maggie Owen, RCT
Name Printed, TitleMaggie Owen 1-5-98
Signature, DateOrganization: ATG Inc.

ORNL Radiological Survey Data

Survey Number: 27
Time: 0700

Date: 1-7-98

Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SABS-2075-1

Building: SWSA 5 Specific Location: OHF Water Tank

Description: Direct Frisk and disc smear survey on all
Stainless Steel Loaded into roll off #5

Instruments Used and Calibration Due Dates: ATG 2929 #131370 (10-98),
ATG 100357 (9-30-98), 121265 (9-30-98)

General Description of Radiological Conditions: 100% Survey of all stainless steel
Loaded into roll off #5 found no fixed or transmittable contamination
All metal meets DOE 5400.5 standards for unconditional release of
material. All disc smears <20 DPM/100cm² alpha, <200 DPM/100cm² Beta-gamma.
All direct frisk <100 DPM/100cm² alpha, <1000 DPM/100cm² Beta-gamma.

Division or Group Needing the Survey: ATG-1 ER Person-hours Spent on the Survey: 20

Completed by (signature): Maggie O'Brien

Reviewed by (signature): M J Whithead

Date: 1-7-97

Page 1 of 3 MO 1-T-97

Chicklin

1/12/98

1 of 3

ATG INC.

ALLIED TECHNOLOGY GROUP

Material Release Certification

The scrap metal referenced below originated from the dismantlement of the Old Hydrofracture bins and water tank at ORNL, performed by ATG, Inc., under Subcontract Number 1GX-JWQ34V, Supplemental Agreement No. 6. A 100% surface survey of the scrap metal was provided by a Radiation Control Technician qualified in accordance with 10 CFR 835. The metal was surveyed, segregated, and staged for final disposition. The metal staged for recycle from the area designated below has been confirmed to meet DOE 5400.5 standards for unconditional release and is packaged for transport to Southern Salvage. See supporting survey data and qualifying documentation.

OHF Bin / Tank Identity Water Tank (see attached for additional information)

Roll-Off Bin / Load Number 5

Certified By: Maggie Owen (RCT)
Name Printed, Title

Maggie Owen 1-7-98
Signature, Date

Organization: ATG Inc.

HEALTH PHYSICS MATERIAL TRANSFER CLEARANCE

TAG NUMBER

GT 334928

SURVEY INFORMATION

BUILDING

SWSA 5

ROOM NO.

REQUESTED BY

Whithead

DIVISION

ER

DESCRIPTION OF MATERIAL/REMARKS

Roll off #5 of
Stainless Steel

SURFACE CONTAMINATION

CHECK
IF NONE
DETECTED

MAX. FIXED-REMOVABLE ALPHA

<100

dpm/100cm²

REMOVABLE ALPHA

<20

dpm/100cm²

MAX. FIXED-REMOVABLE BETA/GAMMA

<1000

dpm/100cm²

REMOVABLE BETA/GAMMA

<200

dpm/100cm²

HEALTH PHYSICS INSTRUMENTS USED

Alpha Instrument I.D.

ATG-2929

ATG-100357

Beta/Gamma Instrument I.D.

ATG-2929

ATG-121265

SURVEY COMPLETED

DATE

1-7-98

BY (NAME and BADGE NUMBER)

Maggie Owen

VOID AFTER

90 Days

UCH-148 (128 7-84)

ORNL Radiological Survey Data

Survey Number: 27B
Time: 0900Date: 1-6-98Surveyor Badge No.: _____ ☒ Routine Survey (check if yes) RWP No. NABuilding: SWSA 5 Specific Location: White TentDescription: Routine Massalin survey of White
Tent used by ATG for Eating, drinking, smoking
area.Instruments Used and Calibration Due Dates: ATG 121265 (9-30-98)ATG 100357 (9-30-98)General Description of Radiological Conditions: No transferrablecontamination detected by LAS.Division or Group Needing the Survey: ATG / ER Person-hours Spent on the Survey: 5Completed by (signature): Maggie OwenReviewed by (signature): Ch WalkerDate: 1/12/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 28Date: 1-7-98Time: 0800Surveyor Badge No.: _____ Routine Survey (check if yes) ☐ RWP No. SAAS-2075Building: 5WSA 5 Specific Location: Stainless steel water tankDescription: Survey of post decon attempts on stainless steel water tank. Direct fresh only. This survey is on outside of tank.Instruments Used and Calibration Due Dates: ATG 121265 (9-30-98)

General Description of Radiological Conditions: Decon efforts were not successful, after several attempts at decon, fixed contamination levels remain up to 24000 DPM/100cm² Beta-Gamma. Contaminated metal placed in de-land for storage.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: _____Completed by (signature): Maggi OwenReviewed by (signature): Chad WalkerDate: 1/12/98Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 29 (Survey # out of order due) Date: 1-5-98
 Time: 1400 to Late Entry

Surveyor Badge No.: _____ Routine Survey (check if yes) RWP No. SAB5-2075
 Building: SWSA 5 Specific Location: Contamination Area around Bins 1, 3, & 4
 Description: Direct Frisk survey to down post C-areas
around Bins 1, 3 & 4.

Instruments Used and Calibration Due Dates: ATG 100356 (4-7-98)
ATG 121265 (9-30-98), ATG 100357 (9-30-98)

General Description of Radiological Conditions: Direct Frisk of ground in
C-area Located several small areas of contamination
up to 2000 DPM/100cm² Beta-Gamma. Areas were removed
and ground re-surveyed. Final survey all direct frisks
< 100 DPM/100 cm² Alpha, < 1000 DPM/100cm² Beta-Gamma.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 10

Completed by (signature): Maggie Dues

Reviewed by (signature): Chickalar Date: 1/12/98
 Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 30
Time: 0800

Date: 1-7-98

Surveyor Badge No.: _____ ☒ N/A Routine Survey (check if yes) RWP No. SARS-2075

Building: SWSA 5 Specific Location: Sea-Land

Description: General survey performed by masslin e'
direct frisk on metal loaded into Sea-Land
for storage.

Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98),
ATG 121265 (9-30-98)

General Description of Radiological Conditions: Fixed Contamination levels up
to 200,000 DPM/100cm² Beta-gamma, no alpha, located
by direct frisk. Transferable Beta-gamma levels
up to 2000 DPM/105, no alpha. Sea land is posted
"Contamination Area" "RWP Required for Entry".

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 40

Completed by (signature): Maggie D. J.

Reviewed by (signature): [Signature]

Date: 1/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 31
ne: 0900

Date: 1-9-98

Surveyor Badge No _____ Routine Survey (check if yes) ☐ RWP No. SARS-20751

Building: SWSA 5 Specific Location: Stainless Steel Water tank

Description: Internal Survey of Water tank after decontamination

Instruments Used and Calibration Due Dates: ATG 121265 (9-30-98)

ATG 100357 (9-30-98), ATG 2929 (#131370) 10/98

General Description of Radiological Conditions: Direct frisk of internal
caves of water tank, located no fixed alpha or beta-gamma
contamination. Disc smears located no transferable beta-
gamma and low levels of alpha. After decon all disc
smears < 200 dpm/100cm² alpha, < 200 dpm/100cm² beta gamma,
< 100 dpm/100cm² alpha fixed, < 1000 dpm/100cm² beta gamma.
Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 6

Completed by (signature): Maggie Quinn

Reviewed by (signature): Cal Walker

Date: 1/18/98
Page 1 of 1

ORNL Radiological Survey Data

Survey Number: 32
Time: 1200

Date: 1-9-98

Surveyor Badge No. _____ Routine Survey (check if yes) ☐ RWP No SARS-2075A

Building: SLUSA 5 Specific Location: Contamination Area around water tank

Description: Survey to downpost Contamination area
around Stainless Steel Water tank.

