SITE SPECIFIC DECOMMISSIONING COST ESTIMATE REPORT

of the facilities located at

202 Medical Center Boulevard, Webster, TX

&

9320 Tavenor Street, Houston, TX

Formally Operated by
Gulf Nuclear of Louisiana

October 18, 2001

Prepared For:

The Honorable Wesley W. Steen
U.S. Bankruptcy Judge
United States Bankruptcy Court
Southern District of Texas
515 Rusk Avenue
Houston, Texas 77002

Prepared By:

USEcology

109 Flint Road
Oak Ridge, TN 37830

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1.0 INTRODUCTION

This site specific Decommissioning Cost Estimate Report (DCER) provides the information needed to identify site hazards and to select worker protection methods during subsequent clean-up activities. The more accurate, detailed, and comprehensive the information available about the site, the more the protective measures can be tailored to the actual hazards that workers may encounter.

US Ecology was issued an "Engagement Letter" by the U.S. Bankruptcy Judge, United States Bankruptcy Court, Southern District of Texas dated August 20, 2001 containing authorization to proceed with the work referred to in the letter.

This report contains a summary of the characterization performed at Gulf Nuclear of Louisiana's Webster and Tavenor, Texas Facilities by US Ecology of Oak Ridge, Tennessee between September 4, 2001 and September 10, 2001. This report has been provided to the below listed court on the date of October 18, 2001.

The Honorable Wesley W. Steen
U.S. Bankruptcy Judge
United States Bankruptcy Court
Southern District of Texas

The Webster Facility began operations in 1971, primarily supplying radioactive tracers to the oil field industry. Over the next few years, operations expanded to include Am-241 neutron sources, Cs-137 sources and Ir-192 radiography sources. Many radioisotopes, such as Co-60 and Ra-226, were used in manufacturing products used primarily in the oil field industry.

Operations began as Nuclear Environmental Engineering Incorporated and operated as NEEI for several years. The name was changed to Gulf Nuclear and eventually to the GNI Group, Inc. ("GNI"). The facility and its radioactive business was sold and the facility was then operated by a third-party as Gulf Nuclear, Inc. Several years later, the facilities were returned by the third-party owner to the GNI organization under the name of Gulf Nuclear of Louisiana, Inc.

At the time of this survey, the facilities were not in operation and had been shut down for several years. The general condition of the site is that of disarray and untidiness. No security personnel are located at either facility.

1.1 Purpose

The following text is an excerpt from the State of Texas "Guidelines for Preparing a Decommissioning Cost Estimate Report (DCER). US Ecology prepared this DCER using guidance from this document.

The purpose of the DCER is to determine the proper amount of financial assurance for decommissioning the licensed facilities. In preparing the DCER, one should assume that the Texas Department of Health will engage a party other than the licensee to decommission the facility. The party must be specifically licensed by either the Texas Department of Health or the United States Nuclear Regulatory Commission or an Agreement State to possess and/or use the radioactive material encountered at the facility to be decommissioned and is authorized to perform decontamination of equipment and facilities at temporary job sites. If the party is not already licensed by the TDH to engage in such work, then the cost of either obtaining such a license or the cost of obtaining reciprocal recognition of their out of state license should be included in the cost estimate.

If the person engaged to perform the decommissioning of the facility is not a licensee within the Houston area, then the cost estimate should include the cost for travel to and from the Houston area, lodging and meals in the Houston area for the duration of the decommissioning effort, and the cost for local transportation.

The DCER should identify the classifications of personnel who will be needed to decommission the facility and their rate of compensation. For example:

Position	Compensation
Supervising Health Physicists	$XX/hr
Health Physicist Technician	$XX/hr
Laborer	$XX/hr
Clerical	$XX/hr

The DCER should estimate the amount of time and the staff needed to review both the Texas Department of Health license file on the licensee's operations and history and the licensee's own records to determine the radioactive material which the licensee may have possessed, where it was used and where loss of control of the material occurred.

In estimating the amount of time, staff and equipment needed to begin radiological characterization of the licensee's facility, the following should be done:

1. Identify each building, room or area in a building (including closets), and areas outside buildings that comprise the facility.

2. Provide the dimensions of each building, room or area in a building, and areas outside buildings at the facility.

3. Describe the nature of the construction of the floor, walls, and ceiling of each room or area in a building.

4. Identify the contents of each room or area in a building and areas outside buildings at the facility.

5. Identify the location of each plumbing feature (e.g., floor drains, sinks, commodes,

shower stalls, washing machine drains, etc.) in each room or area in a building or area outside buildings at the facility with a connection to either a sanitary sewerage or septic tank or holding tank.

6. Identify the location of each ventilation intake register and duct work in each room or area in a building.

7. Identify the location of each air handling system in each room or area in a building. This includes blower units, filter units and discharge ducting and outlets.

8. Identify the radiological monitoring/detection equipment needed to characterize the facility.

The DCER should systematically assess the cost for decommissioning the facility by tabulating for each room or area in a building, and for each area outside a building the type of surveys performed, the personnel to be used, the amount of time estimated to perform the surveys and the cost for such, the type of analytical services needed (if required, such as wipe sample analysis, soil sample analysis, or chemical analysis), an estimate of the radionuclides and activity expected, and an estimate of the volume of waste and the waste form.

The DCER should identify the type of decontamination methodology that will be needed for specific areas (e.g., rooms) or features (e.g., glove boxes) at the facility, or if demolition will be the prefered management methodology, and the equipment needed for each and the type of personnel to be engaged to conduct. The cost for these should be estimated for each area.

The DCER should identify the type and number of containers needed for the waste generated in decommissioning and the total cost and cost per container, and vendor for the containers.

The DCER should identify the disposal facility to which specific waste can be sent for disposal and provide the estimated cost for such. The cost estimate should include the details of the disposal cost estimate, packaging of the waste, surveying and labeling of the waste containers, loading of the waste on to transport vehicles, survey and placarding of the vehicles, preparation of the required shipping papers and manifest, and the cost for transport to the disposal site.

If waste cannot be disposed of at a current disposal facility, the DCER should identify the waste waste as to radionuclide(s) and volume and a plan stated for management of the waste. The plan for management of the waste should describe how the waste is stored, where it is stored, how it is secured, how it is monitored to preclude unauthorized entry to the storage area and/or removal of the material, how it is to be protected against flood, fire and wind, and an estimate of the cost for each of the aforementioned and ultimate disposal.

The DCER should identify the type of program (i.e., computer code) that will be utilized to demonstrate that the facility will meet the 25 mrem/year limit, the equipment and its cost for running the program, the personnel who will be used to run the program and their cost. The personnel and cost for preparing a report to the state documenting the decommissioning of the facility.

1.2 References

a. Title 49, Code of Federal Regulations, Parts 171 to 174, "Transportation", Revised as of April 1, 1996.
b. U.S. Nuclear Regulatory Commission, DRAFT NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination", February, 1993.
c. Title 25 of the Texas Administrative Code (25 TAC) Section (§) 289.252(gg)(1) and (2).
d. Title 25 TAC §289.254(h)(1) and (2).
e. Title 25 TAC §289.252(gg)(5).
f. NUREG –1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)
g. Title 25 TAC §289.254(h)(5).
h. NUREG/CR-5849 Manual for Conducting Radiological Surveys in Support of License Termination

1.3 Site Description

The following text provides a brief physical description of the Webster and Tavenor facilities. Characterization data for the two facilities is located in Section 2.0.

1.3.1 Webster Facility Description

The east side of the Webster facility shares a parking lot with a Breast Cancer Medical Facility. The west side of the facility is enclosed with a cyclone fence. This fence is posted as a Radioactive Materials Storage Area. The south, north and east sides of the buildings are not posted.

It is evident that the facility has experienced at least one recent break-in or burglary. This is evident by a large broken window in the front office area that has since been secured with plywood.

The Webster facility basically consists of ten areas; 1) office section, 2) laboratory section, 3) radiography area, 4) machine shop, 5) old Cs-137 & Am-Be labs, 6) leak test lab, 7) new Cs-137 & Am-Be labs) 8) tracer lab, 9) storage area and 10) operational support areas.

The following is a brief description of these ten areas:

1) Office Section

The front office section is common residential construction with wood paneling inside and frame and brick construction on the outside. The building sits on a concrete pad foundation. The floor in this section is covered with asphalt tile and carpet. There are two air conditioning systems, one overhead system (top of the roof) and one closet type.

2) Laboratory Section

The Laboratory Section of the front building contains four labs and one storage area. These labs are 2 x 4 frame construction with sheet rock walls. The floors are covered with poured in place

urethane material.

3) Radiography Room

The Radiography room contains a lead shot hot cell. The double walls are 6" apart and the mild steel in 1/8" thick.

4) Machine Shop

The Building Two area is the mechanical shop and at one time contained lathes and metal working machines. This area has a concrete floor that has been painted. The walls and ceiling are sheet rock. All of the partitions are 2 x 4 framing with sheet rock covering.

5) Old Cs-137 & Am-Be Labs

The (Old) Cs-137 room contains two hot cells that have not been used for several years. One hot cell is 2' x 2' x 2' and the other is 4'-x 4' x 4'. The cells are constructed of mild steel. These two cells have contact readings of 5000 mR/hr.

The (Old) Am-Be Lab contains two Am-241 glove boxes. This room was not used for several years. The glove boxes are 2' x 3' x 4'. They are unshielded and constructed of mild steel. These hot cells have an estimated Curie content, based on MicroShield calculations, of 1-Curie. A copy of the MicroShield calculation is attached.

6) Leak Test Lab

The Leak Test Lab contains a wooden hood and two glove boxes. These units are small and were used for Tritium and I-125 operations. The cabinets are wooden and can be easily removed if necessary.

7) New Cs-137 & Am-Be Lab

The Cesium area is a lab that contains Cs-137 hot cells. The floor is covered with tile and the walls are covered with sheet rock. The walls are stacked 8" x 8" x 16" solid concrete blocks. Care must be taken to keep these blocks from being contaminated.

The Am-Be Lab is a double contained Am-241 hot lab. The walls are concrete blocks covered with sheet rock. The floor is concrete covered with tile. Caution must be exercised to keep the blocks free of contamination.

8) Tracer Lab

The Tracer Lab contains an area which was used for packaging and shipping of radioactive material. This building is a metal building with exposed surfaces. The inside surfaces are coated with blown on insulation. There is an inside area that contains hoods and glove boxes that were used for tracer materials. The devices are constructed of wood.

This Tracer Lab contains two hot cells. One cell was used for work with Gd-153 and Sc-46. This cell is a double walled cell filled with lead shot. The second cell is constructed of concrete blocks covered with hard board. This cell contained Ir-192.

9) Storage Area

The back building was used for storage. The building is metal with a concrete floor. There is a radioactive waste bunker that is constructed of concrete blocks. There is an enclosed area behind the Gd-153 cell to prevent the spread of contamination from the hot cell. There is a down hole high pressure unit in the floor. This unit is approximately 6' deep. The open area inside the security fence is covered with asphalt that is approximately 2" thick.

10) Operational Support Areas
The room labeled "Pipeliner" was used for shipping and contains only wooden cabinets.

The room that is not labeled was used as a lunchroom and as a storage room. This room does not contain any radioactive equipment.

1.3.2 Tavenor Facility Description

The Tavenor facility is located on a 5.01-acre site. The site has five buildings and surrounding grounds. Four of the five buildings are the remains of the process area that was occupied by Gamma Industries. The property was sold to GNI in 1985. GNI has performed partial decommissioning in the four remaining process buildings. The fifth building was constructed five years ago to store radioactive waste generated during the decommissioning performed by GNI. The site basically consists of 1) New Waste Storage Building, 2) One Story Brick Office Building, 3) Fabrication/Machine Shop, 4) Am-Be Lab, 5) Radiography Lab, and 6) Surrounding Grounds.

The following is a brief description of these six areas:

1) New Waste Storage Building
The new waste storage building is constructed from sheet metal with a concrete slab floor. The building is elevated ~ 2-feet above grade. The ceiling is 20-feet high with a double-pitch. The interior space is ~2,800 square feet.

There are 52 B-25 boxes of waste currently stored inside. These boxes are single stacked and comprise approximately 80% of the available floor space. Fifty B-25 boxes contain soil and gravel from remediation of Tavenor's radioactive contaminated leach fields. Two boxes contain Am-Be hot cells. These boxes are easily identified as they are 1.5-feet taller than the rest of the boxes. They were staged in the middle of the storage building with the soil boxes placed around them for shielding.

There are two equipment roll-up doors and one personnel door. The building does not have a ventilation system. This building does have electrical and is equipped with an alarm system.

2) Brick Office Building
The one story brick office building comprises ~4,500 square feet of floor space. This building has been partially remediated. This building is in a deteriorated condition and is unsafe for personnel entry. Many of the interior structural supports and roof beams have collapsed. Sections of the roof have collapsed. The floor in some areas has been removed. Carpet from this building was removed during remediation and placed outside for storage. The carpet is

radiologically contaminated. Readings were collected with a G-M Detector that ranged between 20,000 counts per minute (cpm) to 50,000 cpm.

3) Fabrication/Machine Shop

The fabrication/machine shop is a 785 square foot metal building with a small storage loft. The floor area is littered with old fabrication equipment and an assortment of discarded junk. Several items, such as drill bits, had elevated readings of radioactivity up to ten times background.

4) Am-Be Lab

The Am-Be Lab has been 90% demolished. One sheet metal wall, several steel wall support beams and approximately 20% of the sheet metal roof still exist. The concrete floor has undergone scabbling to remove contamination. The scabbling was performed by GNI personnel. The building sits on concrete slab footprint of 795 square feet. GNI believes that Cs-137 sources may have been historically manufactured in this building as well.

5) Radiography Lab

The radiography lab is a concrete building with 624 square feet of floor space. It has two rooms of about equal size. Each room has had partial remediation performed in the interior areas, i.e., concrete floor scabbling, sub-floor soil removal, and equipment removal. This building still has extensive radioactive contamination. Readings of 1mR/hr were found on the floor and walls.

6) Surrounding Grounds

The surrounding grounds around the before mentioned buildings is ~75% overgrown with dense trees and underbrush. Much of the ground was under six to twelve inches of water at the time of the characterization survey. Thick swarms of mosquitoes are present. Approximately 4,000 square feet of broken asphalt and concrete covers the grounds between the buildings.

Radioactive contaminated leach fields are located throughout the surrounding grounds. There is a total of one thousand feet of leach field line at Tavenor. Section 2.0, Historical Review, describes the leach fields in more detail.

2.0 HISTORICAL REVIEW

Texas radioactive materials license L02995 and L03378 were reviewed for the period 1983 to the present. Both licenses are issued in the name of GNI of Louisiana, Incorporated. License L02995, formerly L01654 extends back to the early 1970's when the predecessor of GNI of Louisiana, Gulf Nuclear was named Nuclear Environmental Engineering, Incorporated. License L03378 was originally issued to Gamma Industries, which was acquired by Gulf Nuclear in the 1980's. The files document the existence of contamination at both sites, both within and outside the restricted areas. The review of license L02995 did not yield any comprehensive inventory of the radioactive sources and materials stored in that facility. Nor are there any comprehensive surveys of the facility within that file. Periodic contamination surveys were performed during routine inspections, however, these ceased more that eight years ago. Those surveys reviewed did document contamination in excess of allowable levels in restricted and unrestricted areas on a frequent basis.

Although the file for license L03378 does indicate that contaminated soil and equipment is contained in 50 some odd B-25 boxes stored in a Butler building within the fenced area at the Tavenor Street site, an inventory of the contents of those boxes could not be located there. Again routine inspections of the facility ceased some eight or more years ago. Both facilities have been monitored by the Texas Department of Health, Bureau of Radiation Control for the period from 1983 to the present. Monitoring consisted of placing and exchanging on a quarterly basis numerous TLD's along the fences surrounding the facilities. Also soil samples and sewage samples were collected. Fence line monitors depict widely fluctuating radiation levels at certain locations along the fence at the Webster facility (L02995). Samples of sewerage taken at the waste water treatment plant serving the Webster facility have contained measurable concentrations of Am-241 and some soil samples taken near that facility have in the past contained Cs-137.

The only documented contamination incident located in the file occurred at the Webster facility in 1983. The incident consisted of the inadvertent breach of a three curie americium-beryllium source. The incident prompted and extensive investigation and facility survey. The survey revealed wide-spread contamination within the facility, especially within the plenum formed by the false ceiling and in air conditioning duct work. Also several technicians were determined to have had sufficient intakes of americium to warrant chelation therapy. The investigation revealed the transfer of soils contaminated with Cs-137 off-site to the property of one of the employees. The contaminated soil was removed from this property and the property ultimately surveyed and released by the Bureau of Radiation Control. The investigation report is rather lengthy and will be made available as an addendum to this report.