Instruments Used and Calibration Due Dates: ATG 100357 (9-30-98)
ATG 121265 (9-30-98)

General Description of Radiological Conditions: Direct, fresh survey of all
ground area. <100 dpm/100 cm² alpha, <1000 dpm/100 cm²
beta gamma. Random massless survey detected
no transference activity. Posting removed
from area.

Division or Group Needing the Survey: ATG/ER Person-hours Spent on the Survey: 4

Completed by (signature): Maggie Owen

Reviewed by (signature): Chad Allen Date: 1/12/98
Page 1 of 1

APPENDIX C

HEALTH PHYSICS INSTRUMENT CALIBRATION DOCUMENTATION

BICRON MICRO-REM CALIBRATION DATA SHEET

Barcode #: _____

Serial #: B5042HP #: ATG

As-Found

Test	Pass	Fail	Range	Dose Rate	Acceptance Range	Net Response
Visual:	☐	☐	X1000	50%	100 mrem/hr	90 - 110
Battery:	☐	☐	X100	50%	10 mrem/hr	9 - 11
HV:	☐	☐	X10	50%	1.0 mrem/hr	0.9 - 1.1
Bkg:	☐	☐	X1	50%	100 μ rem/hr	90 - 110
X1 Bkg:	☐	☐	X0.1	50%	10 μ rem/hr	9 - 11
X0.1 Bkg:	☐	☐				

By: BB Date: 6/19/97

Calibration

Temp:	Range	Dose Rate	Acceptance Range	Net Response
<u>24 °C</u>	X1000	25%	50 mrem/hr	45 - 55
Pressure: <u>740 mm Hg</u>	X1000	50%	100 mrem/hr	90 - 110
Humidity: <u>55 %RH</u>	X1000	75%	150 mrem/hr	135 - 165
Test Pass Fail	X100	25%	5 mrem/hr	4.5 - 5.5
Visual: ☒	X100	50%	10 mrem/hr	9.0 - 11.0
Battery: ☒	X100	75%	15 mrem/hr	13.5 - 16.5
HV: ☒	X10	25%	0.5 mrem/hr	0.45 - 0.55
Overload: ☒	X10	50%	1.0 mrem/hr	0.90 - 1.10
Bkg: <u>—</u>	X10	75%	1.5 mrem/hr	1.35 - 1.65
X1 Bkg: <u>5 μrem/hr</u>	X1	50%	100 μ rem/hr	90 - 110
X0.1 Bkg: <u>5 μrem/hr</u>	X1	75%	150 μ rem/hr	135 - 165
	X0.1	25%	5 μ rem/hr	4.5 - 5.5
	X0.1	50%	10 μ rem/hr	9.0 - 11.0

By: BB Date: 6/19/97

Performance Validation and Reproducibility Check

Test	Pass	Fail	Dose Rate	Acceptance Range	Trial 1	Trial 2	Trial 3
Visual:	☒	☐	100 mrem/hr	90 - 110	100	100	100
Battery:	☒	☐	10 mrem/hr	9 - 11	10	10	10
HV:	☒	☐	1.0 mrem/hr	0.9 - 1.1	1.0	1.0	1.0
Bkg:	☐	☐					
X1 Bkg: <u>5 μrem/hr</u>			100 μ rem/hr	90 - 110	100	100	100
X0.1 Bkg: <u>5 μrem/hr</u>			10 μ rem/hr	9 - 11	10	10	10

By: BB Date: 6-20-97

Remarks: _____

Reviewed By: BBDate: 25 JUN 97

Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG ORDER NO. 226657
Mfg. Ludlum Measurements, Inc. Model 2822 Serial No. 89045
Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR 098235
Cal. Date 5/27/97 Cal Due Date 11/27/97 Cal. Interval 6 Months Meterface 202-014
Check mark ☒ applies to applicable Instr. and/or detector IAW mfg. spec. T. 72 °F RH 40 % Alt 701.8 mm Hg
☐ New Instrument ☐ Instrument Received ☐ Within Toler. ☐ $\pm 10\%$ ☐ $10-20\%$ ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments
☒ Mechanical ck. ☒ Window Operation
☒ Audio ck.
☒ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV
☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.
Instrument Volt Set 850 V = 3.82 on High Voltage dial. High Voltage set with detector connected.
☒ HV Readout (2 points) Ref./Inst. 196 / 500 V Ref./Inst. 220 / 2000 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-8 in which the front of probe faces source.

Alpha Channel	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400K cpm	400360	400360
	40K cpm	40035	40035
	4K cpm	4003	4003
	400 cpm	400	400
	40 cpm	40	40
Beta/Gamma Channel	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400K cpm	400318	400318
	40K cpm	40030	40030
	4K cpm	4003	4003
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. 10-1963

Reference Instruments and/or Sources:

Ci-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ S105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ Neutron Am-241 Be S/N T-304
☒ Alpha S/N Pu-239 12800cpm ☒ Beta S/N Tc-99 14300cpm C-14 0.165uCi ☐ Other _____
☒ m 500 S/N 54668 ☐ Oscilloscope S/N _____ ☒ Multimeter S/N 57390613

Calibrated By: G. Masarabadi Date 5/27/97

Reviewed By: Robert A. Schlegel Date 5/28/97

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Detector 43-10-1 Serial No. PR09P335 Order # 226657
 Customer ATG Alpha Input Sensitivity 175 mV
 Counter 2929 Serial No. 89045 Beta Input Sensitivity 4 mV
 Count Time 1Minute Beta Window 50 mV
 Other _____ Distance Source to Detector Trax

[illegible]

Signature Gerald B. Salas Date 5/27/87

ALPHA SMEAR COUNTER (CTA) CALIBRATION DATA SHEET

Scaler #: 99043

I.D. #: M134019

Location: ATG

Linearity Sources

²³⁹Pu(1) #: 1257 430 dpm²³⁹Pu(2) #: 1339 7470 dpm²³⁹Pu(3) #: 1262 62000 dpm

Chi-Square Source #: 1339 7470 dpm

239 Pu

Bkg: 0.6

As-Found Results

Count Time (min): 1

Linearity Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	2404	2403.4	32.2%	32.2%
	2465	2464.4	33.0%	Range (Mean $\pm$ 10%) 29.0% to 35.5%
	2356	2355.4	30.5%	
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	135	134.4	31.3%	y TCP
#3	20424	20423.4	32.9%	y TCP

Date: 5-21-97 Remarks:

Bkg: 0.4

Calibration Results

Count Time (min): 1

Linearity / Reproducibility Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	2508	2507.6	33.6%	32.9%
	2469	2468.6	33.0%	Range (Mean $\pm$ 10%) 29.6% to 36.2%
	2395	2394.6	32.1%	
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	129	128.6	29.9%	y TCP
#3	20875	20874.6	33.7%	y TCP
Chi-Square Test			Reproducibility	Pass/Fail Init.
				Pass TCP

Count #	Gross	Net (n)	(n - $\bar{n}$)	(n - $\bar{n}$) ²
1	2482	2481.6	15.3	234.1
2	2483	2482.6	16.3	265.7
3	2410	2409.6	-56.7	3214.9
4	2509	2508.6	42.3	1789.3
5	2469	2468.6	2.3	5.3
6	2561	2560.6	94.3	8892.5
7	2462	2461.6	-4.7	22.1
8	2504	2503.6	37.3	1391.3
9	2437	2436.6	-29.7	882.1
10	2447	2446.6	-19.7	388.1
11	2425	2424.6	-41.7	1738.9
12	2430	2429.6	-36.7	1346.9
13	2490	2489.6	23.3	542.9
14	2457	2456.6	-9.7	94.1
15	2454	2453.6	-12.7	161.3
16	2445	2444.6	-21.7	470.9
17	2494	2493.6	27.3	745.3
18	2509	2508.6	42.3	1789.3
19	2482	2481.6	15.3	234.1
20	2384	2383.6	-82.7	6839.3
SUM		49326	0.0	31048.2

n = cpm

 $\bar{n}$ = average of nSum of n - $\bar{n}$ must = 0

Chi-Square value must be between 10 and 30.