In respects to Tavenor, it is important to note that it was Gamma Industries licensed practice to release radioactive material into the site's septic system which subsequently flowed into extensive leach fields located within the property boundary. The soil in this region has a layer of dense clay approximately two feet below grade. When the contamination was released in the leach field it percolated through the top soil until it reached this layer of clay. At the clay layer, the contamination spread laterally to some extent. GNI performed extensive remediation of the leach field areas. Approximately 4,800 cubic feet of soil and gravel were removed and placed into the 50 B-25 boxes currently stored in the New Waste Storage Building described in Section 1.2.2, Tavenor Facility Description.

During the years that the Gulf Nuclear facility located on Tavenor Street in Houston was operated by Gamma Industries, radioactive materials, predominantly cesium-137 found thier way into a septic tank. One tank and drainfield are located within the fenced area to the west of the Butler building. Some contaminated soil from this area has been excavated and stored in the Butler building. There are several areas where soil remains contaminated from another septic tank, located directly behind the main office building. The tank is exposed and elevated readings can be obtained from the root ball of a rather large tree which grew out of it. From its location relative to the nearest fence, it appears the drain field for this tank is also within the fenced area.

The Webster facility still has an abundance of radiological sources, i.e., Am-Be sealed sources used in the oil industry, check sources, and radium needles used in the medical industry. An inventory of sources is provided in Section 4.0, Facility Characterization.

GNI reported that all radioactive sources from Tavenor were collected and properly disposed.

3.0 RADIOLOGICAL OVERVIEW FOR WEBSTER AND TAVENOR FACILITIES

US Ecology personnel performed a radioactive characterization survey which consisted of the collection of soil samples, swipe samples of interior surfaces, direct surface radiation measurements, and general area radiation readings. In addition, an inventory of radiation sources was performed.

During the initial phases of the characterization survey, it quickly became evident that radioactive contamination was not contained within the confines of the radiological engineered controlled areas. Alpha contamination 120 times greater than natural background levels was measured at the opening of the front door exit. A small pile of dirt and dust that had been swept into a corner near the front door had readings 650 times greater than background. There were two vacuum cleaners in the front office area that had high levels of internal contamination.

The interior of each facility was littered with dead cockroaches, dead rodents and rodent feces that had high levels of radioactivity. One dead rat located in the front office had radiation levels reading 2000 microR/hour. Natural background in the Houston area was measured at 40 microR/hour. Dead cockroaches had radiation levels of up to 60,000 counts per minute (cpm) using a Geiger Mueller (GM) Detector. Natural background for the GM detector was 40 to 60 cpm.

The bathroom facilities in the office areas also contained measurable levels of contamination. The sink drain lines had readings of 3,000 cpm. A paper towel dispenser was measured at 300,000 cpm on the external surface. The air intake vent on a refrigerator had 10,000 cpm. Elevated contamination was found on several door knobs and light switches.

Each of the 21 rooms located in the front office area had contamination levels exceeding acceptable surface limits for radioactivity as defined in Texas Administrative Code 289.202. Contamination was found on frequented pathways, such as office entryways, with levels as high as 400,000 cpm.

Each office contained an air vent located in the ceiling. Each vent had elevated levels of radioactivity. The office area ventilation exhaust system vents directly to the atmosphere. This air duct system is not filtered.

4.0 FACILITY CHARACTERIZATION

Site characterization proceeded in three phases:

1. Prior to site entry, offsite characterization was conducted. This entailed gathering information away from the site (historical) and conducting reconnaissance surveys

from the site perimeter.

2. A site survey was conducted of the exterior grounds, within the property boundary and the buildings interiors. During this phase, access to the property was restricted to US Ecology survey team personnel and GNI support personnel.
3. Offsite analysis was performed at an independent, licensed laboratory. All collected field readings and laboratory data were reviewed and compared against Department of Transportation regulations, Texas Administrative Code 289.202, and various licensed radioactive waste disposal site's waste acceptance criteria (WAC).

4.1 Characterization Data

The following is a list of data and/or reports and their location:

- Analytical data are located in Attachment A.
- Photographs are located in Attachment B.
- Smear Counting Analysis Reports for each area of concern are located in Attachment E.
- Site Maps containing radiological data are located in Attachment F.
- 25 Texas Administrative Code 289.202 (Standards for Protection Against Radiation From Radioactive Material)

Radioactive Material Inventory

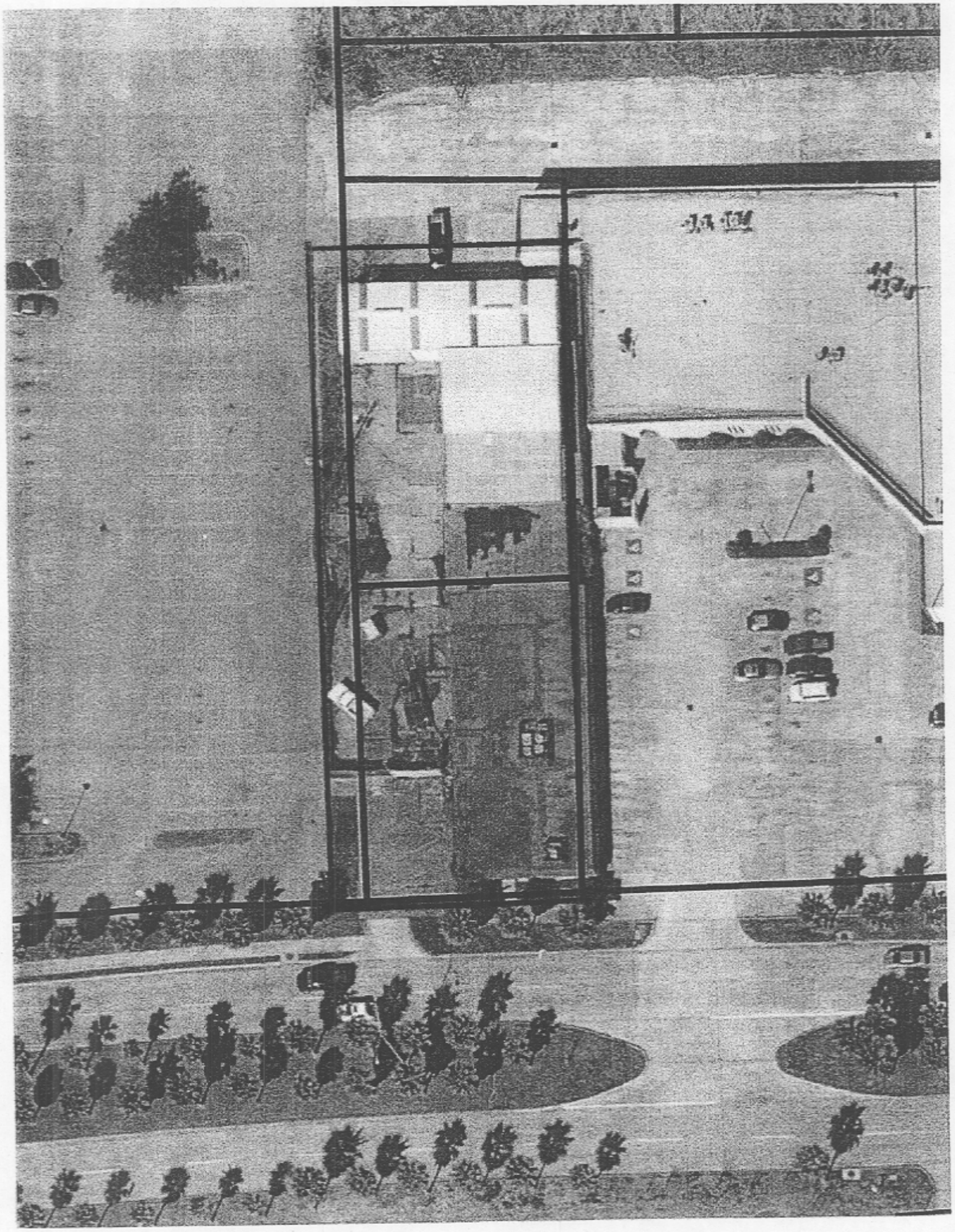
The facility contains many discreet sources. A complete inventory with activity levels is provided. Some of these sources contain levels of radioactivity with high enough activity to cause an over exposure within several minutes of personal contact. All sources are currently located behind locked doors in the radiologically controlled areas. The following table contains a list of sources currently stored inside locked deep wells located in the new Am-Be Lab.

Table 4.1, Webster Source Inventory Located Inside the Am-Be Lab

Source Isotope	Serial Number	Activity
Am-241/Berillium	HPB-427	50 mCi
Am-241/Berillium	CSV-N25	25 mCi
Am-241/Berillium	EL-821	100 mCi
Am-241/Berillium	CSV-651	25 mCi
Am-241/Berillium	CSV-903	250 mCi
Am-241/Berillium	A-445	100 mCi
Am-241/Berillium	NB-519	250 mCi
Am-241/Berillium	NO SERIAL PRESENT	250 mCi
Pu-238	1009-2	150 mCi

Table 4.2, Webster Radioactive Material Inventory Located Inside Waste Storage Room

Source Isotope	Description	Activity or Dose Rate
Unknown	2-capsules dark powder	320 mR/hr contact
Radium	3-poly vials (~40 needles)	280 mR/hr contact
Radium	1-lead pig (~40 needles)	800 mR/hr contact
Radium	50 needles scattered on floor	
Cd-109	Sources	3 mCi
Co-60	(3) 55-gallon drums trash	0.001 mCi
Cs-137	Source	18 Ci
Cs-137	Source	2 Ci
Cs-137	Source	100 microCi
Cs-137	(2) Sources	10 microCi
Unknown contaminate	~ 100 cubic feet of trash	Unknown
Sr-90	Source	39.7 Rad/second
Sr-90	Source	280 microCi
Ni-63	Source	5 microCi
1% Uranium	Powder	100 grams
0.5% Uranium	Powder	100 grams
2% Uranium	Powder	100 grams
4% Uranium	Powder	100 grams
1% Th & 0.04% U	Powder	50 grams
Radium	(8) Sources	3 microCi
Radium	1-lead pig (7 needles)	310 mR/hr
Radium	1-lead pig (25 needles)	220 mR/hr
Radium	1-lead pig (5 needles)	180 mR/hr
Radium	1-lead pig (1 needles)	12 mR/hr