 $\bar{n}$ = 2466 cpm

Performance Range

 $\bar{n} + 3\sigma$ = 2615 cpm $\bar{n} - 3\sigma$ = 2317 cpm

Chi-Square Value = 12.59

Instrument Efficiency = 33.0%

charge * PIR53P09

Remarks: Cal Due: 5/98

Completed By: TC Palmer

Date: 5-29-97

Reviewed By: B. Baker

Date: 5-30-97

BETA SMEAR COUNTER (CTB) CALIBRATION DATA SHEET

Scaler #: 99043

I.D. #: M134019

Location: ATG

Linearity Sources

⁹⁹Tc(1) #: 3121 4200 dpm
⁹⁹Tc(3) #: 1256 378000 dpm

⁹⁹Tc(2) #: 3122 27500 dpm
 Chi-Square Source #: ~~3122~~ 27500 dpm ⁹⁹Tc

Energy Response Sources

⁹⁹Tc #: 3122 27499 ³⁶Cl #: 2007A 355193 ⁹⁰Sr/⁹⁰Y #: 1263 15863

Bkg: 57

As-Found Results

Count Time (min): 1

Linearity Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	4814	4757	15.3%	17.5%
	4852	4795	17.4%	Range (Mean $\pm$ 10%) 15.7% to 19.2%
	4905	4848	17.6%	
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	731	674	16.0%	y TCP
#3	63089	63032	16.7%	y TCP

Date: 5-21-97 Remarks:

Bkg: 61

Calibration Results

Count Time (min): 1

Linearity / Reproducibility Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	4443	4382	15.9%	16.0%
	4456	4395	16.0%	Range (Mean $\pm$ 10%) 14.4% to 17.6%
	4471	4410	16.0%	
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	700	639	15.2%	y TCP
#3	58713	58652	15.5%	y TCP

Chi-Square Test

Reproducibility Pass/Fail Init. Pass TCP

Count #	Gross	Net (n)	(n - $\bar{n}$)	(n - $\bar{n}$) ²
1	4411	4350	-4.6	21.2
2	4381	4320	-34.6	1197.2
3	4473	4412	57.4	3294.8
4	4416	4355	0.4	0.2
5	4522	4461	106.4	11321.0
6	4373	4312	-42.6	1814.8
7	4320	4259	-95.6	9139.4
8	4470	4409	54.4	2959.4
9	4272	4211	-143.6	20621.0
10	4439	4378	23.4	547.6
11	4387	4326	-28.6	818.0
12	4374	4313	-41.6	1730.6
13	4433	4372	17.4	302.8
14	4432	4371	16.4	269.0
15	4519	4458	103.4	10691.6
16	4362	4301	-53.6	2873.0
17	4474	4413	58.4	3410.6
18	4373	4312	-42.6	1814.8
19	4365	4304	-50.6	2560.4
20	4516	4455	100.4	10080.2
SUM		87092	-0.0	85466.8

Energy Response

Source	Gross	Net	Eff. %
⁹⁹ Tc	4470	4409	16.0%
³⁶ Cl	114814	114753	32.3%
⁹⁰ Sr/ ⁹⁰ Y	5065	5004	31.5%

n = cpm

 $\bar{n}$ = average of nSum of n - $\bar{n}$ must = 0

Chi-Square value must be between 10 and 30.

 $\bar{n}$ = 4355 cpm

Performance Range

 $\bar{n} + 3\sigma$ = 4553 cpm $\bar{n} - 3\sigma$ = 4157 cpm

Chi-Square Value = 19.63

Instrument Efficiency = 15.8%

Remarks: Cal. Due 5/98

ReScale's ⁹⁹Tc source used for Chi²Completed By: *CC Palmer*

Date: 5-29-97

Reviewed By: *BBB*

Date: 5-30-97

ALPHA SMEAR COUNTER (CTA) CALIBRATION DATA SHEET

Scaler #: 99043

I.D. #: M134019

Location: ATG

Linearity Sources

²³⁹Pu(1) #: 1257 430 dpm
²³⁹Pu(3) #: 1262 62000 dpm

²³⁹Pu(2) #: 1339 7470 dpm
 Chi-Square Source #: Z-824 2500 dpm

Th 230

Bkg: 0.6

As-Found Results

Count Time (min): 1

Linearity Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	2404	2403.4	32.2%	32.2%
	2465	2464.4	33.0%	Range (Mean $\pm$ 10%)
	2356	2355.4	31.5%	29.0% to 35.5%
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	135	134.4	31.3%	y TCP
#3	20424	20423.4	32.9%	y TCP

Date: 5-21-97 Remarks:

Bkg: 0.4

Calibration Results

Count Time (min): 1

Linearity / Reproducibility Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	2508	2507.6	33.6%	32.9%
	2469	2468.6	33.0%	Range (Mean $\pm$ 10%)
	2395	2394.6	32.1%	29.6% to 36.2%
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	129	128.6	29.9%	y TCP
#3	20875	20874.6	33.7%	y TCP

Chi-Square Test

Reproducibility Pass/Fail Init. Pass TCP

Count #	Gross	Net (n)	(n - $\bar{n}$)	(n - $\bar{n}$) ²
1	441	440.6	-39.6	1572.1
2	450	449.6	-30.6	939.4
3	470	469.6	-10.6	113.4
4	510	509.6	29.4	861.4
5	472	471.6	-8.6	74.8
6	468	467.6	-12.6	160.0
7	473	472.6	-7.6	58.5
8	507	506.6	26.4	694.3
9	528	527.6	47.4	2242.0
10	501	500.6	20.4	414.1
11	483	482.6	2.4	5.5
12	480	479.6	-0.6	0.4
13	458	457.6	-22.6	513.0
14	478	477.6	-2.6	7.0
15	457	456.6	-23.6	559.3
16	471	470.6	-9.6	93.1
17	521	520.6	40.4	1628.1
18	493	492.6	12.4	152.5
19	501	500.6	20.4	414.1
20	451	450.6	-29.6	879.1
SUM		9605	0.0	11382.6

n = cpm

 $\bar{n}$ = average of nSum of n - $\bar{n}$ must = 0

Chi-Square value must be between 10 and 30.

 $\bar{n}$ = 480 cpm

Performance Range

 $\bar{n} + 3\sigma$ = 546 cpm $\bar{n} - 3\sigma$ = 415 cpm

Chi-Square Value = 23.70

Instrument Efficiency = 19.2%

Remarks: Cal Due: 5/98

ATG's Pu source used for chi²

Completed By: JC Palmer

Date: 5-29-97

Reviewed By: BMB

Date: 5-30-97

04-80-19

BETA SMEAR COUNTER (CTB) CALIBRATION DATA SHEET

Scaler #: 99043

I.D. #: M134019

Location: ATG

Linearity Sources

⁹⁹Tc(1) #: 3121 4200 dpm⁹⁹Tc(2) #: 3122 27500 dpm⁹⁹Tc(3) #: 1256 378000 dpm

Chi-Square Source #: 94Tc470-0544 40200 dpm

Energy Response Sources

⁹⁹Tc #: 3122 27499³⁶Cl #: 2007A

355193

⁹⁰Sr/⁹⁰Y #: 1263

15863

Bkg: 57

As-Found Results

Count Time (min): 1

Linearity Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	4814	4757	17.3%	17.5%
	4852	4795	17.4%	Range (Mean $\pm$ 10%)
	4905	4848	17.6%	
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	731	674	16.0%	y TCP
#3	63089	63032	16.7%	y TCP

Date: 5-21-97 Remarks:

Bkg: 61

Calibration Results

Count Time (min): 1

Linearity / Reproducibility Test				
Source	Gross Cpm	Net Cpm	Efficiency	Mean
#2	4443	4382	15.9%	16.0%
	4456	4395	16.0%	Range (Mean $\pm$ 10%)
	4471	4410	16.0%	
Source	Gross Cpm	Net Cpm	Efficiency	Within Range? (y/n) Init.
#1	700	639	15.2%	y TCP
#3	58713	58652	15.5%	y TCP
Chi-Square Test			Reproducibility	Pass/Fail Init. Pass TCP

Count #	Gross	Net (n)	(n - $\bar{n}$)	(n - $\bar{n}$) ²
1	6669	6608	78.7	6193.7
2	6538	6477	-52.3	2735.3
3	6626	6565	35.7	1274.5
4	6598	6537	7.7	59.3
5	6623	6562	32.7	1069.3
6	6702	6641	111.7	12476.9
7	6664	6603	73.7	5431.7
8	6590	6529	-0.3	0.1
9	6601	6540	10.7	114.5
10	6508	6447	-82.3	6773.3
11	6568	6507	-22.3	497.3
12	6548	6487	-42.3	1789.3
13	6630	6569	39.7	1576.1
14	6709	6648	118.7	14089.7
15	6522	6461	-68.3	4664.9
16	6551	6490	-39.3	1544.5
17	6620	6559	29.7	882.1
18	6453	6392	-137.3	18851.3
19	6587	6526	-3.3	10.9
20	6499	6438	-91.3	8335.7
SUM		130586	-0.0	88370.2

Energy Response

Source	Gross	Net	Eff. %
⁹⁹ Tc		-61	-0.2%
³⁶ Cl		-61	-0.0%
⁹⁰ Sr/ ⁹⁰ Y		-61	-0.4%

n = cpm

 $\bar{n}$ = average of nSum of n - $\bar{n}$ must = 0

Chi-Square value must be between 10 and 30.

 $\bar{n}$ = 6529 cpm

Performance Range

 $\bar{n} + 3\sigma$ = 6772 cpm $\bar{n} - 3\sigma$ = 6287 cpm

Chi-Square Value = 13.53

Instrument Efficiency = 16.2%

Remarks: Cal. Due 5/98

ATG's ⁹⁹Tc source used for Chi²

Completed By: C. Palmer

Date: 5-29-97

Reviewed By: BKB

Date: 5-30-97

NON-HPIC INSTRUMENT

PANCAKE PROBE GM
CALIBRATION DATA SHEET

ATG

Barcode #: 1146459Serial #: 100502

HP #:

As-Found Radiological Response

Temperature: °C
 Pressure: mm Hg
 Humidity: %
 Thermometer ID#:
 Barometer ID#:
 Hygrometer ID#:
 Beta Set: ¹³⁷Cs Source:
 Performed By: SBZ
 Date: 9-30-97

Visual: ☐
 Battery: ☐
 High Voltage: ☐
 Audio: ☐
 Alarm: ☐
 Reset: ☐
 Response: ☐
 Background: cpm

NOT REQUIRED
NEW INSTRUMENT

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
⁹⁹ Tc	0.12 µCi	-	
³⁶ Cl	0.08 µCi	-	
⁹⁰ Sr-Y	0.03 µCi	-	
¹³⁷ Cs	0.1 mR/h	-	
	1.0 mR/h	-	
	10 mR/h	-	

Radiological Calibration

Temperature: 23 °C
 Pressure: 736 mm Hg
 Humidity: 47 %
 Thermometer ID#: 1139839
 Barometer ID#:
 Hygrometer ID#:
 Beta Set: 1 ¹³⁷Cs Source: 10182
 Background: 40 cpm
 Performed By: SBZ
 Date: 9-30-97

Visual: ☒
 Battery: ☒
 High Voltage: N/A
 Audio: ☒
 Alarm: N/A
 Reset: ☒
 Response: ☒
 Reproducibility: ☒
 Overload: ☒

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹⁴⁷ Pm	0.05 µCi	2100 - 2600	2400
⁹⁹ Tc	0.12 µCi	12800 - 15700	15000
³⁶ Cl	0.08 µCi	25300 - 31000	26000
⁹⁰ Sr-Y	0.03 µCi	14700 - 18000	16000
¹³⁷ Cs	0.1 mR/h	225 - 275	260
	1.0 mR/h	2250 - 2750	2600
	10 mR/h	22500 - 27500	24K
Trial 2	10 mR/h	22500 - 27500	24K
Trial 3	10 mR/h	22500 - 27500	24K

Performance Validation

Temperature: 23 °C
 Pressure: 736 mm Hg
 Humidity: 50 %
 Thermometer ID#: 1139839
 Barometer ID#:
 Hygrometer ID#:
¹³⁷Cs Source: 10182
 Background: 40 cpm

Visual: ☒
 Battery: ☒
 High Voltage: ☒
 Audio: ☒
 Alarm: ☒
 Reset: ☒
 Response: ☒

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹³⁷ Cs	0.1 mR/h	225 - 275	260
	1.0 mR/h	2250 - 2750	2600
	10 mR/h	22500 - 27500	24K

Performed By: SBZ Date: 9-30-97

Remarks:

Reviewed By: KSDate: 9-30-97

NON-MPIC INSTRUMENT

PANCAKE PROBE GM
CALIBRATION DATA SHEET

ATG

Barcode #: M146456Serial #: 130326

HP #: _____

As-Found Radiological Response

Temperature: _____ °C		Pass Fail		Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: _____ mm Hg	Visual: ☐			⁹⁹ Tc	0.12 µCi	-	
Humidity: _____ %	Battery: ☐			³⁶ Cl	0.08 µCi	-	
Thermometer ID#: _____	High Voltage: ☐			⁹⁰ Sr-Y	0.03 µCi	-	
Barometer ID#: _____	Alarm: ☐			¹³⁷ Cs	0.1 mR/h	-	
Hygrometer ID#: _____	Reset: ☐				1.0 mR/h	-	
Beta Set: _____	Response: ☐				10 mR/h	-	
Performed By: <u>882</u>	Background: _____ cpm						
Date: <u>9-30-97</u>							

Radiological Calibration

Temperature: <u>24</u> °C		Pass Fail		Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u>736</u> mm Hg	Visual: ☒			¹⁴⁷ Pm	0.25 µCi	2,100 - 2,600	2,200
Humidity: <u>47</u> %	Battery: ☒			⁹⁹ Tc	0.12 µCi	12,800 - 15,700	13,000
Thermometer ID#: <u>M139839</u>	High Voltage: ☒			³⁶ Cl	0.08 µCi	25,300 - 31,000	26,000
Barometer ID#: <u>1</u>	Audio: ☒			⁹⁰ Sr-Y	0.03 µCi	14,700 - 18,000	15,000
Hygrometer ID#: <u>1</u>	Alarm: <u>N/A</u>			¹³⁷ Cs	0.1 mR/h	225 - 275	260
Beta Set: <u>1</u>	Reset: ☒				1.0 mR/h	2,250 - 2,750	2,500
¹³⁷ Cs Source: <u>10182</u>	Reproducibility: ☒				10 mR/h	22,500 - 27,500	23K
Background: <u>40</u> cpm	Overload: ☒			Trial 2	10 mR/h	22,500 - 27,500	23K
Performed By: <u>882</u>				Trial 3	10 mR/h	22,500 - 27,500	23K
Date: <u>9-30-97</u>							

Performance Validation

Temperature: <u>23</u> °C		Pass Fail		Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u>736</u> mm Hg	Visual: ☒			¹³⁷ Cs	0.1 mR/h	225 - 275	270
Humidity: <u>50</u> %	Battery: ☒				1.0 mR/h	2,250 - 2,750	2600
Thermometer ID#: <u>M139839</u>	High Voltage: ☒				10 mR/h	22,500 - 27,500	25K
Barometer ID#: <u>1</u>	Audio: ☒						
Hygrometer ID#: <u>1</u>	Alarm: <u>N/A</u>						
¹³⁷ Cs Source: <u>10182</u>	Reset: ☒						
Background: <u>40</u> cpm	Response: ☒						
Performed By: <u>882</u>							
Date: <u>9-30-97</u>							