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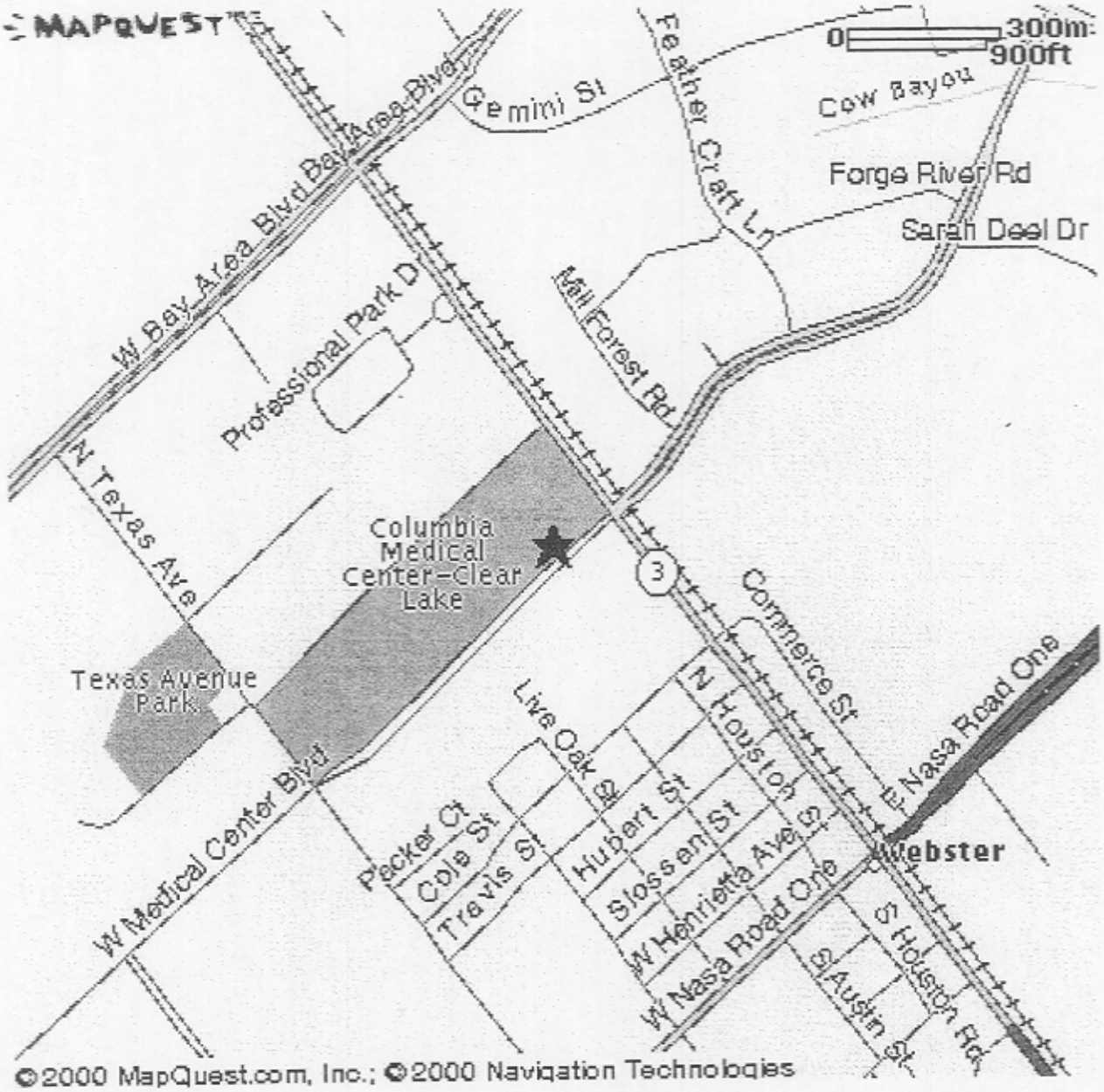
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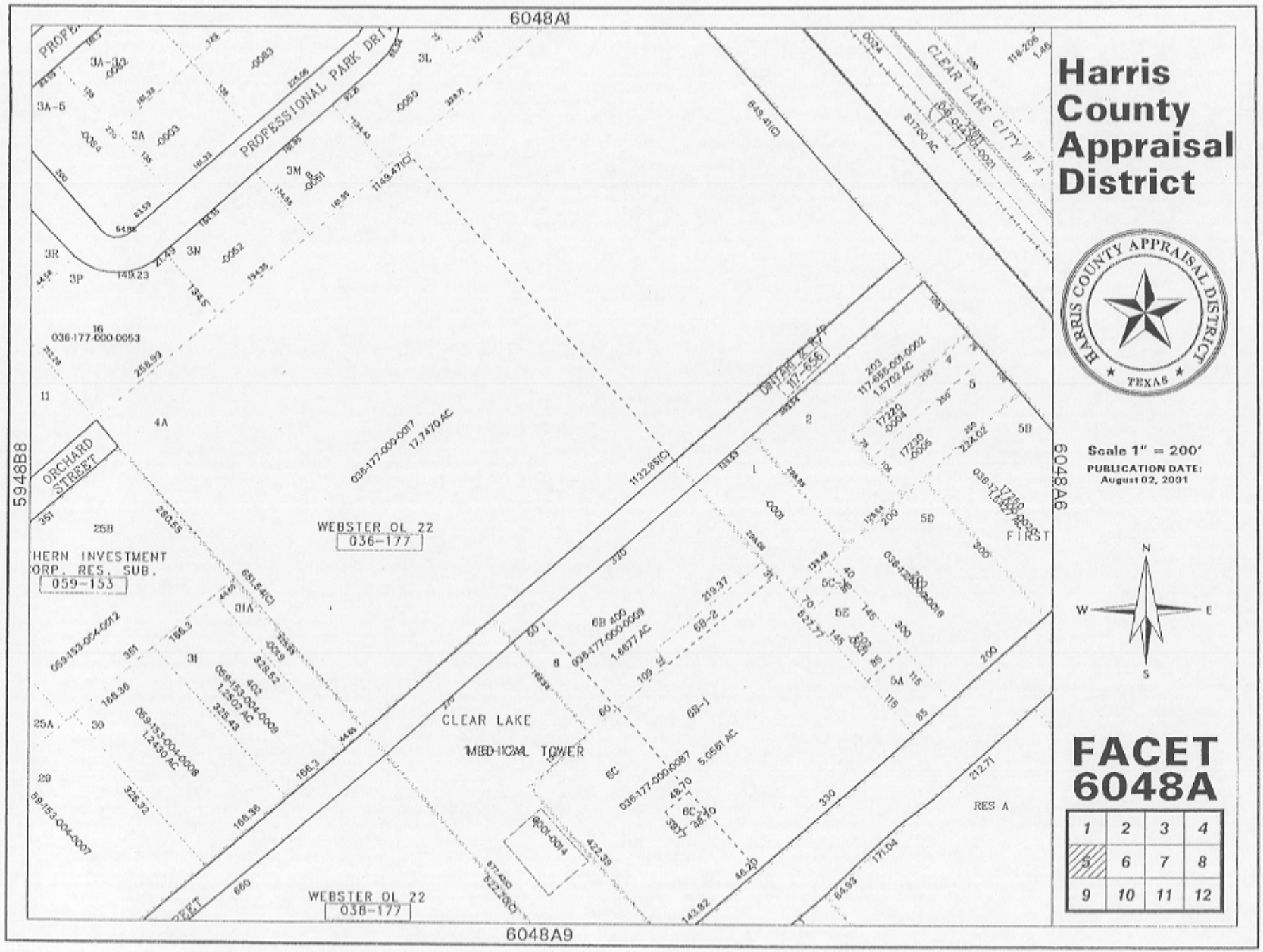
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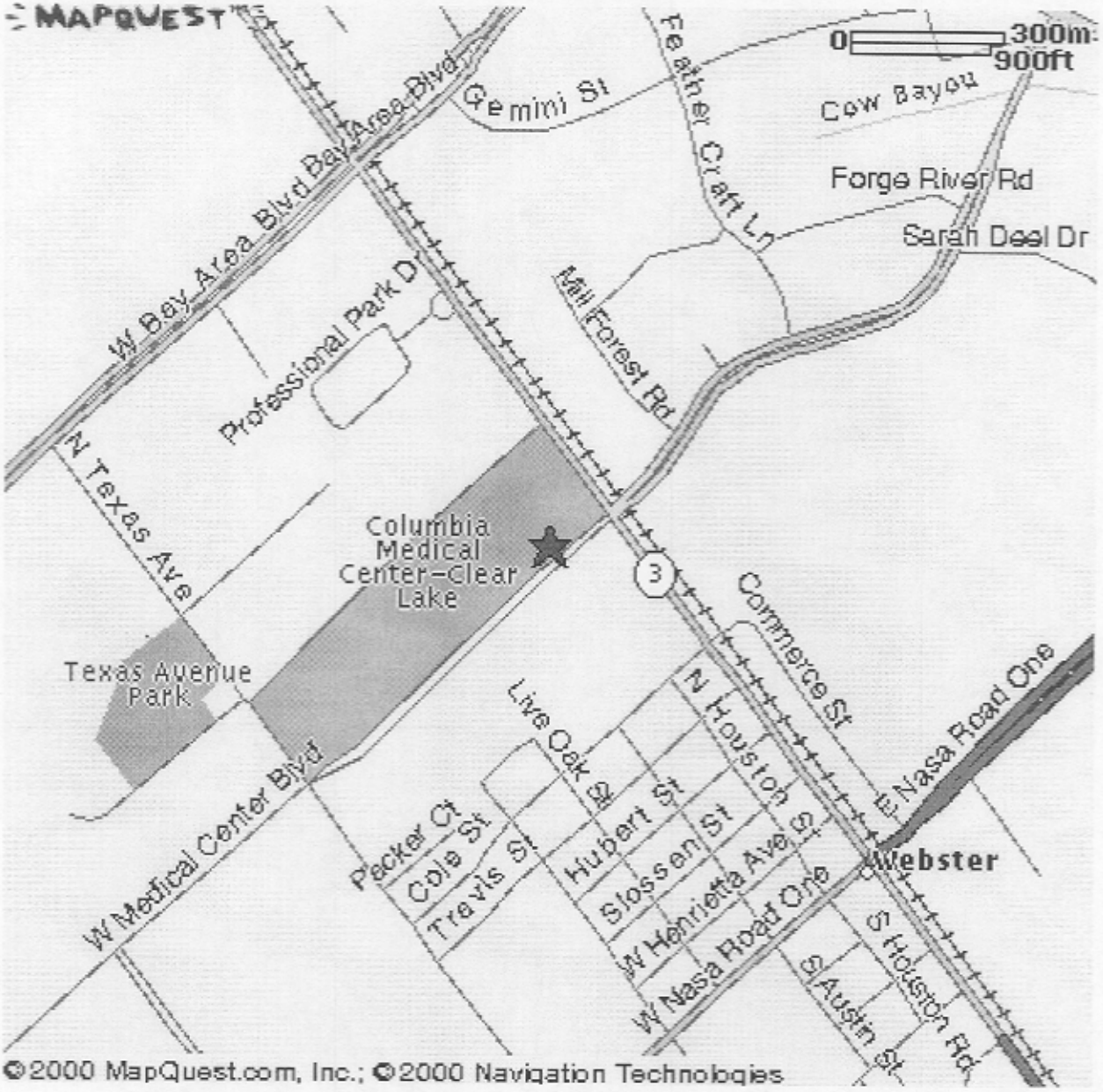
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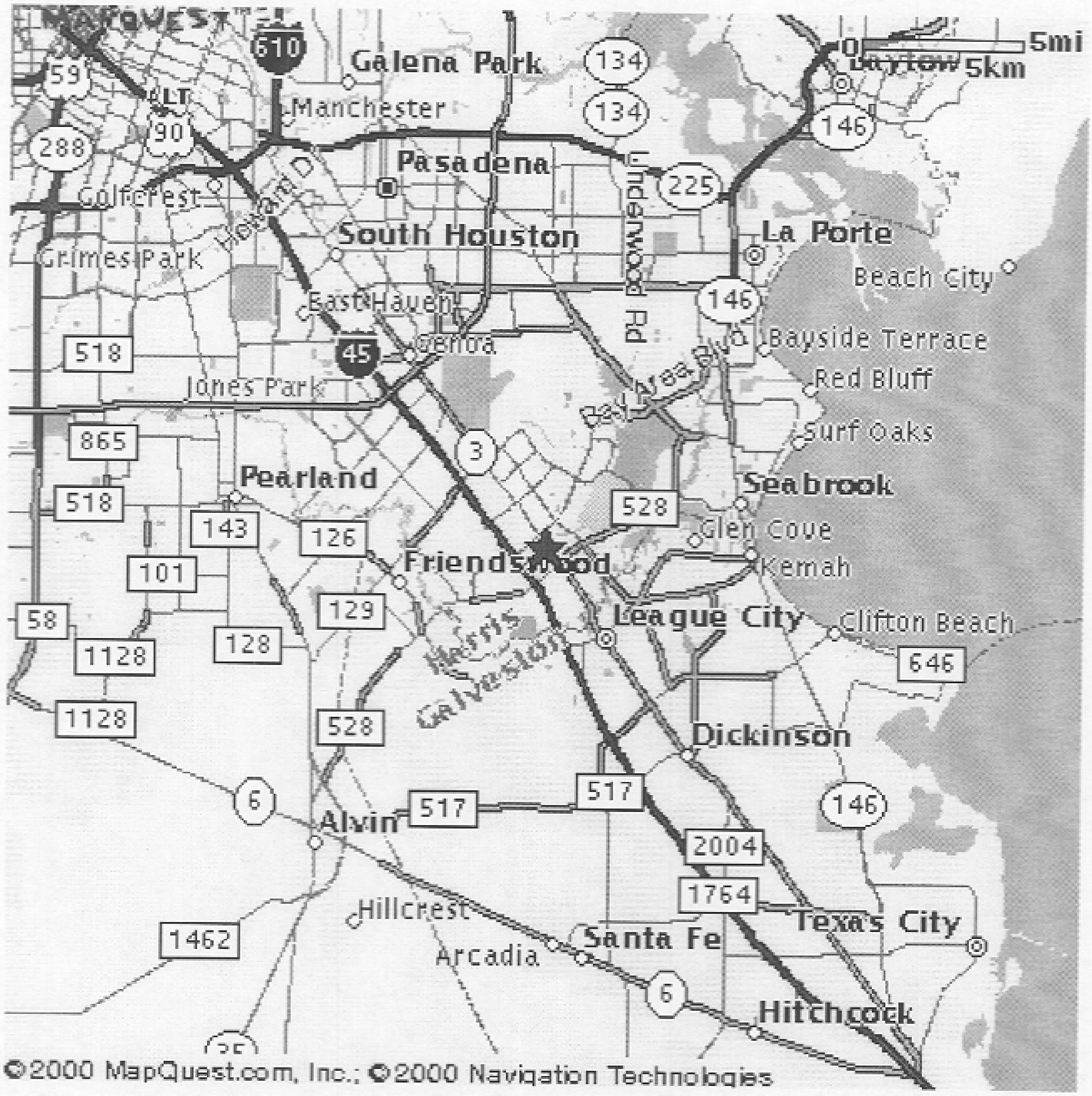
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SITE SPECIFIC CHARACTERIZATION SUMMARY REPORT

of the facilities located at

202 Medical Center Boulevard, Webster, TX
&
9320 Tavenor Street, Houston, TX

Formally Operated by
Gulf Nuclear of Louisiana

CONFIDENTIAL

DRAFT

September 28, 2001

Prepared For:

The Honorable Wesley W. Steen
U.S. Bankruptcy Judge
United States Bankruptcy Court
Southern District of Texas
515 Rusk Avenue
Houston, Texas 77002

Prepared By:

USEcology

109 Flint Road
Oak Ridge, TN 37830

Introduction

US Ecology was issued an "Engagement Letter", attached, by the U.S. Bankruptcy Judge, United States Bankruptcy Court, Southern District of Texas dated August 20, 2001 containing authorization to proceed with the work referred to in the letter.

It is important to note that this report is a preliminary draft summary of the characterization performed at Gulf Nuclear of Louisiana's (GNI) Webster and Tavenor, Texas Facilities by US Ecology of Oak Ridge, Tennessee between September 4, 2001 and September 10, 2001. A detailed, comprehensive Site Specific Decommissioning Plan will be provided to the Court no later than October 12, 2001. This draft report primarily summarizes the findings for the Webster facility. No unusual findings were made for the Tavenor facility, which currently is used for storage of containerized soil. When the word "facility," "site," or "office" is used in this draft report it can be interpreted to apply to the Webster facility, which was observed to have high levels of contamination and exposure risk.

Site Description

At the time of this survey, the facility was not in operation and had been shut down for several years. The general condition of the site is that of disarray and untidiness. No security personnel are located at the facility.

The facility basically consists of an office section, a radiography area, a machine shop, an Am-241 and Cs-137 area, a tracer lab and storage area.

The east side of the facility shares a parking lot with a Breast Cancer Medical Facility. The west side of the facility is enclosed with a cyclone fence. This fence is posted as a Radioactive Materials Storage Area. The south, north and east side of the buildings are not posted.

It appears that the facility has experienced at least one recent break-in, burglary, or act of vandalism, which is evident by a large broken window in the front office area that has subsequently been secured with plywood.

Historical Review for Gulf Nuclear

Texas radioactive materials license L02995 and L03378 were reviewed for the period 1983 to the present. Both licenses are issued in the name of GNI of Louisiana, Incorporated. License L02995, formerly L01654 extends back to the early 1970's when issued to the predecessor of GNI was named Nuclear Environmental Engineering, Incorporated. License L03378 was originally issued to Gamma Industries, which was acquired by Gulf Nuclear in the 1980's. The Texas Department of Health, Bureau of Radiation Control (BRC) files reviewed document the existence of contamination at both sites, both within and outside the restricted areas. The review of license L02995 did not yield any comprehensive inventory of the radioactive sources and materials stored in that

facility, nor are there any comprehensive surveys of the facility within that file. Periodic contamination surveys were performed during routine inspections, however, these state inspections ceased more that eight years ago. Those surveys reviewed did document contamination in excess of allowable levels in restricted and unrestricted areas on a frequent basis.

Although the file for license L03378 does indicate that contaminated soil and equipment is contained in 50 some odd B-25 boxes stored in a Butler building within the fenced area at the Tavenor Street site, an inventory of the contents of those boxes could not be located there. Again, it should be noted that routine inspections of the facility ceased some eight or more years ago. Both facilities have been monitored by the BRC for the period from 1983 to the present. Monitoring consisted of placing and exchanging on a quarterly basis numerous TLD's along the fence lines surrounding the facilities. In addition, soil samples and sewage samples were collected during this period. Fence line monitors depict widely fluctuating radiation levels at certain locations along the fence at the Webster facility (L02995). Generally samples of sewerage taken at the wastewater treatment plant serving the Webster facility have contained measurable concentrations of Am-241 and some soil samples taken near that facility have in the past contained Cs-137.

The only documented contamination incident located in the file occurred at the Webster facility in 1983. The incident consisted of the inadvertent breach of a three curie americium-beryllium source. The incident prompted an extensive investigation and facility survey by the BRC. The survey revealed wide-spread contamination within the facility, especially within the plenum formed by the false ceiling and in air conditioning duct work. Also several technicians were determined to have had sufficient intakes of americium to warrant chelation therapy. The investigation also revealed the transfer of soils contaminated with Cs-137 off-site to the property of one of the employees. The contaminated soil was removed from this property and the property ultimately surveyed and released by the Bureau of Radiation Control. The investigation report is rather lengthy and will be made available as an addendum to the final version of this report.

Radiological Summary of the Webster Facility

US Ecology personnel performed an extensive radioactive characterization survey which consisted of the collection of soil samples, swipe samples of interior surfaces, direct surface radiation measurements, and general area radiation readings. In addition, an inventory of radiation sources was performed.

During the initial phases of the characterization survey, it quickly became evident that radioactive contamination was not contained within the confines of the radiological engineered controlled areas. Alpha contamination 120 times greater than natural background levels was measured at the opening of the front door exit. A small pile of dirt and dust that had been swept into a corner near the front door had readings 650 times greater than background. There were two vacuum cleaners in the front office area that had high levels of internal contamination.

The interior of each facility was littered with dead cockroaches, dead rodents and rodent feces that had high levels of radioactivity. One dead rat located in the front office had radiation levels reading 2000 microR/hour. Natural background in the Houston area was measured at 40 microR/hour. Dead cockroaches had radiation levels of up to 60,000 counts per minute (cpm) using a Geiger Mueller (GM) Detector. Natural background for the GM detector was 40 to 60 cpm.

The bathroom facilities in the office areas also contained measurable levels of contamination. The sink drain lines had readings of 3,000 cpm. A paper towel dispenser was measured at 300,000 cpm on the external surface. The air intake vent on a refrigerator had 10,000 cpm. Elevated contamination (approximately 10 times background) was found on several door knobs and light switches.

Each of the 21 rooms located in the front office area had contamination levels exceeding acceptable surface limits for radioactivity as defined in Texas Administrative Code 289.202. Contamination was found on frequented pathways, such as interior office entryways, with levels as high as 400,000 cpm, signaling a concern for tracking contamination offsite.

Each office contained an air vent located in the ceiling. Each vent had elevated levels of radioactivity (approximately 10 times background). The office area ventilation exhaust system vents directly to the atmosphere and are not filtered.

Source Inventory

The facility contains many discrete sources. A complete inventory with activity levels will be provided in the comprehensive decommissioning plan. The majority of these sources contain levels of radioactivity with high enough activity to cause an over exposure within several minutes of personnel contact. These sources are currently located behind locked doors in the radiologically controlled areas.

Radioactive Waste Disposal

Approximately 5000 cubic feet of waste currently exists in disposal containers at both facilities and approximately 5 to 10 times that amount will be generated during decommissioning activities. Of this volume, approximately 500 cubic feet cannot be disposed of at any commercial radioactive disposal site in the United States as it currently exists. The levels of radioactivity are simply too high to meet the various disposal site's Waste Acceptance Criteria (WAC). US Ecology is researching every possible process currently available in an effort to meet treatment and disposal requirements for this waste stream.

Preliminary Cost Estimate

At this time, US Ecology conservatively estimates that combined decommissioning and disposal costs will be four (4) to five (5) million dollars. This estimate is exclusive of any potential subsurface remediation greater than 6-inches in depth or remediation of contamination beyond either facility boundary.

FAX TRANSMISSION

AMERICAN ECOLOGY CORPORATION
www.americanecology.com
Houston, Texas Office
P.O. BOX 130489
The Woodlands, TX 77393-0489
281-296-7444 (phone)
281-419-8711 (fax)
rtrimble@americanecology.com

CONFIDENTIAL

To: Hal Morris, Esq.
Fax #: 512-482-8341
From: Robert M. Trimble
General Counsel
Subject: Gulf Nuclear

Date: October 1, 2001
Pages: 7, including this cover sheet.

COMMENTS:

Hal, Please call me at 281-296-7444 to discuss any comments you may have. Thanks, Rob.

CONFIDENTIAL

FILE

AMERICAN ECOLOGY CORPORATION
www.americanecology.com
Houston, Texas North Office
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The Woodlands, Texas 77393-0489
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Fax: 281-419-8711

October 1, 2001

CONFIDENTIAL

Via Fax #512-482-8341
Hal F. Morris, Esq.
Office of Texas Attorney General
300 West 15th Street, 8th Floor
Austin, Texas 78701

Re: Gulf Nuclear—US Ecology's Preliminary Draft Site Specific Characterization Report

Dear Hal:

As we briefly discussed last week by phone, attached please find the referenced draft report based on the information gathered and evaluated at this time. I also am sending the attached report to your via email. Based on my quick read of the attached draft report, the high levels of contamination near the exit doorways and in the office ventilation exhaust system appear particularly troublesome for the Webster facility.

Thank you for your courtesy and professionalism in this matter. If you have any questions, please call me at 281-296-7444.

Sincerely,
American Ecology Corporation

Rob Trimble

By: Robert M. Trimble
General Counsel

Attachment

cc: US Ecology Personnel

FILE

Broker

STRAIGHT BILL OF LADING - SHORT FORM - NOT NEGOTIABLE

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading,

From: USEPA (6SF-R2)
202 Medical Center Dr
Webster, TX 77598
(281)-557-4863
Contact: Greg Fife

Consigned To: US ECOLOGY NMMC
109 FLINT ROAD
OAK RIDGE, TN 37830
(800) 888-8859
Contact: Neal Sawer

Freight Bill #
A020404
Shipment #
~~01-NS-04-7~~

A020404

Originating Carrier: Kindrick Trucking Co.
Connecting Carrier(s): N/A
Delivering Carrier: Kindrick Truckii Tractor #: K-2000 Trailer #: JDT18 DATE: 5/21/2002

# of Packages	HM	Description	Weight (lbs.)
2	X	RADIOACTIVE MATERIAL, NOS, 7, UN2982	630
		Package ID#: D2,D4 SEE ATTACHED MANIFEST FOR DETAILS	
		ENCAPSULATED SOURCES D4, NON- ENCAPSULATED SOURCES D2	
7	RQ	RADIOACTIVE MATERIAL, NOS, 7, UN2982	6,510
		Package ID #'s: R1 -R5, D1, D3 SEE ATTACHED MANIFEST FOR DETAILS	
		ENCAPSULATED SOURCES	
		Seal on Truck	
		Yellow III Labels on Drums	
		Placarded Radioactive	
		Exclusive Use Only	
		24 hr Emergency Contact - 865-599-9417	

Dimensions of Cargo Before Loading	Length:	LEGAL	Width:	LEGAL	Height:	LEGAL	Total Feet of Trailer Space Occupied:	TOTAL

UNLESS A GREATER VALUE IS DECLARED, THE SHIPPER HEREBT RELEASES THE VALUE TO $5000.00 PER TON OF 2000 POUNDS FOR EACH ARTICLE

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION, ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED VEHICLE CONTAINS MATERIALS PROPERLY PLACARDED IN ACCORDANCE WITH 49CFR172.500

	DATE	TIME		DATE	TIME		DATE	TIME
ARRIVED AT SHIPPER	5/21/02	1350	SCHEDULED:	5/21/02	1500	LOADING STARTED:	5/21/02	1430
LOADING COMPLETED:	5/21/02	1520	VEHICLE RELEASED:	5/21/02	1615	SHIPPER'S SIGNATURE:	[signature]	

SINATURE TALLY RECEIPT - Must be filled out and signed at origin and each time the shipment changes custody.

Received from Consignor:

Date:	Time:	Tractor #:
Driver's Signature:		

X

Change of Custody:

Date:	Time:	Tractor #:
Driver's Signature:		

	DATE	TIME		DATE	TIME		DATE	TIME
ARRIVED AT CONSIGNEE:			SCHEDULED:			UNLOADING STARTED:		
UNLOADING COMPLETED:			VEHICLE RELEASED:			CONSIGNEE'S SIGNATURE:		

RECEIVED THE ABOVE DESCRIBED PROPERTY IN GOOD CONDITION EXCEPT AS NOTED

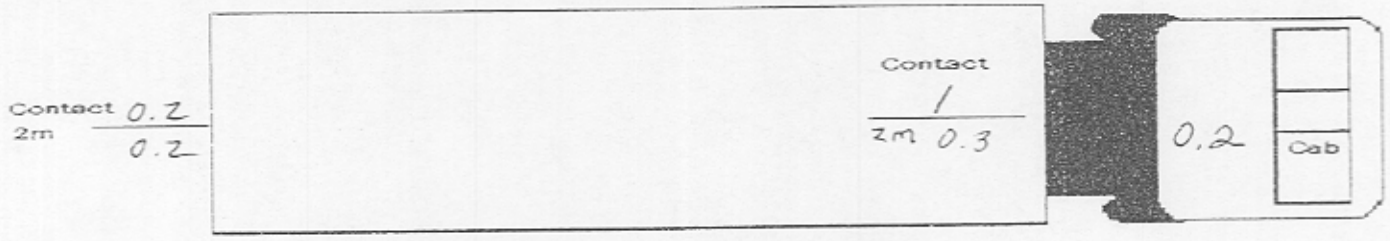
RADIOLOGICAL SURVEY REPORT

SURVEY #: GNS-094

DATE: 5-21-02	INSTRUMENTATION USED				
TIME: 1535	MODEL	S/N	EFF.%	BKRD	CAL. DUE DATE
SURVEYOR: K CORBETT	773	48484	N/A	<0.2	9-4-02
LOCATION: GNI					
REVIEWED BY:					
Legend: Smear Locations = 0	Contact Dose Rates mR/hr = *			30 cm Reading = ~~#~~	

PURPOSE OF SURVEY: SHIPPING SURVEY

CONTACT 0.2 / 2M 0.2 CONTACT 2 / 2M 2 CONTACT 10 / 2M 1.5



CONTACT 0.2 / 2M 0.2 CONTACT 1 / 2M 1 CONTACT 60 / 2M 3

DOSE RATE UNDER TRAILER 50

ALL DOSE RATES IN mR/Hr AS NOTED

CAB# TENN. 460184Y DOT ORE PLF 036 (K 2000)
TRAILOR# TENN. T484423 US DOT 642202 (JDT18)

Remarks: Shipping # A020404

US Ecology

Exclusive Use Instructions
Radioactive Material Shipment

- This shipment of radioactive material has been designated as an "Exclusive Use" as defined by DOT in 49 CFR 173.403.
- If at any time, containers with surface dose rates in excess of 200mr/hr are loaded onto the vehicle, no further loading or rearranging of cargo is authorized.
- All containers will be secured to prevent shifting or movement during transit.
- Radioactive placards will be applied to all four sides of the vehicle whenever any quantity of Radioactive Material LSA, UN2912 or Radioactive Material SCO, UN2913 consigned as exclusive use in accordance with 173.427 or any package bearing a Radioactive Yellow III is loaded onto the vehicle.
- Vehicle driver is required to maintain placards intact and clean during transit.
- Radiation levels on the vehicle will be maintained below the following:
  Surface <200mr/hr 2 meters <10mr/hr Cab <2mr/hr
- Any loading, unloading, or shifting of cargo will be followed by a vehicle survey to ensure that vehicle radiation limits have not been exceeded.
- The material loaded on this vehicle may not be transferred to another vehicle.
- In the event of an accident, implement the actions detailed in the attached General Emergency Response Procedures.
- These instructions must be carried with the shipping papers and shall be regarded as an attachment to the shipping papers.

I have read and understand these instructions.

Driver Signature Gerald Tolbert Date 5-21-02

Shipment Number(s) A020404

(Rev. 1/13/00)

APPENDIX E
Page 1 of 1

VEHICLE INSPECTION

Shipment #: A020404 Carrier: KTC

Tractor #: K-2000 Trailer #: T18 Date: 5-21-02

Part I

Shipper Section

Front Tire Tread >1/8" (Yes)/No

Rear Tire Tread >1/16" (Yes)/No

Any Tires Recapped? Yes/(No)

Windshield Wipers Operational? (Yes)/No

Rear Vision Mirrors Adequate? (Yes)/No

Horn Operational? (Yes)/No

Charged Fire Extinguisher? (Yes)/No

Adequate # of Placards Displayed Properly? (Yes)/No

Brake Lights Operational? (Yes)/No

Turn Signals Operational? (Yes)/No

Head Lights Operational? (Yes)/No

Reflectors Adequate and Unbroken? (Yes)/No

Weight In: 35000 Weight Out: _____ Cal. Date: _____ (Truck Scale)

The following items were noted during inspection: _____

_____

_____

Shipper Signature

5-21-02
Date

Part II

Driver Section:

Name: HAROLD Tolley Lic #: 855714926TN Exp. Date: 6-15-03

Circle Yes or No

Hazmat Training Current? (Yes)/No

Hazmat Physical Current? (Yes)/No

Service Brakes Good Condition? (Yes)/No

Parking Brakes Operational? (Yes)/No

Steering Mechanism Operational/Safe? (Yes)/No

Fifth Wheel attached properly? (Yes)/No

Trailer Frame Free of Defects? (Yes)/No

Driver's Log in Place and Current? (Yes)/No

The load is adequately secured to prevent shifting during incidents normal to transport? (Yes)/No

Harold Tolley
Driver Signature

5-21-02
Date

APPENDIX N
Page 1 of 1

SHIPMENT DOCUMENTATION CHECKLIST (MISCELLANEOUS)

Must be maintained in the shipment file, and accompany shipment:		Initials
a.	Uniform Low-Level Radioactive Waste Manifest or alternate shipping papers	BH
b.	Bill of Lading (As Needed)	BH
c.	Emergency response information (As Needed)	BH
d.	Exclusive Use instructions (As Needed)	BH
e.	Hazardous Materials Certificate of Registration (As Needed)	N/A

Must be maintained in the shipment file:

f.	Load Plan (circle one: Appendix C or D) (Verify the packages listed on the load plan against the manifest.)	BH
g.	Vehicle Radiological Survey (per ORD-HP-11)	BH
h.	Marking Checklist (Appendix B)	BH
i.	Vehicle Inspection (Required for all LSA/SCO or n.o.s. shipments	BH
j.	Disposal Container Forms or Alternate Package Characterizations	N/A
k.	Package Survey (for all Transship containers and Overpacks) (Verify the Dose Rates on the manifest against the Package Survey) (Package survey in accordance with ORD-HP-11)	BH

Shipper Signature	Date 5/21/02
Quality Assurance Signature	Date 5/21/02

APPENDIX C
Page 1 of 1

LOAD PLAN - POSITION OF DRUMS ON OR IN TRAILER

SHIPMENT NUMBER: 4020404 DATE: 5/21/02

FRONT OF TRAILER

# R-3 WT 1170	# R-2 WT 1190	# R-5 WT 1040
# R-1 WT 1200	# R-4 WT 1180	# D-3 WT 630
# WT	# WT	# D-4 WT 630
# WT	# D-1 WT 100	# D-2 WT 30
# WT	# WT	# WT
# WT	# WT	# WT
# WT	# WT	# WT
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# WT	# WT	# WT

VERIFICATION: Packages have been loaded onto the vehicle as indicated on this diagram. [signature] 5/21/02 (Initial & Date)

Packages have been adequately secured to prevent shifting during incidents normal to transport. [signature] 5/21/02 (Initial & Date)

All packages have been inspected and are in unimpaired physical condition. [signature] 5/21/02 (Initial & Date)

[signature]
Radwaste Technician

[signature]
QC Technician (Optional)

APPENDIX A
Page 1 of 1

INTRUSIVE INSPECTION FORM

Shipment # _____

Container #	Results (sat/unsat)	Initial	Date
NA			

1) For shipments of boxes, an intrusive inspection shall be performed on each box.
2) For shipments of drums, the following minimum percentage of the packages shall undergo intrusive inspection:
   - 1-10 drums 50%
   - 11-25 drums 30%
   - 26-100 drums 15%
   - >100 drums 10%

Radwaste Technician

5/21/02
QC Technician (Optional)

APPENDIX J
Page 1 of 1

LABELING CHECKLIST

Transport Index	Maximum Radiation Level at any Point on the External Surface	Label Category[1]
Less than 0[2]	Less than or equal to 0.005 mSv/hr (0.5 mRem/hr)	White - I
More than 0 but not more than 1.0	Greater than 0.005 mSv/hr (0.5 mRem/hr) but less than or equal to 0.5 mSv/hr (50 mRem/hr)	Yellow - II
More than 1 but not more than 10	Greater than 0.5 mSv/hr (50 mRem/hr) but less than or equal to 2 mSv/hr (200 mRem/hr)	Yellow - III
More than 10	Greater than 2 mSv/hr (200 mRem/hr) but less than or equal to 10 mSv/hr (1,000 mRem/hr)	Yellow - III (Shall be shipped exclusive use)

[1] Any package containing a "highway route controlled quantity" (173.403) shall be labeled as RADIOACTIVE YELLOW - III.
[2] If the measured TI is not greater than 0.05, the value may be considered to be zero.

A. Information required on labels
   1. Contents from 49 CFR 173.435 in accordance with 49 CFR 173.433(f)
   2. Activity SI units or SI Units with customary units in parentheses
   3. Transport Index (Yellow II or Yellow III Labels only).

B. Subsidiary hazards (except Class 9 material) are within 6 inches of the primary hazard label.

C. One primary hazard label affixed to same surface as the proper shipping name marking.

D. Labels (primary and subsidiary) affixed on two opposite sides (other than the bottom) White-I, Yellow-II, or Yellow-III shall be placed on opposing sides.

Package I.D. Number	Measured T.I.	Max. Rad Level on External Surfaces	Label Selected	A	B	C	D
R-1	6.0	40 mR/hr	Yellow3	✓	✓	✓	✓
R-2	4.0	30 mR/hr	Yellow3	✓	✓	✓	✓
R-3	6.0	80 mR/hr	Yellow3	✓	✓	✓	✓
R-4	6.0	35 mR/hr	Yellow3	✓	✓	✓	✓
R-5	2.0	30 mR/hr	Yellow3	✓	✓	✓	✓
D-1	2.0	150 mR/hr	Yellow3	✓	✓	✓	✓
D-2	2.0	150 mR/hr	Yellow3	✓	✓	✓	✓
D-3	14.0	190 mR/hr	Yellow3	✓	✓	✓	✓
D-4	18.0	320 mR/hr	Yellow3	✓	✓	✓	✓

1) List each package of Radioactive Material requiring specification labeling.
2) Place a circle in each grid which applies to that package.
3) Place a check mark inside each circle as that item is deemed complete or verified.

Shipper

QC Technician (Optional)

GUIDE 163 RADIOACTIVE MATERIALS (LOW TO HIGH LEVEL RADIATION)

POTENTIAL HAZARDS

HEALTH

- Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.
- Undamaged packages are safe; contents of damaged packages may cause external and/or internal radiation exposure.
- Type A packages (cartons, boxes, drums, articles, etc.) identified as "Type A" by marking on packages or by shipping papers contain non-life endangering amounts. Partial releases might be expected if "Type A" packages are damaged in moderately severe accidents.
- Type B packages (large and small, usually metal) identified as "Type B" by marking on packages or by shipping papers contain potentially life endangering amounts. Because of design, evaluation, and testing of packages, life endangering releases are not expected in accidents involving "Type B" packages except those of utmost severity.
- Radioactive White-I labels indicate radiation levels outside undamaged packages are very low (less than 0.005 mSv/h (0.5 mrem/h)).
- Radioactive Yellow-II and Yellow-III labeled packages have higher radiation levels. The transport index (TI) on the label identifies the maximum radiation level in mrem/h one meter from the package.
- Some radioactive materials cannot be detected by commonly available instruments.
- Water from cargo fire control may cause pollution.

FIRE OR EXPLOSION

- Some of these materials may burn, but most do not ignite readily.
- Radioactivity does not change flammability or other properties of materials.
- Type B packages are designed and evaluated to withstand total engulfment in flames at temperatures of 800°C (1475°F) for a period of 30 minutes.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- **Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.**
- Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. • Stay upwind. • Keep unauthorized personnel away.
- Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide adequate protection against internal radiation exposure, but not external radiation exposure.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO_2, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).
- Dike fire-control water for later disposal.