Remarks: _____

Reviewed By: KLSDate: 9-30-97

NON-HPIC INSTRUMENT **PANCAKE PROBE GM**
CALIBRATION DATA SHEET

ATG

Barcode #: M146458Serial #: 97901

HP #: _____

As-Found Radiological Response

Temperature: _____ °C	Pass/Fail	Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: _____ mm Hg	Visual: ☐	⁹⁹ Tc	0.12 µCi	-	
Humidity: _____ %	Battery: ☐	³⁸ Cl	0.08 µCi	-	
Thermometer ID#: _____	High Voltage: ☐	⁹⁰ Sr-Y	0.03 µCi	-	
Barometer ID#: _____	Audio: ☐	¹³⁷ Cs	0.1 mR/h	-	
Hygrometer ID#: _____	Alarm: ☐		1.0 mR/h	-	
Beta Set: _____ ¹³⁷ Cs Source: _____	Reset: ☐		10 mR/h	-	
Performed By: <u>BBZ</u>	Response: ☐				
Date: <u>9-30-97</u>	Background: _____ cpm				

Radiological Calibration

Temperature: <u>23</u> °C	Pass/Fail	Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u>736</u> mm Hg	Visual: ☒	¹⁴⁷ Pm	²² 0.05 µCi	2,100 - 2,600	2400
Humidity: <u>48</u> %	Battery: ☒	⁹⁹ Tc	0.12 µCi	12,800 - 15,700	14,000
Thermometer ID#: <u>M139839</u>	High Voltage: <u>N/A</u>	³⁸ Cl	0.08 µCi	25,300 - 31,000	28,000
Barometer ID#: <u>↓</u>	Audio: ☒	⁹⁰ Sr-Y	²⁰² 0.03 µCi	14,700 - 18,000	17,000
Hygrometer ID#: <u>↓</u>	Alarm: <u>N/A</u>	¹³⁷ Cs	0.1 mR/h	225 - 275	260
Beta Set: <u>1</u> ¹³⁷ Cs Source: <u>10182</u>	Reset: ☒		1.0 mR/h	2,250 - 2,750	2,500
Background: <u>30</u> cpm	Reproducibility: ☒		10 mR/h	22,500 - 27,500	22,500
Performed By: <u>BBZ</u>	Overload: ☒	Trial 2	10 mR/h	22,500 - 27,500	22,500
Date: <u>9-30-97</u>		Trial 3	10 mR/h	22,500 - 27,500	22,500

Performance Validation

Temperature: <u>23</u> °C	Pass/Fail	Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u>736</u> mm Hg	Visual: ☒	¹³⁷ Cs	0.1 mR/h	225 - 275	260
Humidity: <u>50</u> %	Battery: ☐		1.0 mR/h	2,250 - 2,750	2,500
Thermometer ID#: <u>M139839</u>	High Voltage: ☒		10 mR/h	22,500 - 27,500	22,500
Barometer ID#: <u>↓</u>	Audio: ☒				
Hygrometer ID#: <u>↓</u>	Alarm: <u>N/A</u>				
¹³⁷ Cs Source: <u>10182</u>	Reset: ☒				
Background: <u>30</u> cpm	Response: ☒				

Performed By: BBZDate: 9-30-97

Remarks: _____

Reviewed By: KLSDate: 9-30-97

NON-HPIC INSTRUMENT **PANCAKE PROBE GM**
CALIBRATION DATA SHEET

ATG

Barcode #: M146460Serial #: 125261

HP #: _____

As-Found Radiological Response

Temperature: _____ °C
 Pressure: _____ mm Hg
 Humidity: _____
 Thermometer ID#: _____
 Barometer ID#: _____
 Hygrometer ID#: _____
 Beta Set: _____ ¹³⁷Cs Source: _____
 Performed By: SBZ
 Date: 9-30-97

Pass Fail

Visual: ☐Battery: ☐Voltage: ☐Audio: ☐Alarm: ☐Reset: ☐Response: ☐

Background: _____ cpm

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
⁹⁹ Tc	0.12 µCi	-	
³⁸ Cl	0.08 µCi	-	
⁹⁰ Sr-Y	0.03 µCi	-	
¹³⁷ Cs	0.1 mR/h	-	
	1.0 mR/h	-	
	10 mR/h	-	

Radiological Calibration

Temperature: 23 °C
 Pressure: 736 mm Hg
 Humidity: 48 %
 Thermometer ID#: M139839
 Barometer ID#: ↓
 Hygrometer ID#: ↓
 Beta Set: 1 ¹³⁷Cs Source: 10182
 Background: 40 cpm
 Performed By: SBZ
 Date: 9-30-97

Pass Fail

Visual: ☒Battery: ☒High Voltage: ☒Audio: ☒Alarm: N/AReset: ☒Reproducibility: ☒Overload: ☒

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹⁴⁷ Pm	<u>202 0.05</u> <u>2.97 0.11</u> µCi	<u>2,100 - 2,600</u>	<u>2,200</u>
⁹⁹ Tc	0.12 µCi	<u>12,800 - 15,700</u>	<u>13,000</u>
³⁸ Cl	0.08 µCi	<u>25,300 - 31,000</u>	<u>25,500</u>
⁹⁰ Sr-Y	<u>102 0.02</u> <u>147 0.08</u> µCi	<u>14,700 - 18,000</u>	<u>16,000</u>
¹³⁷ Cs	0.1 mR/h	<u>225 - 275</u>	<u>260</u>
	1.0 mR/h	<u>2,250 - 2,750</u>	<u>2,400</u>
	10 mR/h	<u>22,500 - 27,500</u>	<u>22.5K</u>
Trial 2	10 mR/h	<u>22,500 - 27,500</u>	<u>22.5K</u>
Trial 3	10 mR/h	<u>22,500 - 27,500</u>	<u>22.5K</u>

Performance Validation

Temperature: 23 °C
 Pressure: 736 mm Hg
 Humidity: 50 %
 Thermometer ID#: M139835
 Barometer ID#: ↓
 Hygrometer ID#: ↓
¹³⁷Cs Source: 10182
 Background: 40 cpm

Pass Fail

Visual: ☒Battery: ☒High Voltage: ☒Audio: ☒Alarm: N/AReset: ☒Response: ☒

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹³⁷ Cs	0.1 mR/h	<u>225 - 275</u>	<u>260</u>
	1.0 mR/h	<u>2,250 - 2,750</u>	<u>2,400</u>
	10 mR/h	<u>22,500 - 27,500</u>	<u>23K</u>

Performed By: SBZDate: 9-30-97

Remarks: _____

Reviewed By: ASDate: 9-30-97

NON-APL
INSTRUMENT

RADIOLOGICAL CALIBRATION DATA SHEET

Barcode #: M146455Serial #: 100357HP #: ATGDetector Type: MODEL 3 BEAR CLAW

As-Found Radiological Response

Pass/Fail		Response Verification					As-Found Efficiency (%)
Temperature: _____ °C	Visual: ☐	Range	Source Number	Activity (dpm)	Response (cpm)	Efficiency (%)	
Pressure: _____ mm Hg	Battery: ☐	X1	5793	2,230			
Humidity: _____ %	Audio: ☐	X10	9735	18,200			
Thermometer ID#: _____	Alarm: ☐	X100	9101	176,000			
Barometer ID#: _____	Reset: ☐	X1000	9105	2,480,000			
Hygrometer ID#: _____	Background: ☐	Scaler	9735	18,200			
	Response: ☐						
	Cal. Factor: ☐						