SPILL OR LEAK

- Do not touch damaged packages or spilled material.
- Slightly damaged or dented outer surfaces seldom indicate failure of packaging since most have an inner container.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

To: George
Brozowski

in care of
Chris Petersen

George's #6658541

From Jeff

GNI, Webster TX
Summary of AM Waste
All are estimated:

Number of Glove Boxes	5 (Includes Tavanor)
Number of Vent Units	4 (Does not include Tavanor)
Number of Items/Tools	30 (Does not include Tavanor)
Number of Bags of Waste	20 (Does not include Tavanor)
~~Number of Sources~~	~~15 (Does not include Tavanor)~~

~~1 Pu-Be Source 150 mci~~

Source Number	pig external dose mr/hr	TABLE READINGS DOSE RATE 1" mr/hr	6" mr/hr	12" mr/hr	36" mr/hr	type reading	TABLE READINGS CC alpha CPM	beta/gamma CPM
I-22	na	1	0.2	<	0.2	N	N	N
I-23	na	1.5	0.5	0.3	0.2	N	N	N
I-25	na	<	bkg	bkg	bkg	direct	<	1000
I-17	na	5	1.2	0.4	0.2	N	N	N
I-18	na	1	0.3	0.2	0.2	N	N	N
I-89	na	na	bkg	bkg	bkg	na	na	na
I-91	na	na	bkg	bkg	bkg	na	na	na
I-102	bkg	na	bkg	bkg	bkg	na	na	na
I-103	1.5	na	0.3	bkg	bkg	na	na	na
I-105	4	na	1.5	0.7	0.3	na	na	na
I-51	na	na	0.5	2.5	1	na		
I-108	na	na	8	4	0.5	na	na	na
I-93	na	na	bkg	bkg	bkg	na	na	na
I-94	na	na	bkg	bkg	bkg	na	50K cpm	na
I-35	na	na	0.7	0.5	0.4			
I-37	na	na	0.4	0.3	0.2			
I-40	na	na	0.6	0.4	0.2			
I-44	na	na	0.3	0.2	<.2			
I-4	na		0.6	0.4	0.2	na		
I-54	na	na	3	1.5	0.5	na	na	na
I-55	na	na	0.2	0.2	0.2	na	na	na
I-56	na	na	0.2	0.2	0.2	na	na	na
I-57	na	na	0.2	<.2	<.2	na	na	na
I-63	na	na	0.2	0.2	0.2	na	na	na
I-68	na	na	0.2	0.2	0.2	na	na	na
I-82	na	na	bkg	bkg	bkg	na	na	na

)UNT RATE SIZE cc	WEIGHT gm	LOADED pig mr/hr	Information on source SN	Radionucle Source	Info on PIC	OW RO2 mR/hr	2929 Date loose DPM/smea	2929 Date loose DPM
4CFT	11350	na	TRASH	none	N	N	N	N
5CF	9080	na	TRASH	AM ROOM	N	N	N	N
7.5FT3	18160	na	DRUM	none	N	N	N	N
26000	10160	na	TRASH	none	N	N	N	
29000	31780	na	TRASH	none	N	N	N	
3cf	9080	na	Trash, wood, paneling		na	bkg		
7.5cf	3178	na	PC's only		na	bkg	na	na
2ft3	9080	na	board		na	bkg	na	na
1.5ft3	13620	na	bag debris b2/r1		na	45	na	na
2.5ft3	13620	na	bag debris		na	6	na	na
1.5cf	9080	na	item 51			10		
3cf	40	na	Bag of trash		na	35		
3cf	11350	na	Wood,metal debris		na	bkg	na	na
1.5cf	9080	na	Pipe		na	bkg	5000 dpm	na
2cf	20lbs		item 35			1.5		
2cf	10lbs		item 37			5		
1.75cf	15lbs		item 40			10		
1.75cf	12lbs		item 44					
50000	3178	na	item 3					
.25 cf	2lbs	na	Electric device		na	400	1200	500k
1cf	2.5lbs	na	Plastic beakers, broke		na	5	1200	500k
1cf	4lbs	na	Rope, plastic, trash		na	4	1200	500k
1000	252	na	Trash & plastic		na	10	1200	500k
0.75	4lbs	na	Bag of trash		na	4	1200	500k
2cf	15	na	Trash (PC's)		na	0.2	1200	500k
2.5cf	16350	na	RU192 20 gallon drum		na	bkg	200k	na

Basis of Ra	Radionuclide Isotope	Basis of ad	Activity mCi	Class AU Limit uCi/cc
Digidart	AM-241,CS-137			
Digidart	AM-241,EU-154,EU-152, co-60			
Digidart	AM-241			
Digidart	CS-137,AM-241,EU-154			
Digidart	CS-137,AM-241,CO-60, Ag-108m			
Digidart	Am-241			
Digidart	Am-241, Ra-226			
Digidart	Am-241			
Digidart	Cs-137, Am-241, Ag-108m, Eu-154			
Digidart	Am-241, Ag-108m, Cs-137, Co-60			
Digidart	Am-241, Ag-108m, Eu-154			
Digidart	am-241, agMicroshield			
Digidart	Am-241			
Digidart	Am-241, Cs-137			
Digidart	Ag108m Ir192 Cs137	reshoot		
Digidart	Am241 Eu152 Eu154	reshoot		
Digidart	Am241 Ag108m Eu154	reshoot		
Digidart	Ag109m Cs137 Am241	reshoot		
Digidart	Am-241			
Digidart	Am-241,Eu-154,Cs-137			
Digidart	Am-241, Ag-108m,Eu-154,Cs-137			
Digidart	Am-241, Ag-108m,Eu-154,Cs-137			
Digidart	Am-241,Eu154, Ag108M, Cs-137			
Digidart	Am-241, Cs-137, Ag-108m			
Digidart	Am-241, Eu-155, Eu-154, Ag-108m, Cs-137			
Digidart	Am-241			

Sorting For TRU Waste

1. Does it have Am-241 — all do
2. Is the on Contact Dose Rate <13 ur greater than BKG? Cannot tell for Site
3. Is the Am-241 Greater Than 1% total Activity? — none less than 1%
4. Is the Am-241 Greater than 10 nci/gram?
5. Is the activity insignificant to the over all activity of IP Box?

Item/Source	Radinuclides	mr/hr on Contact Dose Rate	Weight Grams	% Ratio Cs-137	% Ratio Am-241	% Ratio Co-60
133	CS-137,AM241	na	600	42%	50%	0%
I-23	CS-137,AM-241,EU-154,EU-152	1.5	9080	0%	98%	0%
I-25	CS-137,AM-241	<	18160	0%	100%	0%
I-7	AM-241,CS-137	10	70	27%	73%	0%
I-8	AM-241,CS-137, Eu-154	10	70	11%	88%	0%
I-9	AM-241,CS-137, Eu-154	5	68	30%	66%	0%
I-10	AM-241,CS-137	5	68	50%	50%	0%
I-11	AM-241,CS-137	4	775.3	40%	60%	0%
I-12	AM-241,CS-137	20	4540	50%	50%	0%
I-13	AM-241,CS-137, co-60	1.5	381	73%	26%	1%
I-16	AM-241,CS-137	0.2	59	44%	56%	0%
I-17	CS-137,AM-241,EU-154	5	10160	29%	58%	0%
I-18	CS-137,AM-241,CO-60, Ag-108m	1	31780	35%	14%	8%
I-19	AM-241,CS-137	50	22	59%	27%	0%
I-33	Cs137 Co60 Ag108m Am241	0.5	36320	75%	9%	0%
I-35	Ag108m Ir192 Cs137 Co60 Am241	0.7	9080	87%	6%	2%
I-37	Am241 Eu152 Eu154 Ag108m	0.4	4540	3%	5%	0%
I-40	Am241 Ag108m Eu154 Co60	0.6	6810	70%	7%	3%
I-44	Ag109m Cs137 Am241 Co60 Ir192	0.3	5448	52%	12%	1%
I-4	Am-241	0.6	3178	0%	100%	0%
I-53	Eu-155, Am241, Ra-226, Eu154, Ag108m, Cs	4	1362	1%	4%	0%
I-54	Am-241,Eu-154,Cs-137	3	908	26%	73%	0%
I-56	Am-241, Ag-108m,Eu-154,Cs-137	0.2	1816	39%	43%	0%
I-63	Am-241, Cs-137, Ag-108m	0.2	1816	75%	16%	0%
I-68	Am-241, Eu-155, Eu-154, Ag-108m, Cs-137	0.2	15	9%	22%	0%
I-78	Am-241, Ra-226, Cs-137	bkg	42222	0%	76%	0%

I-79	Am-241	bkg	2270	0%	100%	0%
I-81	Am-241	bkg	1362	0%	100%	0%
I-84	Am-241	bkg	45400	0%	100%	0%
I-85	Am-241, Cs-137	bkg	5902	2%	98%	0%
I-91	Am-241, Ra-226	bkg	3178	0%	86%	0%
I-92	Am-241	bkg	2270	0%	100%	0%
I-93	Am-241	bkg	11350	0%	100%	0%
I-98	Am-241	bkg	1362	0%	100%	0%
I-102	Am-241	bkg	9080	0%	100%	0%
I-103	Cs-137, Am-241, Ag-108m, Eu-154	0.3	13620	25%	39%	0%
I-105	Am-241, Ag-108m, Cs-137, Co-60	1.5	13620	51%	12%	5%
I-51	Am-241, Ag-108m, Eu-154	0.5	9080	0%	20%	0%
I-80	Am-241	bkg	42222	0%	100%	0%
I-82	Am-241	bkg	16350	0%	100%	0%
I-83	Am-241	bkg	9080	0%	100%	0%
I-88	Am-241	bkg	96656.6	0%	100%	0%
I-89	Am-241	bkg	9080	0%	100%	0%
I-99	Am-241	bkg	2724	0%	100%	0%
I-100	Am-241, Cs-137	bkg	2724	30%	70%	0%
I-94	Am-241, Cs-137	bkg	9080	60%	40%	0%
I-97	Am-241	bkg	6810	0%	100%	0%
I-77	Am-241	0.2	42222	0%	100%	0%
I-64	Am-241, Cs-137, Ag-108m	0.2	172	92%	6%	0%
I-57	Am-241,Eu154, Ag108M, Cs-137	0.2	252	11%	16%	0%
I-55	Am-241, Ag-108m,Eu-154,Cs-137	0.2	1135	10%	14%	1%
I-22	AM-241,CS-137	1	11350	68%	32%	0%

% Ratio Eu-154	% Ratio Eu-152	% Ratio Ag-108m	% Ratio Ra-226	% Ratio Eu-155	% Ratio Ir-192
8%	0%	0%	0%	0%	0%
1%	2%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
1%	0%	0%	0%	0%	0%
4%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
13%	0%	43%	0%	0%	0%
0%	0%	0%	0%	0%	0%
13%	0%	16%	0%	0%	0%
0%	0%	4%	0%	0%	2%
34%	10%	48%	0%	0%	0%
16%	0%	3%	0%	0%	0%
0%	0%	28%	0%	0%	7%
0%	0%	0%	0%	0%	0%
32%	0%	2%	44%	18%	0%
1%	0%	0%	0%	0%	0%
9%	0%	9%	0%	0%	0%
0%	0%	9%	0%	0%	0%
59%	0%	4%	0%	6%	0%
0%	0%	0%	24%	0%	0%

0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	14%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
19%	0%	16%	0%	0%	0%
0%	0%	33%	0%	0%	0%
57%	0%	23%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	2%	0%	0%	0%
68%	0%	5%	0%	0%	0%
60%	0%	15%	0%	0%	0%
0%	0%	0%	0%	0%	0%

Radioactive Waste Broker & Processor Services,[1] CRCPD Notes of 30 Jan. 2002

Firm	States served	Contact	Voice Phone	Fax	e-mail	Will do:[1] Mixed Waste	Import Export	Rad.Mat. Identif.[2]	Decay storage	Incin. & Rtn.	Compact & Rtn.	Stabil.& Pkg.[3] Specialty
ADCO Services	All	Lon Warbiany	708/429-1660	-9759	jbell@adcoservices.com	Yes	Yes	No+	$T_{\frac{1}{2}}$<120d	Broker	Broker	U & Th
Applied Health Physics	N.East	Vince Petriano	412/835-9555	-9559	ahp@icubed.com	Yes	Yes	Yes+	<6 Mo.	Broker	Broker	
Bionomics	E & Mid-W	John McCormick	800/576-6513	865/376-4291	John-bionomic@home.com	Yes	Some	Yes	Broker	Broker	Broker	U & Th
Chase Environmental	All	John O'Neil	865/584-0833	584-1961	jonel@chaseenv.com	Yes	Yes	Yes	Broker	Broker	Broker	
Ecology Services	East	Ruth Rilee	800/932-7299	410/381-2602	rrilee@ecologyservices.com	Yes	Yes	Yes+	Broker	Broker	Broker	Mixed waste
Duratek	All	Donnie Brackett	865/220-1526	-1643	dbrackett@duratekinc.com	LSC	Yes	Yes	Broker	Yes	Yes	Diverse Mat.
New World Technol.	West	Tom Dias	925/443-7967	-0119	tom@newworld.org	Yes	Yes	Yes+	No	No	No	Diverse Mat.
NSSI	South	Robt. Gallagher	713/641-0391	-6153	rdgallagher@nasihouston.com	Yes	Yes	Yes+	Yes	Broker	Broker	Mixed waste
Philotechnics	All	Don Hartche	865/483-1551	-1530	ajarnbrust@philotechnics.com	Yes	Yes	Yes+	Broker	Broker	Broker	Contam. Pkgs.
RACE	Mid-south	Gerald Webb	901/775-0690	-0629	webbgerald@cs.com	No	Yes	No	<1 Yr.	Broker	Yes	Large Equip.
Radiac Research	NYC	Art Green	718/963-2233	388-5107	agreen@radiacenv.com	LSC	Some	Yes	Yes	Some	Broker	Broker
Rad'n. Safety Assoc.	Atlantic	Paul Steinmeyer	860/228-0467	-4402	rsa@radpro.com	Some	Yes	Yes+	No	Broker	Broker	MgTh, NiTh
R.M. Wester	Mid-West	Robert Wester	636/828-9628	-9657	RMRWW1@aol.com	Yes	Yes	Yes+	<6 Mo.	Broker	Broker	Broker
RSO, Inc.	East	David Wellner	301/953-2482 x306	497-6363	dwellner@rsoinc.com	Yes	Yes	Yes	Yes	Broker	Broker	Organics
Solutient Technologies	All	John Kowal	412/885-7434 330/497-5905	-7535 -2045	jkowal@nb.net	Yes	Yes	Yes	Broker	Broker	Broker	
Thomas Grey Assoc.	All	Richard Gallego	714/997-8090	-3561	regallego@qwest.net	Yes	No	Yes	$T_{\frac{1}{2}}$<90d	Broker	Yes	Liquids
Waste Ctrl. Specialists	All	Bill Domsife	717/540-5220	-5102	wcs-oak-ridge@msn.com	Yes	Yes	No	Yes & Ra	Broker	No	RCRA &

TSCA listed

WCS - Jeff Shouse — 888-789-2783

Dan Jones - Grammatron (713) 641-3640

1 All firms deal with leaking sources, contamination, diffuse NORM, burial permits, packaging & transport; most offer training & calibration.
Additional NORM firms are on Site Ident. & Decon. list, see www.crcpd.org 'Free Documents,' 'Commercial Services.'

2 Identification of radionuclides and amounts in unmarked packages or in contamination. + indicates firms that provide mail-out leak test kits.

3 For processing services, only principle waste types are identified. Other processing firms are Diversified Technology for resins, sludges & liquids, Jim Mooney, 865/539-9000 ext 30, fax -9001; Envirocare, Layne McCleary, 801/532-1330, fax 537-7345, for resins, soils, rubble and other solids including mixed waste; International Uranium, Michelle Rehmann, 303/389-4131 fax -4125 for 11e.2 material & other U_{nat}; for metals and equipment: Alaron 513/583-1744; Starmet-NMI, Don King, 800/227-1401 ext 1; Duratek and NSSI (above).

Some firms that transport Rad. Mat. are: Hittman Transport 800/233-9933; Tri-States Motor Transit-Trism Environ. 800/234-8768; Kindrick Transport 865/882-0457; Roadway 800/257-2637 opt.4; TAG Transport 865/354-8927; ADCO and RSO Inc. (see entries above).

For assistance with LowTrack manifesting, contact Ron Fuchs, ML Technologies, 877/502-7705, rfuchs@mltech.com

Please provide corrections to Terry Devine, Ph. 502/227-4543, fax 502/223-7026.