Performed By: SBZDate: 9-24-97

NON-APL INSTRUMENT

Radiological Calibration

Pass/Fail		Response Test/Efficiency Determination					Average Efficiency
Temperature: <u>23</u> °C	Visual: ☒	Range	Source Number	Activity (dpm)	Response (cpm)	Efficiency (%)	
Pressure: <u>736</u> mm Hg	Battery: ☒	X1	5793	2,230	<u>320</u>	<u>14</u>	
Humidity: <u>50</u> %	Gamma Ref: ☒	X10	9735	18,200	<u>2300</u>	<u>13</u>	
Thermometer ID#: <u>M139839</u>	Audio: ☒	X100	9101	176,000	<u>23K</u>	<u>13</u>	
Barometer ID#: <u>↓</u>	Alarm: <u>N/A</u>	X1000	9105	2,480,000	<u>310K</u>	<u>13</u>	
Hygrometer ID#: <u>↓</u>	Reset: ☒	Scaler	9735	18,200	<u>N/A</u>	<u>→</u>	
	Background: ☒						
	Response: ☒						
	Reproducibility: ☒						
	Uniformity: ☒						

Calibration Factor Determination			
100 cm ² Source Number	Activity (dpm)	Response (cpm)	Cal. Factor

Reproducibility/Uniformity Test			
Position	Activity (dpm)	Acceptance Range (cpm)	Response (cpm)
Center ₂	176,000	<u>20.7K - 25.3K</u>	<u>23K</u>
Center ₃			<u>23K</u>
Corner 1/Heel			<u>23K</u>
Corner 2/Toe			<u>23K</u>
Corner 3*			<u>—</u>
Corner 4*			<u>—</u>

* For beermug probes only.

Performed By: SBZDate: 9-30-97

Performance Validation

Pass/Fail		Response Verification					Calibration Efficiency (%)
Temperature: <u>23</u> °C	Visual: ☒	Range	Source Number	Activity (dpm)	Response (cpm)	Efficiency (%)	
Pressure: <u>736</u> mm Hg	Battery: ☒	X1	5793	2,230	<u>300</u>	<u>13</u>	
Humidity: <u>48</u> %	Audio: ☒	X10	9735	18,200	<u>24K</u>	<u>13</u>	
Thermometer ID#: <u>M139839</u>	Alarm: <u>NA</u>	X100	9101	176,000	<u>23K</u>	<u>13</u>	
Barometer ID#: <u>↓</u>	Reset: ☒	X1000	9105	2,480,000	<u>310K</u>	<u>13</u>	
Hygrometer ID#: <u>↓</u>	Background: ☒	Scaler	9735	18,200	<u>NA</u>	<u>—</u>	
	Response: ☒						
	Cal. Factor: <u>NA</u>						

Calibration Factor Verification				
100 cm ² Source #	Activity (dpm)	Cal. Factor	Acceptance Range (cpm)	Response (cpm)

Performed By: SBZDate: 9-30-97marks: EFFICIENCIES ARE ABSOLUTE EFFICIENCIES AND HAVE NOT BEEN CORRECTED FOR PROBE AREA.Reviewed By: KBDate: 9-30-97

NON-HPIC INSTRUMENT

PANCAKE PROBE GM
CALIBRATION DATA SHEET

ATG

Barcode #: M146461

Serial #: 121265

HP #:

As-Found Radiological Response

Temperature: °C	Pressure: mm Hg	Humidity: %	Thermometer ID#:	Barometer ID#:	Hygrometer ID#:	Beta Set: ¹³⁷ Cs Source:	Performed By: <u>882</u>	Date: <u>9-30-97</u>	Background: cpm	Pass Fail	Visual:	Battery:	High Voltage:	Audio:	Alarm:	Reset:	Response:

NOT REQUIRE NEW INSTRUMENT

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
⁹⁹ Tc	0.12 µCi	-	
³⁸ Cl	0.08 µCi	-	
⁹⁰ Sr-Y	0.03 µCi	-	
	0.1 mR/h	-	
¹³⁷ Cs	1.0 mR/h	-	
	10 mR/h	-	

Radiological Calibration

Temperature: 23 °C	Pressure: 736 mm Hg	Humidity: 49 %	Thermometer ID#: M139839	Barometer ID#:	Hygrometer ID#:	Beta Set: 1	¹³⁷ Cs Source: 10182	Performed By: <u>882</u>	Date: <u>9-30-97</u>	Background: 40 cpm	Reproducibility:	Overload:	Pass Fail	Visual:	Battery:	High Voltage:	Audio:	Alarm:	Reset:	Response:

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹⁴⁷ Pm	0.05 µCi	2,100 - 2,600	2,400
⁹⁹ Tc	0.12 µCi	12,800 - 15,700	14,000
³⁸ Cl	0.08 µCi	25,300 - 31,000	27,000
⁹⁰ Sr-Y	0.03 µCi	14,700 - 18,000	17,000
	0.1 mR/h	225 - 275	270
¹³⁷ Cs	1.0 mR/h	2,250 - 2,750	2,600
	10 mR/h	22,500 - 27,500	24K
Trial 2	10 mR/h	22,500 - 27,500	24K
Trial 3	10 mR/h	22,500 - 27,500	24K

Performance Validation

Temperature: 23 °C	Pressure: 736 mm Hg	Humidity: 50 %	Thermometer ID#: M139839	Barometer ID#:	Hygrometer ID#:	¹³⁷ Cs Source: 10182	Background: 40 cpm	Performed By: <u>882</u>	Date: <u>9-30-97</u>	Pass Fail	Visual:	Battery:	High Voltage:	Audio:	Alarm:	Reset:	Response:

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
	0.1 mR/h	225 - 275	260
¹³⁷ Cs	1.0 mR/h	2,250 - 2,750	2500
	10 mR/h	22,500 - 27,500	23K

Remarks:

Reviewed By: 165Date: 9-30-97

BIGRON-SURVEYOR-MX7 PANCAKE PROBE CALIBRATION DATA SHEET

Nov-Dec 97

Barcode #: M146520Serial #: 100356HP #: ATG (Model 3)

As-Found Radiological Response

Temperature: <u> </u> °C		Visual:	Pass	Fail	Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u> </u> mm Hg	Humidity: <u> </u> %	Battery:			⁹⁹ Tc	0.12 µCi	12,800 - 15,700	
Thermometer ID#: <u>M139839</u>	High Voltage:				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	
Barometer ID#: <u>M139839</u>	Audio:				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	
Hygrometer ID#: <u>M139839</u>	Alarm:				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	
Beta Source Set: <u>1</u>	Reset:				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	
¹³⁷ Cs Source: <u>10182</u>	Response:				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	
Background: <u> </u> cpm					⁹⁹ Tc	0.12 µCi	12,800 - 15,700	

NOT REQUIRED
NEW INSTRUMENT

Performed By: SBZDate: 12-2-97

Radiological Calibration

Temperature: <u>27</u> °C		Visual:	Pass	Fail	Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u>744</u> mm Hg	Humidity: <u>26</u> %	Battery:			¹⁴⁷ Pm	0.04 µCi	2,000 - 2,500	<u>2100</u>
Thermometer ID#: <u>M139839</u>	High Voltage: <u>N/A</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
Barometer ID#: <u>M139839</u>	Audio: <u>✓</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
Hygrometer ID#: <u>M139839</u>	Alarm: <u>N/A</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
Beta Source Set: <u>1</u>	Reset: <u>✓</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
¹³⁷ Cs Source: <u>10182</u>	Response: <u>✓</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
Background: <u>50</u> cpm	Reproducibility: <u>✓</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
	Overload: <u>✓</u>				⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
Performed By: <u>SBZ</u>					⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>
Date: <u>12-2-97</u>					⁹⁹ Tc	0.12 µCi	12,800 - 15,700	<u>15,000</u>

Non-HPIC
Non-DRAW Instrument

Performance Validation

Temperature: <u>24</u> °C		Visual:	Pass	Fail	Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
Pressure: <u>744</u> mm Hg	Humidity: <u>30</u> %	Battery:			¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Thermometer ID#: <u>M139839</u>	High Voltage: <u>N/A</u>				¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Barometer ID#: <u>M139839</u>	Audio: <u>✓</u>				¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Hygrometer ID#: <u>M139839</u>	Alarm: <u>N/A</u>				¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Beta Source Set: <u>1</u>	Reset: <u>✓</u>				¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
¹³⁷ Cs Source: <u>10182</u>	Response: <u>✓</u>				¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Background: <u>50</u> cpm					¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Performed By: <u>SBZ</u>					¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>
Date: <u>12-2-97</u>					¹³⁷ Cs	0.1 mR/h	225 - 275	<u>260</u>

marks: * Performed with no alarm capability.