This information is not to be construed as an endorsement by CRCPD, Inc., of the services identified in this list.

Containerize in casks?

Linda
Roger Winklerner

1. Get rid of
   - Disposed of!
2. Don't ripe me off!
   - $2 day/cubic ft
3. Recomm
4. Quickly
5. Despose
6. Be honest!
7. How long in bus
8. Storage of waste
9. Offered services to others
10. License

Low level waste Policy Act

Department of Energy
Washington, DC 20585

DRAFT

Mr. Greg A. Cooke, Regional Administrator
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Cooke:

The Deputy Secretary of Energy has asked me to respond to your letter of March 11, 2002, requesting the Department of Energy (DOE) to quickly accept Greater-Than-Class C (GTCC) waste being generated at a Superfund site. The DOE has a program that can accept GTCC sealed sources. Your contractor has been in touch with that program and we believe the sealed sources can be accepted in the near future.

The DOE does not have any programs in place to accept the other types of GTCC waste being generated at the cleanup site. For this reason, the DOE is not able to provide any near term assistance for these wastes. If it is necessary to move the waste in the next several months, we recommend that you use an appropriate licensed commercial storage facility.

We will continue to discuss these issues with you over the coming months to determine a path forward for your GTCC waste. Ms. Patrice Bubar, Associate Deputy Assistant Secretary, Office of Integration and Disposition, will be the point of contact to work with you on this issue. She can be reached at (202) 586-5151.

If you have any further questions, please contact me at (202) 586-7709, or Ms. Betty A. Nolan, Office of Congressional and Intergovernmental Affairs, at (202) 586-7328.

Sincerely,

Jessie Hill Roberson
Assistant Secretary for
Environmental Management

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

MAR 11 19[illegible]

Mr. Francis S. Blake
Deputy Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Secretary Blake:

The purpose of this letter is to ask for assistance in the disposal of "greater than Class C" radioactive waste material found at a Superfund cleanup site in Texas. An immediate public health threat exists at this site, and the U.S. Environmental Protection Agency (EPA) needs to remove this material as quickly as possible.

The Texas Department of Health - Bureau of Radiation Control, has asked for Superfund assistance to clean up a radiologically contaminated site, known as Gulf Nuclear, Incorporated, located in Webster, Texas (south of Houston, Texas). This facility is located adjacent to a medical facility and a breast screening center.

In the process of cleaning the facility, we identified five glove boxes contaminated with americium-241, "greater than Class C" radioactive waste. These glove boxes are the only "greater than Class C radioactive waste" we have located thus far. However, we have found false walls hiding additional radiological sources. Without complete emptying and demolition of the building, followed by removal of the slab, there is no feasible way to determine if other "greater than Class C" radioactive wastes are located at the site.

The glove boxes are relatively small, and for radiological safety reasons (highly contaminated with neutron radiation ranging from 20 mR/hour to 400 mR/hour), we believe we cannot disassemble them. Although we searched our known resources, we were unable to locate a source which could safely dispose of these glove boxes. We need your help in disposing of these boxes.

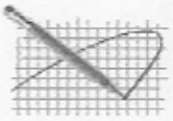
The EPA has begun cleanup of the site, which will include the complete dismantling and removal of all buildings at the site. As a result, no single structure to store the glove boxes will remain, and any delay in the removal of these boxes will cause further delays or potentially

shutdown of the removal project. The uncertainty of the disposition of these glove boxes is already slowing site cleanup, and we need to have the glove boxes off the site by April 22, 2002, in order to reassure the community that the site is radiation-free.

Any assistance you can provide would be appreciated. If you have any questions, please give me a call at 214.665.2100, or your staff can call Charles Gazda, Chief of the Response and Prevention Branch, at 214.665.2270. Technical questions about the cleanup should be addressed to Greg Fife, the EPA On-Scene Coordinator for this site. He can be reached at 214.789.2879. I look forward to hearing from you in the near future.

Sincerely yours,

Gregg A. Cooke
Regional Administrator



Greg Fife
04/24/02 04:59 PM

To: George Brozowski/R6/USEPA/US@EPA, Chris Petersen/R6/USEPA/US@EPA
cc:
Subject: additional clean up of glove boxes tech

In addition to the Solutient man, Kowal, the contractor is exploring the possibility of using the same technology from the same company who is doing the glove box decon at Rocky Flats. The process uses a high-dollar solvent that is recycled over the surfaces of the boxes. The end result is the waste minimization, but he offers no disposal of the americium removed.

We actually thought that our boxes would probably end up in line to be decon'ed by this company, after DOE took the boxes. We wanted to avoid handling the boxes as much as we could here. However, it looks like we have no choice but to do it here, at least the waste volume reduction.

The guy doing the decon for DOE at Rocky Flats has given a nonbinding estimate of the cost at around $240,000, again exclusive of disposal of the americium waste.

Randy Martin
Environmental Alternatives
640 Marlboro Street, Route 101
Keene, NH 03431
603-352-3888

George Brzuwski

Facsimile Transmittal

Environmental Alternatives, Inc.
640 Marlboro Street, Route 101
Keene, New Hampshire 03431
Phone: (603) 352-3888
Fax: (603) 352-3899

Enviroalt1@aol.com

Send to:	Post-it® Fax Note 7671	Date	# of pages ▶
	To Chris Peterson	From Eric	
Company:	Co./Dept. & Geo Broz	Co.	l Alternatives, Inc.
Date: 3/6	Phone #	Phone #	on Requested
Fax Numb	Fax #	Fax #	2-3888

- ☐ Urgent
- ☐ Reply ASAP
- ☐ Please comment
- ☐ Please Review
- ☐ For your Information

Total pages, including cover: 8

Comments:

Dear Jim,

Attached please find the additional information that you had requested in our phone conversation yesterday. I have highlighted in bold italics, the section of the introduction page of our statement of qualifications that lists EAI's technologies and capabilities. Included in this transmittal is the technical write up that explains the chemical extraction process in more detail.

I look forward to receiving more information about the scope of work from you and appreciate your interest in our capabilities. This project seems to be a good match for our technologies and we are extremely interested in working with you and your staff.

Should you have any questions or require any additional information, please do not hesitate to contact me.

INTRODUCTION

Environmental Alternatives, Inc. (EAI) was founded in 1989 to provide advanced cleaning technologies to the nuclear, industrial, and aerospace industries. ***EAI is dedicated to bringing safe, environmentally acceptable cleaning and waste minimization services to its clients and offers them a complete line of premier technologies such $C0_2$ blast cleaning, Chemical Extraction, and AIM (absorbent impregnated media). EAI also offers most forms of conventional processes to include multi-media dry abrasives, liquid abrasives, high pressure water blasting, scabbling, scarification and concrete shaving for a broad range of cleaning and decontamination applications.***

Headquartered in New England, EAI has provided remediation services throughout the world. The turnkey cleaning systems are mobilized to each site along with a staff of trained and qualified personnel. Multiple rigs and crews are at work throughout the United States performing a wide range of services for nuclear shutdowns, steam generator replacements, environmental cleanup actions and fossil power plant annual outages.

This Statement of Qualifications demonstrates our capabilities to provide radionuclide decontamination, environmental remediation for hazards such as PCB's and lead, as well as, industrial cleaning projects.

EAI's project experience includes the following (partial list):

NUCLEAR DECONTAMINATION

Decontamination Project — **General Atomics/DOE**

EAI performed a three-month decontamination project on 100,000 pounds of lead as part of a facility decontamination and decommissioning (D&D) program. Over the course of the project, 99 percent of all materials were free released.

Decontamination Services — **Cintichem/DOE**

As part of a facility D&D program, EAI was subcontracted to provide decontamination services. During the course of the project, 80,000 pounds of lead (including lead sheets, bricks, blankets, pigs, and scrap) were decontaminated to free release criteria.

Hot Cell Decontamination Services — **Confidential Client**

As part of a facility D&D project, EAI was subcontracted to provide decontamination services with the goal of achieving free release of six 30-year-old hot cells while minimizing secondary waste and generating zero mixed waste. All six hot cells were decontaminated to free release levels over a six-week period.

3.0 Category C - Decontamination Technology

3.1 Chemical Extraction Process Description

The chemical extraction process employs as many as 25 different components in four separate chemical formulations, which are used in sequence to accomplish the extraction of contaminants. The first two chemicals are surface preparation formulas (0300 and 0200) which contain complex blends of acids and other chemical agents to clean dirt, oil, grease and other interferences from the surface. These blends also solubilize in-organics and organics and prepare the substrate by establishing proper conditions for the extraction step. Most importantly, the sequencing and timing for application of these allows for a synergistic chemical combination. Each formula has an important role on its own, but when 0200 is overlaid on 0300, the resulting, complex compounds have a powerful ability to put even the most insoluble, inorganic oxides into solution.

The extraction blend (0100) uses advanced chemistry in the fields of micro emulsification and chemical ion exchange, and is central to the overall technology. The extraction technique uses these blends to interact with contaminants at the molecular level. In essence, the extraction solution penetrates below the surface and binds itself to the contaminants, then pulls horizontally and vertically through the microscopic pores to the surface. Additional components of the formula encapsulate the contaminants to prevent them from recontacting and thereby recontaminating the surface, keeping them in suspension until they can be removed during the rinse step. A final formulation (0400) is used in situations where extra solvency is desirable.

The chemical formulations used in the technology satisfy OSHA Section SVIII, 29 CRF 191.1200, containing no hazardous components regarding flammability or reactivity (as per 40 CRF 261). They are carefully designed to prevent the release of any harmful fumes. Even though low and high pH blends are used in the process, the pH at disposal is close to 7, and the liquids are non-corrosive. Our products do not contain components which would classify them as hazardous for disposal under TCLP testing. As a result, the waste stream from a project can be characterized based on the contaminants which were extracted.

The chemistry is based on several hypotheses relating to contaminant migration and removal. The first hypothesis is that contaminants migrate along the grain boundaries and into pores and microscopic voids (Kirkendall effect) of a material, even for seemingly non-porous media. Mobility of the contaminants, time, and secondary forces often drive these contaminants to deeper levels in the substrate. Furthermore, contaminants tend to become chemically or electrostatically bonded to the substrate. In many cases, the time between the contamination event and decontamination efforts will allow the contaminant migration pathways to become partially closed.

All of these factors point to the need for a sophisticated chemical system which:

- Reopens the pores and capillary pathways to the maximum possible extent,

- Penetrates into the pores as deeply as possible,
- Breaks the electrostatic and chemical bonds which hold the contaminants in place,
- Complexes or sequesters the contaminants to prevent recontamination,
- Activates the capillary rise effect. (Young and Laplace equation).

The chemical formulas are designed to address each of these complex needs, using over 25 components to incorporate dissolution, oxidation, reduction, hydrolysis, decomposition, wetting, complexation, microencapsulation, and flotation chemistry principles. The chemistry further compensates for situations in which the contamination is a mixture of pure elements, oxides, and related compounds with varying solubility indices. The spent chemical solutions, without contaminants, do not contain any TCLP constituents and have been disposed of by incineration, solidification (and land disposal), and discharge to liquid effluent treatment systems.

The technology is a tailored process for applying and removing each of the chemicals in the right sequence and combinations to achieve optimal results. In most projects, three different chemical formulas are used. Chemicals are applied in low volumes, usually as a spray, to minimize consumption and secondary waste volume. After being applied, the chemicals are scrubbed into the contaminated surfaces, left to dwell for a defined time, and rinsed and removed. The application and removal of all three formulas constitutes one cycle of the process, and typically requires one day (24 hours). Sampling and/or surveys can be performed at the end of any cycle, and often shows reduction of 90% or more per cycle.

The chemical extraction process has been found to be most applicable in remediation or decontamination projects when one or more of the following conditions apply:

- The acceptable level for any residual contaminant is very low (e.g., free release 1,000 dpm/100 cm^2 or lower),
- Simple surface cleaning is ineffective,
- Disposal is undesirable, either because the volume and resulting disposal and replacement costs are too high, or due to resource recycle or waste minimization objectives,
- Significant safety concerns such as flammability, corrosivity, creation of airborne contaminant particles, fugitive emissions or generation of toxic fumes and/or explosive gases – are raised.
- Decontamination is to be performed on surfaces that are not flat and horizontal, such as walls, ceilings, structural beams, and internal piping.

For radioactive-contaminated metals, this method is particularly applicable in situations involving equipment which is needed for ongoing operations or for return to a vendor, when there is a high salvage ("as is") value, when the scrap value is much higher if unrestricted release is achieved, or when other factors make metal melting (and restricted use) impracticable or unacceptable. For radioactively-contaminated concrete, the process offers the potential to avoid the high costs associated with demolition and disposal of large waste volumes.

This sequence of applying, rinsing, and removing each of the chemical formulations constitutes one extraction cycle and takes less than one day. This cycle is repeated as needed until the desired residual contaminant levels are achieved. Sampling can be done at the end of any complete cycle to determine specific levels. Normally, we can accurately predict how many cycles will be required, thereby reducing the need for intermediate sampling. Our experience is that many projects can expect contaminant reduction rates in excess of 90% per cycle, and as high as 99% in some cases.

Chemicals are normally atomized and applied as a fine spray to minimize the volume of chemicals used and the resultant waste. Large volumes are not necessary for the extraction process to be successful. In fact, typical liquid waste volumes are only 0.04 to 0.10 gallons per square foot for the entire project. The extraction process does require that the chemicals make good contact with all surfaces. To do this, the chemicals are rubbed onto the surface manually or with automated machinery (i.e. floor scrubbers). Crew size depends on the size of the job, time requirement, and available working space.

TYPES OF CONTAMINANTS EXTRACTED

The chemical technology can be used to remove a wide variety of contaminants from porous surfaces and substrates. This is made possible through tailoring of the chemistry and process for individual contaminants and other project-specific factors. We have focused our developmental efforts on those contaminants which are particularly difficult to remove and which have extremely low acceptable levels for clean-up, but can make appropriate modifications for other contaminants. A list of some of the contaminants which can be extracted follows:

Radionuclides (including Transuranics)

The chemical process initially demonstrated its abilities to extract radioactive contaminants for the Department of Energy, but similar applications exist in the nuclear utility, fuels processing, medical equipment, and oil and chemical (NORM) industries as well. We have developed chemistry and applications for the deradiation of concrete floors and walls, metal working equipment, tools, lead bricks/shielding, clothing, internal piping, evaporation basins, and holding tanks. The process is effective on **both surface and fixed contaminants**, as verified by surface smears and by alpha, beta/gamma, and x-ray detectors. Our approach offers the significant economic advantages of reusing tools and equipment, of "reclassification", or of drastically reduced disposal costs.

PCBs

Polychlorinated biphenyls (PCBs) were the original focus for the extraction technology. As such, we have had extensive experience in removing all types of PCBs from an array of substrates. This technology is particularly effective when old spills and higher Arochlor type PCBs are involved, due to the 95 and 99% per cycle (one crew day). Where other processes plateau at unacceptable levels, our contaminant extraction process **has consistently succeeded** in achieving the EPA's 10 ug per 100 cm2 level, and has reached **non detect levels** (less than 1 microgram) when required. This allows for full release by the EPA, rather than the paperwork and liability of obtaining a variance with ongoing monitoring.

Heavy Metal

Heavy metal contamination is prevalent throughout the industry and is particularly problematic due to the low levels which are required to avoid classification as "hazardous". Heavy metal extraction formulas and processes have been developed to deal with the most challenging constituents, including **lead, arsenic, and mercury**. Reduction rates for heavy metals are typically 80% to 90% per cycle, leading to levels below regulatory thresholds and possible declassification or "clean closure" certification.

Organics, Herbicides, and Pesticides (TCLP and RCRA Constituents)

In addition to the other categories of contaminants, we have successfully modified the technology to address the other hazardous constituents on the TCLP list. As with other contaminants, the process is most applicable when reduction to below regulatory levels will result in substantial economic benefits to the customer, due to opportunities for "delisting" or non-hazardous disposal.

TYPES OF SURFACES AND SUBSTRATES

The chemical extraction technology is designed to work well on any porous surface, ranging from those with a great number of capillary channels or "breathable veins" to those with a small number of very "tight" capillaries. In all cases, the process introduces the proprietary chemical formulations through the capillaries, **penetrating below the surface and into the underlying substrate**. By attaching surface and subsurface contamination, the maximum degree of decontamination is attained. Specific types of surfaces and substrates where the extraction process is effective include:

- Concrete
- Brick, cinder block, and red tile
- Asphalt
- Transite
- Wood
- Cast iron and other metals
- Steel and stainless steel
- Exotic metals

The degree of subsurface penetration is obviously dependent on the nature of the capillary structure. For porous materials such as concrete and wood, very deep extraction is possible. With metals, contaminants become entrapped or bonded in boundary grains and voids, in minor imperfections, and in the oxide layer. While the depth of contaminant penetration is much less in metals than concrete, thorough decontamination still requires a sophisticated approach.

Client core sampling has shown that the chemistry is effective in extracting contaminants. Cases have been documented where contaminants have been extracted from concrete at **depths of more than two inches**. In addition to this core data, analyses of the spent chemicals from several projects have shown high levels of the target contaminants, confirming the extraction mechanism. Results with fixed radionuclides indicate extensive decontamination, regardless of the depth of the particles.

A unique aspect of the technology is that the extraction occurs in both horizontal and vertical directions. This further enhances the effectiveness of the overall process. The process is **not limited to floors or other flat, horizontal surfaces**. The nature of the chemical formulas and application make the extraction technology highly effective on all types of surfaces and substrates. Successful projects have included decontamination of walls, ceilings, equipment, structural beams, internal piping and highly irregular surfaces.

WASTE MINIMIZATION

One area of growing importance to environmental service consumers is the minimization of waste and the corresponding liabilities. Regulatorily, there is increasing pressure to reward options which minimize waste volume, particularly if these options include reclamation. Economically, the cost of all disposal options continues to rise, as disposal facilities pass on the cost of ever stringent regulations. At the same time, there are obvious economic advantages for reuse if equipment and structures can be "decontaminated". Finally, there is the unanswerable question of future liabilities associated with the disposal of hazardous waste. Today's landfills and incinerators have become much more sophisticated than those of the 1950's, but the best precautions still cannot guarantee that a generator will avoid "PRP" liability 30 years from now if a selected disposal site should require remediation.

The contaminant extraction technology offers several distinct advantages in the area of hazardous waste minimization.

- **Low waste volume.** One key element of our research has been to produce the least amount of waste possible in its process. Total liquid waste from a project is typically 0.04 to 0.10 gal per square foot, and has been measured as low as 0.02 to 0.03 gal per square foot. This includes all of the chemical blends, rinsate and contaminants from all cycles from the beginning to the end of the job. The only other wastes are miscellaneous solids, such as the crew's personal protective equipment (PPE) and hand tools. We are continuing to look for ways to reduce this further.

- **Ready for disposal.** Liquid wastes are containerized in drums and are ready for shipment to the customer's chosen disposal facility. Depending on the contaminants, most customers send these wastes for incineration. If necessary, the liquid wastes can be easily solidified as well.

- **Lower liability.** Liability is reduced for the customer in two ways. First, the low volume in itself decreases liability. Second, if the customer's other remediation option is total disposal, then incineration of solids is not an alternative. With incineration of the waste liquids from the process, the generator will receive a "certificate of destruction". Furthermore, permanent "delisting" or "clean closure" status is possible after some projects.

- **Lower worker exposure.** This process is also designed to minimize exposure to both our personnel and customer personnel in the area of the project. The chemical blends are formulated to minimize or eliminate airborne contaminants.

When it comes to safety, decon effectiveness and waste minimization, our chemical technology compares very favorably to competing processes. The chemicals used in some other surface cleaning processes are inherently hazardous, tend to require much higher volumes, and are ineffective on subsurface contamination. Scarification and other physical processes produce large volumes of waste, particularly if there is significant subsurface contamination, create airborne hazards, and effectively move the problem to another location.

Equipment Requirements

The requirements necessary to apply the chemical extraction technology are very basic. First, the chemistry will be applied to the surfaces via atomized spray using 1 or 2 gallon industrial garden style sprayers. Once the chemical has been applied, the formulas are worked into the surface. This step can be done with manual means (scotchbrite, wire brush) or can be automated for faster productivity with rotary power tools.

Following the prescribed dwell time for the chemistry to remain in contact with the surface, a light atomized rinsate of DI water is used followed by a high suction vacuum extraction using nuclear grade wet/dry hepa vacuum.

…us …te	Hazardous constituents for which listed
.....	2,4-Toluenediamine.
.....	Carbon tetrachloride, tetrachloroethylene, chloroform, phosgene.
.....	Ethylene dibromide.
.....	Ethylene dibromide.
.....	Ethylene thiourea.
.....	Ethylene thiourea.
.....	Ethylene thiourea.
.....	Ethylene thiourea.
.....	Dimethyl sulfate, methyl bromide.
.....	Methyl bromide.
.....	Ethylene dibromide.
.....	Benzene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene.
.....	Benzene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene.
.....	Benzene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene.
.....	Benzene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene.
.....	Benzene, benz(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene, naphthalene.
.....	Benzene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene.
.....	Benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene.
.....	Benzotrichloride, benzyl chloride, chloroform, chloromethane, chlorobenzene, 1,4-dichlorobenzene, hexachlorobenzene, pentachlorobenzene, 1,2,4,5-tetrachlorobenzene, toluene.
.....	Carbon tetrachloride, chloroform, chloromethane, 1,4-dichlorobenzene, hexachlorobenzene, pentachlorobenzene, 1,2,4,5-tetrachlorobenzene, 1,1,2,2-tetrachloroethane, tetrachloroethylene, 1,2,4-trichlorobenzene.
.....	Benzene, carbon tetrachloride, chloroform, hexachlorobenzene, pentachlorobenzene, toluene, 1,2,4,5-tetrachlorobenzene, tetrachloroethylene.
.....	Benomyl, carbaryl, carbendazim, carbofuran, carbosulfan, formaldehyde, methylene chloride, triethylamine.
.....	Carbon tetrachloride, formaldehyde, methyl chloride, methylene chloride, pyridine, triethylamine.
.....	Benomyl, carbendazim, carbofuran, carbosulfan, chloroform, methylene chloride.
.....	Benzene, butylate, eptc, molinate, pebulate, vernolate.
.....	Antimony, arsenic, metam-sodium, ziram.
.....	Benzene.
.....	Benzo(a)pyrene, dibenz(a,h)anthracene, benzo (a) anthracene, benzo (b)fluoranthene, benzo(k)fluoranthene, 3-methylcholanthrene, 7, 12-dimethylbenz(a)anthracene.
.....	Benzene, arsenic.
.....	Benzene, arsenic.

—Waste is hazardous because it fails the test for the …teristic of ignitability, corrosivity, or reactivity.

…R 4619, Jan. 16, 1981]

…ITORIAL NOTE: For FEDERAL REGISTER ci…ns affecting Appendix VII, part 261, see

the List of CFR Sections Affected in the Finding Aids section of this volume.

APPENDIX VIII TO PART 261—HAZARDOUS CONSTITUENTS

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
A2213	Ethanimidothioic acid, 2- (dimethylamino) -N-hydroxy-2-oxo-, methyl ester.	30558–43–1	U394
Acetonitrile	Same	75–05–8	U003
Acetophenone	Ethanone, 1-phenyl-	98–86–2	U004
2-Acetylaminefluarone	Acetamide, N-9H-fluoren-2-yl-	53–96–3	U005
Acetyl chloride	Same	75–36–5	U006
1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	591–08–2	P002
Acrolein	2-Propenal	107–02–8	P003
Acrylamide	2-Propenamide	79–06–1	U007
Acrylonitrile	2-Propenenitrile	107–13–1	U009
Aflatoxins	Same	1402–68–2	....
Aldicarb	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime.	116–06–3	P070
Aldicarb sulfone	Propanal, 2-methyl-2- (methylsulfonyl) -, O-[(methylamino) carbonyl] oxime.	1646–88–4	P203
Aldrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-.	309–00–2	P004
Allyl alcohol	2-Propen-1-ol	107–18–6	P005
Allyl chloride	1-Propane, 3-chloro	107–18–6	....
Aluminum phosphide	Same	20859–73–8	P006
4-Aminobiphenyl	[1,1′-Biphenyl]-4-amine	92–67–1	....
5-(Aminomethyl)-3-isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	2763–96–4	P007
4-Aminopyridine	4-Pyridinamine	504–24–5	P008
Amitrole	1H-1,2,4-Triazol-3-amine	61–82–5	U011
Ammonium vanadate	Vanadic acid, ammonium salt	7803–55–6	P119
Aniline	Benzenamine	62–53–3	U012
Antimony	Same	7440–36–0	....
Antimony compounds, N.O.S. [1]	....	....	....
Aramite	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester.	140–57–8	....
Arsenic	Same	7440–38–2	....
Arsenic compounds, N.O.S. [1]	....	....	....
Arsenic acid	Arsenic acid $H_3 AsO_4$	7778–39–4	P010
Arsenic pentoxide	Arsenic oxide $As_2 O_5$	1303–28–2	P011
Arsenic trioxide	Arsenic oxide $As_2 O_3$	1327–53–3	P012
Auramine	Benzenamine, 4,4′-carbonimidoylbis[N,N-dimethyl.	492–80–8	U014
Azaserine	L-Serine, diazoacetate (ester)	115–02–6	U015
Barban	Carbamic acid, (3-chlorophenyl) -, 4-chloro-2-butynyl ester.	101–27–9	U280
Barium	Same	7440–39–3	....
Barium compounds, N.O.S. [1]	....	....	....
Barium cyanide	Same	542–62–1	P013
Bendiocarb	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate.	22781–23–3	U278
Bendiocarb phenol	1,3-Benzodioxol-4-ol, 2,2-dimethyl-,	22961–82–6	U364
Benomyl	Carbamic acid, [1- [(butylamino) carbonyl]-1H-benzimidazol-2-yl] -, methyl ester.	17804–35–2	U271
Benz[c]acridine	Same	225–51–4	U016
Benz[a]anthracene	Same	56–55–3	U018
Benzal chloride	Benzene, (dichloromethyl)-	98–87–3	U017
Benzene	Same	71–43–2	U019
Benzenearsonic acid	Arsonic acid, phenyl-	98–05–5	....
Benzidine	[1,1′-Biphenyl]-4,4′-diamine	92–87–5	U021
Benzo[b]fluoranthene	Benz[e]acephenanthrylene	205–99–2	....
Benzo[j]fluoranthene	Same	205–82–3	....
Benzo[k]fluoranthene	Same	207–08–9	....
Benzo[a]pyrene	Same	50–32–8	U022
p-Benzoquinone	2,5-Cyclohexadiene-1,4-dione	106–51–4	U197
Benzotrichloride	Benzene, (trichloromethyl)-	98–07–7	U023
Benzyl chloride	Benzene, (chloromethyl)-	100–44–7	P028
Beryllium powder	Same	7440–41–7	P015
Beryllium compounds, N.O.S. [1]	....	....	....
Bis(pentamethylene)-thiuram tetrasulfide	Piperidine, 1,1′-(tetrathiodicarbonothioyl)-bis-	120–54–7	....
Bromoacetone	2-Propanone, 1-bromo-	598–31–2	P017

"Not otherwise specified"

OFFICE OF RADIATION AND INDOOR AIR

214-789-2879

AGENDA FOR REGIONAL CONFERENCE CALL

April 3, 2002

Our regional call is set for **Wednesday**, **April 3** from **1:00 to 2:30 EST** in **Room 6409.**
The call-in number is **260-1015** and the access code is **9737** #.

Call Lead - Dennis O'Connor

1:00 - 1:05	Sign On
1:05 - 1:15	WIPP Update - Ray Lee
1:15 - 1:30	CRCPD Meeting, May: Mary Clark, Dennis O'Connor - Who is attending - EPA Presentations and Meeting
1:30 - 1:50	Review of National Meeting: Dennis O'Connor - Review of Action Items - Discussion of meeting summary
1:50 - 2:00	IED Update - Simon McNabb
2:00 - 2:10	Open Time

internet.epa.gov/oria/pno
└ carmen romero – webmistress

NOTES:

The next ORIA Regional Conf. Call is scheduled April 17, 2002.

Bionomics - Kingston TN
Paul Nipper - QA

* Commercial side - no options!
Refuse to?
Duratek 865-220-1629
Jim Harney
└ No shallow land sites will take it
* Hanford) may take it!
NTS -)
Hendaford - Virgel Blanchard -

Solutient Tech - John Koval
* email pictures JKoval@nb.net
? Restrictions to Barnwell (WAC)
? Activity levels => analytical data
Initial Knock-down - fixed conten
Wrapped - brought into tent
=> Wash & water => waste solutify it!
Tent #2 - fiber/sponge media & aluminoxide

Conf Call

Ray Holmes - Sol Tech
Ray Worley - OERR Ri R6 Coord
Dell Reese - Sol Tech Ops Man
Greg Fike - OSC / Jim Langston JJ
Gregg Dempsy - LV
Mick Neely - OR SD

1105 - Fike started call
> Class C waste 100nCi/gm
CFR 61.55
Brown powder in boxes - Am oxide = one gallon
Bellipum - long term storage - disposal
WCS - Andrews TX

Private Call
GD
GF/JL
GRB
} ST not too helpful

BNL - ext fine red mat
mix c polyethelyne (plastic)
good moder for neutrons

Frank Marcinowski
04/18/02 06:52 AM

To: George Brozowski/R6/USEPA/US@EPA
cc:
Subject: Glove box letter

Here is the latest from DOE on the status of their response. I'll let you know more as soon as I do, but the response will be along the lines I outlined in my voice mail to you earlier this week. That is -- they won't be able to get things in place to take the boxes in time to meet an April deadline. So, you might want to consider the alternative of moving them to that other future removal location so you can continue efforts at this gulf nuclear site.

----- Forwarded by Frank Marcinowski/DC/USEPA/US on 04/18/02 07:48 AM -----

Andrew.Wallo@eh.doe.gov
04/17/02 05:40 PM

To: Frank Marcinowski/DC/USEPA/US@EPA
cc:
Subject: Glove box letter

Frank,

I am sorry I didn't get back to you earlier. I have been out sick and just returned today. I called but it was after 5 and your phones didn't answer so I thought I'd send this.

The letter has been draft and gone through GC. It is EM-1's office for signature. I have not yet seen the revised letter so I can't tell you its exact contents or what has been change from the draft we saw weeks ago. I hope to get a copy Thursday and hopefully will get a detailed update at that time.

andy

1100 Conf Call - Gulf Nuclear

GTCC = TransU > Class C
↳ Bags of trash
Gloveboxes ⇒ Neutron dose rates
↳ Beryllium
↳ mixed waste?

Patrice.Bubar@em.doe.gov
202-586-5393(f)
202-586-5151

Robin Anderson
(703)603-8747

EPA United States Environmental Protection Agency

Superfund

Federal Register Notice

15489 - 15490 Federal Register / Vol. 60, No. 57 / Friday, March 24, 1995 / Rules and Regulations

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 300
[FRL-5172-7]

National Oil and Hazardous Substances Pollution Contingency Plan; National Priorities List Update

AGENCY: Environmental Protection Agency.
ACTION: Notice of Deletion of the Radium Chemical Company site from the National Priorities List.

SUMMARY:

The Environmental Protection Agency (EPA) Region II announces the deletion of the Radium Chemical Company site from the National Priorities List (NPL). The NPL is Appendix B of 40 CFR part 300, which is the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which EPA promulgated pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended. EPA and the State of New York have determined that all appropriate Hazardous Substance Response Trust Fund (Fund)-financed responses under CERCLA have been implemented and that no further cleanup is appropriate. Moreover, EPA and the State of New York have determined that remedial actions conducted at the site to date have been protective of public health, welfare, and the environment.

EFFECTIVE DATE:

March 24, 1995.

ADDRESSES:

For further information contact:

Janet Cappelli, Remedial Project Manager
U.S. Environmental Protection Agency, Region II
290 Broadway, 20th Floor
New York, NY 10007-1866
(212) 637-4270

SUPPLEMENTARY INFORMATION:

The site to be deleted from the NPL is: Radium Chemical Company site, Woodside, Queens County, New York.

The closing date for comments on the Notice of Intent to Delete was December 9,

1994. EPA received no verbal or written comments.

EPA identifies sites which appear to present a significant risk to public health, welfare, or the environment and it maintains the NPL as the list of those sites. Sites on the NPL may be the subject of Fund-financed remedial actions. Any site deleted from the NPL remains eligible for Fund-financed remedial actions in the unlikely event that conditions at the site warrant such action. Section 300.66(c)(8) of the NCP states that Fund-financed actions may be taken at sites deleted from the NPL. Deletion of a site from the NPL does not affect responsible party liability or impede EPA efforts to recover costs associated with response efforts.

List of Subjects in 40 CFR Part 300

Environmental protection, Air pollution control, Chemicals, Hazardous substances, Hazardous waste, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Superfund, Water pollution control, and Water supply.

Dated: February 24, 1995.

William J. Muszynski,
Acting Regional Administrator.