Reviewed By: Daniel D. ColungaDate: 12/2/97

PANCAKE PROBE GM CALIBRATION DATA SHEET

ATG
Model 12

Barcode #: _____

Serial #: 121349

HP #: _____

As-Found Radiological Response

Temperature: _____ °C
Pressure: _____ mm Hg
Humidity: _____ %
Thermometer ID#: _____
Barometer ID#: _____
Hygrometer ID#: _____
Beta Set: _____ ¹³⁷Cs Source: _____
Performed By: BB
Date: 8/14/97

Visual: ☐
Battery: ☐
High Voltage: ☐
Audio: ☐
Alarm: ☐
Reset: ☐
Response: ☐
Background: _____ cpm

First ORNL CRI.

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
⁹⁹ Tc	0.12 µCi	-	
³⁶ Cl	0.08 µCi	-	Non
⁹⁰ Sr-Y	0.03 µCi	-	ORNL
¹³⁷ Cs	0.1 mR/h	-	
	1.0 mR/h	-	
	10 mR/h	-	

Radiological Calibration

Temperature: 24 °C
Pressure: 742 mm Hg
Humidity: 67 %
Thermometer ID#: M139839
Barometer ID#: J
Hygrometer ID#: J
Beta Set: 1 ¹³⁷Cs Source: 10182
Performed By: BB
Date: 8/16/97

Visual: ☒
Battery: ☒
High Voltage: ☒
Audio: ☒
Alarm: N/A
Reset: ☒
Response: ☒
Reproducibility: ☒
Overload: ☒

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹⁴⁷ Pm	0.11 µCi	-	2400
⁹⁹ Tc	0.12 µCi	-	14,000
³⁶ Cl	0.08 µCi	-	26,000
⁹⁰ Sr-Y	0.03 µCi	-	17,000
¹³⁷ Cs	0.1 mR/h	-	260
	1.0 mR/h	-	2500
	10 mR/h	-	23K
Trial 2	10 mR/h	-	24K
Trial 3	10 mR/h	-	24K

Performance Validation

Temperature: 24 °C
Pressure: 741 mm Hg
Humidity: 61 %
Thermometer ID#: M139839
Barometer ID#: J
Hygrometer ID#: J
¹³⁷Cs Source: 10182
Background: 50 cpm
Performed By: BB
Date: 8-18-97

Visual: ☒
Battery: ☒
High Voltage: ☒
Audio: N/A
Alarm: N/A
Reset: ☒
Response: ☒

Source	Current Source Strength	Acceptance Range (net cpm)	Instrument Response (net cpm)
¹³⁷ Cs	0.1 mR/h	-	260
	1.0 mR/h	-	2500
	10 mR/h	-	24K

Remarks: _____

Reviewed By: KZRDate: 18 AUG 97

Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ALLIED TECHNOLOGY GROUP

ORDER NO. 204096/227497

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 121399

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR128054

Cal. Date 07/10/97 Cal Due Date 01/10/98 Cal. Interval 6 Months Meterface 202-356

Check mark ☒ applies to applicable Instr. and/or detector IAW mfg. spec. T. 73 °F RH 43 % Alt. 703.8 mm Hg

☐ New Instrument ☐ Instrument Received ☐ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☒ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearly

☒ F/S Resp. ck. ☒ Reset ck. ☐ Window Operation ☒ Geotropism

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 2.2 VDC

☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold
Dial Ratio = mV

☒ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2010 / 2000 V

COMMENTS:

General Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400 K cpm		400
X 1000	100 K cpm		100
X 100	40 K cpm		400
X 100	10 K cpm		100
X 10	4 K cpm		400
X 10	1 K cpm		100
X 1	400 cpm		400
X 1	100 cpm		100

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

All Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cr-137 Gamma S/N ☐ 1162 ☒ G112 ☐ M545 ☐ S105 ☐ T1008 ☐ T879 ☐ E552 ☒ E551 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☒ m 500 S/N 54683 ☐ Oscilloscope S/N ☒ Multimeter S/N 57770262

Calibrated By: Vij P. Trocki Date 7-10-97

Reviewed By: Rhonda Hannon Date 7-14-97

Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG

ORDER NO. 226657

Mfg. Ludlum Measurements, Inc. Model 12 Serial No. 121399 (121349)

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR 128 061

Cal. Date 5-27-97 Cal. Due Date 11-27-97 Cal. Interval 6 Months Meterface 202-356

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 45 % Alt. 697.8 mm Hg

☐ New Instrument ☐ Instrument Received ☒ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity

☒ F/S Resp. ck. ☒ Reset ck. ☐ Window Operation ☒ Geotrapism

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 2.2 VDC

☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold mV

☒ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1500 / 1895 V

COMMENTS:

General Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400 K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45462A and ANSI N323-1978. State of Texas Calibration License No. 10-1963

Reference Instruments and/or Sources:

Ci-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ S105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551

☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☒ m 500 S/N 54663 ☐ Oscilloscope S/N ☒ Multimeter S/N 57770262

Calibrated By: Vij P. Rastogi Date 5-27-97

Reviewed By: Kurt B. Rastogi Date 5/28/97

Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ATG ORDER NO. 226657
Co. Ludlum Measurements, Inc. Model 12 Serial No. 103326
Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR133259
Cal. Date 5-27-97 Cal Due Date 11-27-97 Cal. Interval 6 Months Meterface 202-356
Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 45 % Alt 697.8 mm Hg
☐ New Instrument ☐ Instrument Received ☒ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments
☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☒ F/S Resp. ck. ☒ Reset ck. ☐ Window Operation ☒ Geotropism
☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 22 VDC
☒ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 12/19/89.
Instrument Volt Set 900 V Input Sens. 36 mV Del. Oper. 900 V at 36 mV Threshold mV
☒ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1500 / 1500 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400 K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	370	400
X 10	1 K cpm	95	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45442A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ Neutron Am-241 Be S/N T-304
☐ Alpha S/N ☐ Beta S/N ☐ Other ☐
☒ m 500 S/N 54683 ☐ Oscilloscope S/N ☒ Multimeter S/N 57710262
Calibrated By: Vijay Patrochi Date 5-27-97
Reviewed By: Michael S. Schaffer Date 5/28/97
FORM C22A 05/13/97

APPENDIX D

**OFF-SITE SHIPMENT APPROVAL RECEIPTS
AND RECYCLED MATERIAL**

LOCKHEED MARTIN

Memorandum

Date: December 12, 1997

To: S. A. Hutton

cc: W. P. Carlton, T. K. Cothron, T. W. Morris, R. W. Oliver, T. P. A. Perry,
A. D. Reynolds, L. B. Rodens, M. L. Whitehead, EC Document Center-RC,
File-CLS

From: T. W. Morris, K-1001, MS-7123, 241-4921
C. L. Stair, 9116, MS-8098, 576-8006

Subject: Shipment of Scrap Metal from Old Hydrofracture Facility Demolition (98-35A)

Based upon our review of the shipment proposal information submitted to this office, approval is granted to ship scrap metal in Roll-Off Bin/Load Number 1 (consisting primarily of metal from the upper levels of material/grout storage bins 1 and 4 and auxiliary structural supports from all four material/grout storage bins) to the approved recycling vendor. This approval is based on our receipt of documentation that the conditions in Conrad Stair's 11/25/97 memorandum to you have been met for the aforementioned scrap metal.

CLS:TKC:ag

LOCKHEED MARTIN

Memorandum

Date: December 19, 1997

To: S. A. Hannon

cc: W. P. Carlton, T. K. Cothron, T. W. Morris, R. W. Oliver, T. P. A. Perry,
A. D. Reynolds, L. B. Rodems, M. L. Whitehead, EC Document Center-RC,
File-CLS

From: T. W. Morris, K-1001, MS 7123, 241-4921
C. L. Stair, 9116, MS 8098, 576-8006

Subject: Shipment of Scrap Metal from Old Hydrofracture Facility Demolition (98-35B)

Based upon our review of the shipment proposal information submitted to this office, approval is granted to ship scrap metal in Roll-Off Bin/Load Number 2 (consisting primarily of metal from the bodies of material/grout storage bins 1 and 2, auxiliary structural supports, and two ladders) to the approved recycling vendor. This approval is based on our receipt of documentation that the conditions in Conrad Stair's November 25, 1997, memorandum to you have been met for the aforementioned scrap metal.

CLS:TKC:lr

LOCKHEED MARTIN

Memorandum

Date: January 5, 1998

To: S. A. Herron

c: W. P. Carlton, T. K. Cothran, T. W. Morris, R. W. Oliver, T. P. A. Perry,
A. D. Reynolds, L. B. Rodema, M. L. Whitehead, EC Document Center-RC,
File-CLS

From: T. W. Morris, K-1001, MS 7123, 241-4921
C. L. Stair, 9116, MS 8098, 576-8006

From: Shipment of Scrap Metal from Old Hydrofracture Facility Demolition (98-35C)

Based upon our review of the shipment proposal information submitted to this office, approval is granted to ship scrap metal in Roll-Off Bin/Load Number 3 (consisting primarily of metal from the bodies of material/grout storage bins 2 and 3, with some support and cone parts) to the approved recycling vendor. This approval is based on our receipt of documentation that the conditions in Conard Stair's November 25, 1997, memorandum to you have been met for the aforementioned scrap metal.

CLS:TKC:lr

Subject:

LOCKHEED MARTIN

Memorandum

Date: January 6, 1998

To: S. A. Herron

c: W. P. Carlton, T. K. Cothron, T. W. Morris, R. W. Oliver, T. P. A. Perry,
A. D. Reynolds, L. B. Rodems, ~~EC Document Center-RC~~, EC Document Center-RC,
File-CLS

From: T. W. Morris, K-1001, MS 7123, 241-4921
C. L. Stair, 9116, MS 8098, 576-8006

Subject: Shipment of Scrap Metal from Old Hydrofracture Facility Demolition (98-35D)

Based upon our review of the shipment proposal information submitted to this office, approval is granted to ship scrap metal in Roll-Off Bin/Load Number 4 (consisting primarily of metal from the body of material/grout storage bin 3) to the approved recycling vendor. This approval is based on our receipt of documentation that the conditions in Conard Stair's November 25, 1997, memorandum to you have been met for the aforementioned scrap metal.

CLS:TKC:lr

LOCKHEED MARTIN

Memorandum

Date: December 7, 1998

To: S. A. Herron

c: W. P. Carlton, T. K. Cothron, T. W. Morris, R. W. Oliver, T. P. A. Perry,
A. D. Reynolds, L. B. Rodems, ~~Conard Stair~~, EC Document Center-RC,
File-CLS

From: T. W. Morris, K-1001, MS 7123, 241-4921
C. L. Stair, 9116, MS 8092, 576-8006

Subject: Shipment of Scrap Metal from Old Hydrofracture Facility Demolition (98-35E)

Based upon our review of the shipment proposal information submitted to this office, approval is granted to ship scrap metal in Roll-Off Bin/Load Number 5 (consisting primarily of stainless steel) to the approved recycling vendor. This approval is based on our receipt of documentation that the conditions in Conard Stair's November 25, 1997, memorandum to you have been met for the aforementioned scrap metal.

CLS:TKC:lr

02-05 98 14:26

T:SOUKSL 423 882 1413 P:02

Southern Salvage Scrap Metals, Inc.

903 W. Carter Ave.
P. O. Box 291
Harriman, Tennessee 37748
Phone (423) 882-5669 - FAX (423) 882-1413

Feb. - 5, 1998

See Reference to Ticket # 32598

Load #1 Has a Net Weight of 8,660 LBS
at \$94.00 per Gross ton vs Paid at \$363.41

Load #2 Has a Net Weight of 8,640 LBS
at .18¢ per LB. vs Paid at \$1,555.20

Load #2 was Reduced in Weight of 800 LBS
for Steel, With the Steel attached to
the Stainless the price would have been
around .08¢ per LB. My Company Removed
the Excess Steel to Clean your material to
hold the Price we quoted, for Clean material.

SOUTHERN SALVAGE SCRAP METALS, INC.

Lower Carter Street
P.O. Box 291
HARRIMAN, TENNESSEE 37748
Phone 882-5669

Name ATG Date 1-9-98

Address ONK Ridge
Unpld St.

COMMODITY
GROSS 39420 lbs.
TARE 30760 lbs. PRICE AMOUNT
NET 8660 lbs. 94.00 \$ 363.41

COMMODITY
GROSS _____ lbs.
TARE _____ lbs. PRICE AMOUNT
NET _____ lbs. \$ _____

COMMODITY
GROSS 41040 lbs. PRICE AMOUNT
TARE 31600 lbs. .18 \$ 1555.20
NET 9440 lbs. TOTAL 1918.61
No. 32598 800
8640 HERE

We Will Not Be Responsible For
Damage To Trucks While Unloading

02-05 98 14:27

T:SOU*SA 423 882 1413 P:03

Southern Salvage Scrap Metals, Inc.

903 W. Carter Ave.

P. O. Box 291

Harriman, Tennessee 37748

Phone (423) 882-5669 - FAX (423) 882-1413

Feb. 5, 1998

in Reference to Ticket # 32105

Load #1 has a Net weight of 12,620 LBS
at \$94.00 per Gross tons in Paid at \$529.58

Load #2 has a Net weight of 8,980 LBS at
\$94.00 per Gross tons in Paid at \$376.83

Load #3 has a Net weight of 13,960 LBS at
\$94.00 per Gross tons in Paid at \$585.82

The Net Weights on ticket #32105 is
Divided by 2240 (Gross Ton) and Multiplied
by \$94.00 (Price)

SOUTHERN SALVAGE SCRAP METALS, INC.

Lower Carter Street
P.O. Box 291
HARRIMAN, TENNESSEE 37748
Phone 882-5669

Name ATG Date Dec 23 1997

Address OAK Ridge

Unprod STL
COMMODITY

12/ GROSS 45300 lbs.
123 TARE 32680 lbs. PRICE AMOUNT
NET 12620 lbs. 94/100 \$ 529.58

Unprod STL
COMMODITY

1/5 GROSS 40360 lbs.
TARE 31380 lbs. PRICE AMOUNT
NET 8980 lbs. 94/100 \$ 376.83

Unprod STL
COMMODITY

1/6 GROSS 47820 lbs. PRICE AMOUNT
TARE 33860 lbs. 94/100 \$ 585.82
NET 13960 lbs. TOTAL 1492.23

No 32105 x _____
SIGN HERE

We Will Not Be Responsible For
Damage To Trucks While Unloading

DISTRIBUTION

1. T. W. Burwinkle
2. T. J. Cofer
3. S. A. Herron
4. S. L. Laman
5. P. T. Owen
6. L. B. Raulston
7. A. D. Reynolds
8. M. L. Whitehead
9. Central Research Library
10. File—EMEF DMC—RC

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Sponsor Code (18)

DOE/EM, XF

UC Category (19)

UC-2000, DOE/ER

DOE