40 CFR part 300 is amended as follows:

PART 300--[AMENDED]

1. The authority citation for part 300 continues to read as follows:

Authority: 42 U.S.C. 9601-9657; 33 U.S.C. 1321(d); E.O. 11735, 38 FR 21243; E.O. 12580, 52 FR 2923; E.O. 12777, 56 FR 54747.

Appendix B--[Amended]

2. Table 1 of appendix B to part 300 is amended by removing the Radium Chemical Company site, Woodside, New York.

[FR Doc. 95-6769 Filed 3-23-95; 8:45 am]

BILLING CODE 6560-50-P

TRUTech, L.L.C.

Memo

To: File

From: Bill Borden

CC: Butch Daniels, John McGowin

Date: 11/21/2002

Re: SITE BOUNDARY DOSE LIMIT TECHNICAL BASIS

Currently, a limit of 400 μR/h is applied to measured exposure rates at any point along the fenced boundary of the Gulf Nuclear Webster Site. The derivation of the 400 μR/h is not well documented, and thereby appears to be arbitrary.

Recent consolidation and movement of waste materials have made compliance with the 400 μR/h limit problematic. Substantial cost in the form of labor and materials have been incurred on a daily basis in attempts to keep the boundary exposure rates less than 400 μR/h.

The following regulatory analysis establishes the technical basis for increasing the boundary dose rate limits.

The Shaw Environmental and Infrastructure Gulf Nuclear Project has identified Title 10, Code of Federal Regulations, Part 20 (10 CFR 20), *Standards For Protection Against Radiation*, Section as the applicable regulation for radiation protection. 10 CFR 20.1301[1] (see attached excerpt) provides regulatory maximum values for radiation doses to individual members of the general public, as follows:

- The dose in any unrestricted area from external sources does not exceed 0.002 rem (2 mrem) in any one hour.
- The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (100 mrem) in a year, exclusive of the dose contributions from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released from the administering facility.
- A licensee or license applicant may apply for prior NRC authorization to operate up to an annual dose limit for an individual member of the public of 0.5 rem (500 mrem).

In accordance with the foregoing regulatory maximum values, the Site boundary dose rate is hereby increased to the regulatory maximum values of 2 mrem/h, and 100 mrem/y. The following conditions shall also apply to maintain boundary dose rates at levels that are as low as reasonably achievable (ALARA):

- An administrative control limit (ACL) of 1 mrem/h is hereby established.

---

[1] Title 10, Energy, Chapter I, *Nuclear Regulatory Commission*, Part 20, *Standards For Protection Against Radiation*, Section 1301, *Dose Limits For Individual Members Of The Public*, as currently amended.

- Radioactive waste will be packaged and removed from the Site with all due haste, thereby shortening the potential exposure period to much less than 1 year.

- Daily gamma exposure rate and neutron dose rate measurement should be made at multiple locations outside of the fence demarking the Site boundary, and the two values summed to arrive at dose rate representative total effective dose equivalent (TEDE). The TEDE rate should then be compared to the ALARA goal value of 1 mrem/h.

- The individual performing the perimeter radiation surveys should also observe members of the general public who may spend time in close proximity of the Site fence.

- The ACL should be reviewed and adjusted, if necessary, based on conservative estimates of the amount of time that a member of the general public spends in close proximity to the Site fence.

  Note: The ACL can be set by dividing the basic limit of 100 mrem/y by the amount of estimated time in hours that a member of the general public spends close to the Site fence (e.g., 100 mrem/y divided by 100 hours/y = 1 mrem/h).

ASSESSMENT

The most frequent occupation of locations near to the Site fence are those individuals who work at or visit neighboring medical facilities. Assume that it takes an elderly person 5 minutes to get out of his/her vehicle, and another 5 minutes to get back into his/her vehicle. Further assume that this happens every day of the work week (5 days a week), for a total of 13 weeks (a calendar quarter), and that all of the significant amounts of radioactive waste will have been removed at the end of the coming calendar quarter. The total amount of time spent in close proximity to the Site fence in this scenario would be 650 minutes, or approximately 11 hours. At a maximum of 1 mrem/h, this is a TEDE value of 11 mrem.

Clearly, maintaining an average boundary dose rate of 1 mrem/h will not exceed the regulatory basic dose limit of 100 mrem/y.

TITLE 10--ENERGY

CHAPTER I--NUCLEAR REGULATORY COMMISSION

PART 20--STANDARDS FOR PROTECTION AGAINST RADIATION--Table of Contents

Subpart D--Radiation Dose Limits for Individual Members of the Public

Sec. 20.**1301** Dose limits for individual members of the public.

Source: 56 FR 23398, May 21, 1991, unless otherwise noted.

(a) Each licensee shall conduct operations so that--

(1) The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 millisievert) in a year, exclusive of the dose contributions from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with Sec. 35.75, from voluntary participation in medical research programs, and from the licensee's disposal of radioactive material into sanitary sewerage in accordance with Sec. 20.2003, and

(2) The dose in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with Sec. 35.75, does not exceed 0.002 rem (0.02 millisievert) in any one hour.

(b) If the licensee permits members of the public to have access to controlled areas, the limits for members of the public continue to apply to those individuals.

(c) A licensee or license applicant may apply for prior NRC authorization to operate up to an annual dose limit for an individual member of the public of 0.5 rem (5 mSv). The licensee or license applicant shall include the following information in this application:

(1) Demonstration of the need for and the expected duration of operations in excess of the limit in paragraph (a) of this section;

(2) (2) The licensee's program to assess and control dose within the 0.5 rem (5 mSv) annual limit; and

(3) The procedures to be followed to maintain the dose as low as is reasonably achievable.

(d) In addition to the requirements of this part, a licensee subject to the provisions of EPA's generally applicable environmental radiation standards in 40 CFR part 190 shall comply with those standards.

(e) The Commission may impose additional restrictions on radiation levels in unrestricted areas and on the total quantity of radionuclides that a licensee may release in effluents in order to restrict the collective dose.

[56 FR 23398, May 21, 1991, as amended at 60 FR 48625, Sept. 20, 1995;
62 FR 4133, Jan. 29, 1997]

Shaw Environmental, Inc

12/3/02

Tavenor "South Area" Verification Soil Sample Summary

9320 Tavenor Lane

Houston, Tx

To: Michael Dunn, Chief, Texas Dept of Health

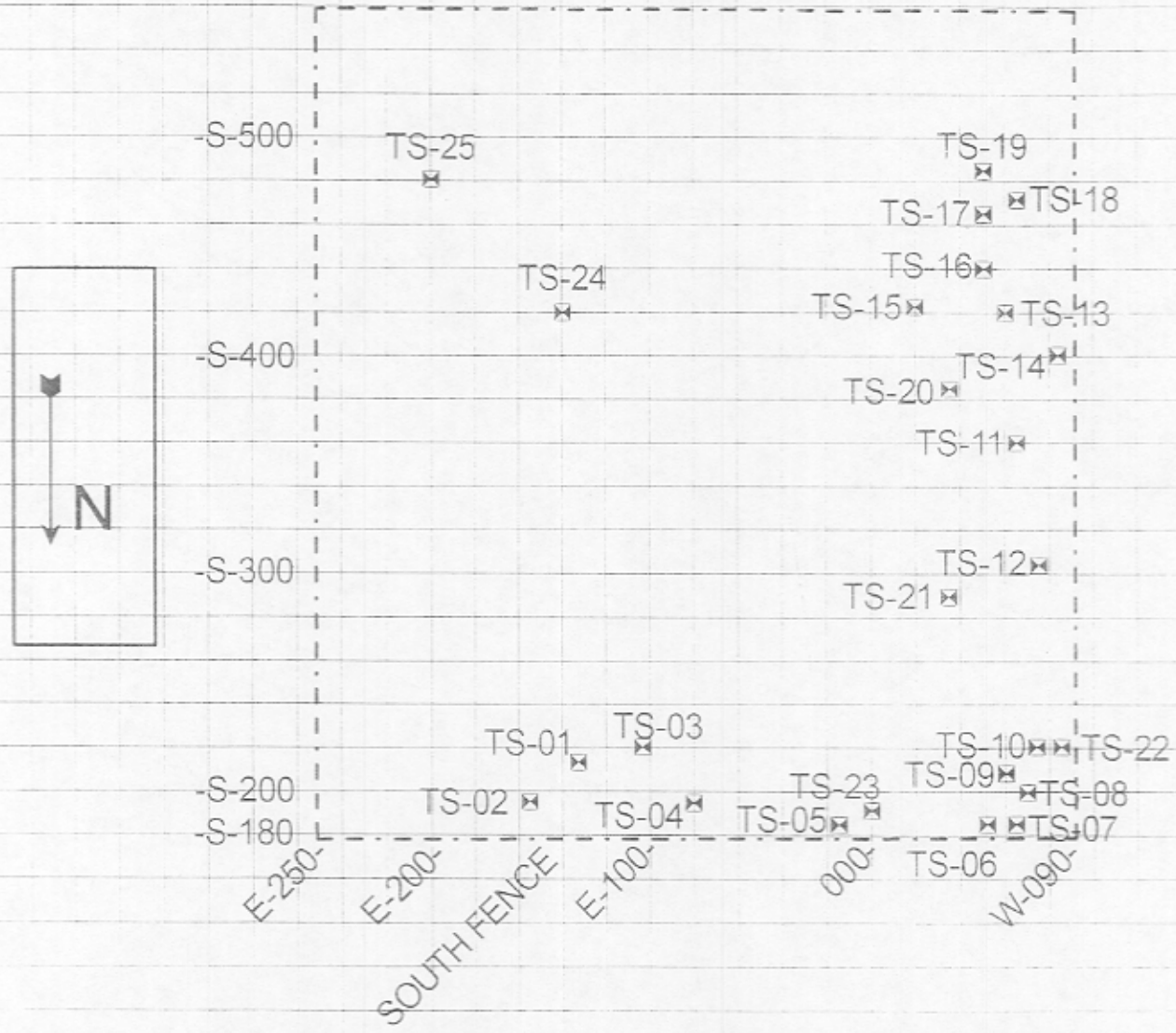
Brad Caskey, Division of Compliance and Inspection

Date	File ID	Grid or Sample Location	Isotope	Net Wt grams	Activity pc/g	Error pc/g @95% CL	MDA pc/g	Description
A.	Split Samples with State (Lisa) from Tavenor							
10/2/02	Tav065v	S-1	Cs-137	442.7	26.24	0.72	0.09	
			Am-241		0.38	0.08	0.43	
	Tav063v	S-2	Cs-137	477.2	0.84	0.02	0.07	
	Tav064v	S-3	Cs-137	499.3	0.58	0.02	0.07	
			Am-241		ND	-	0.35	ND = None Detected
	Tav066v	S-4	Cs-137	595.3	0.81	0.06	0.18	
			Co-60		0.2	0.03	0.18	
			Am-241		ND	-	1.3	
B.	Tavenor "South" Area Verification Samples							
Historical information with scan data was obtained from EPA. Accessible areas were rescanned w 2x2 NaI and remediated by Shaw Environmental with the following "Post" verification soil samples obtained. Typically Cs-137 was the principal isotope of concern with Am-241 & Co-60 occuring very infrequently.								
10/2/02	Tav071v	TS-5	Cs-137	587.9	0.5	0.6	0.13	
	Tav073v	TS-2	Cs-137	546.1	0.26	0.04	0.13	
10/4/02	Tav094v	TS-8	Cs-137	539.1	9.7	0.36	0.26	
10/5/02	Tav096v	TS-10	Cs-137	469.2	2.2	0.14	0.23	
	Tav097v	TS-1	Cs-137	511	ND	-	0.19	ND = None Detected
			Am-241		ND	-	1.7	Typ Am241 MDA @ 2
	Tav098v	TS-22	Cs-137	542.5	16.9	0.6	0.24	
	Tav100v	TS-9	Cs-137	459	16.5	0.6	0.23	
	Tav101v	TS-11	Cs-137	634.4	ND	-	0.27	
	Tav103v	TS-4	Cs-137	507.8	0.16	0.04	0.15	
	Tav104v	TS-6	Cs-137	753.6	1.6	0.09	0.15	
	Tav105v	TS-7	Cs-137	552.3	10.1	0.78	0.18	
	Tav106v	TS-3	Cs-137	589.1	0.42	0.05	0.14	
10/7/02	Tav107v	TS-27	Cs-137	620.4	0.19	0.6	0.13	
	Tav108v	TS-18	Cs-137	454.3	0.24	0.05	0.16	
	Tav109v	TS-12	Cs-137	654.7	ND		0.2	
	Tav110v	TS-19	Cs-137	553.4	0.2	0.04	0.12	
	Tav111v	TS-16	Cs-137	483.5	0.3	0.04	0.16	
	Tav112v	TS-17	Cs-137	560.3	0.2	0.04	0.15	
10/8/02	Tav113v	TS-15	Cs-137	535	0.3	0.05	0.16	
	Tav114v	TS-13	Cs-137	592.1	0.19	0.09	0.17	
	Tav115v	TS-14	Cs-137	607.6	0.35	0.05	0.14	
10/10/02	Tav119v	TS-20	Cs-137	620.4	ND	-	0.22	

If I may be of assistance do not hesitate to call. Mark Cafouras @ 281-554-3492, Gulf Nuclear, Webster, Tx

TAVENOR SITE

SOUTH SECTION



SHAW E&I	SCALE 1/4" = 20'

FIGURE 1

RADIATION WORK PERMIT

SECTION I - ALARA Type: [ ] General [X] Specific

Person-rem estimate <10 mRrem Total Actual Exposure ____ Rem
[X] ALARA Job Review Performed? [ ] ALARA Post-Job Review Required?

RWP No. RWP02-17 Revision. No. 0
Expiration Date/Time: 11-07-2002 1600 hrs

SECTION II – JOB INFORMATION

Facility:	Buildings: Control Zone Yard and Building Portals	Room/Area: N/A	Date Work Scheduled to Begin 11-07-02
Gulf Nuclear Industries			

Equipment/Item To Be Worked On (Model Name/Number): **Survey Meters and Wipes**

Time Work Scheduled to Begin 0900

Work Description: **Perform Direct Measurement and Contamination Surveys**

Anticipated Dose Rates: General Area: <1 mR/hr Max Reading: 100 mR/hr	Anticipated Contamination: General Area: <1,000 dpm/100cm^2 beta/gamma <2,000 dpm/100cm^2 alpha Max. Area: 1.5 x 10^6 dpm/100cm^2 beta/gamma, 100,000 dpm/100cm^2 alpha	Anticipated Airborne <0.1 DAC
RWP Suspension Limit Dose Rates: >20 mR/hr at 30 cm	RWP Suspension Limit Contamination: 2 x 10^6 dpm/100cm^2 beta/gamma, 5,000 dpm/100cm^2 alpha	RWP Suspension Limit Airborne: 0.1 DAC

SECTION III – PROTECTIVE CLOTHING AND EQUIPMENT REQUIREMENTS

HEAD	BODY	FEET	HANDS	DOSIMETRY	RESPIRATORY
[ ] Hood (taped to respirator)	[X] 2 Coveralls	[X Plastic High Top Booties	[X] 2 pair Rubber Gloves	[ ] Pocket Dosimeter (0-200 mR)	[ ] Full Face Respirator
[X] Hard Hat	[ ] Modesty Garments	[ ] Cloth Booties	[X] Surgeon Gloves	[X] Whole Body	
[ ] Face Shield	[ ] Wet Suit	[X] Rubber Over Shoes	[ ] Cloth Work Gloves	[ ] High Range Pocket Dosimeter (0-1500 mR)	[ ] Charcoal Cartridge
[ ] Goggles	[ ] Lab Coat	[ ] High Top Boots	[X] Taped Sleeve Cuffs	[ ] Extremity Dosimetry if handling sources or >500 mR/hr on contact	[ ] Air Line Respirator [ ] Air Line Hood
[X] Safety Glasses	[ ]	[X] Taped Pants Cuffs	[ ]	[ ] Special Dosimetry	[ ] Industrial Hygiene Half Face Respirator

SECTION IV - SPECIAL TRAINING/PERMITS REQUIRED/BRIEFINGS

[ ] Confined Space Permit [ ] Hot Work [ ] Lockout / Tag-out [ ] Beryllium
[ ] ALARA Pre-Job Briefing [ ] High Work [ ] Other _____

SECTION V - SPECIAL INSTRUCTIONS

Additional Worker Requirements:
1. Respiratory requirements may be upgraded by Radiation Protection
2. All personnel are required to wear the minimum safety equipment; Safety Glasses and Steel Toe Shoes in all work areas. Safety glasses are not required when Full Face Respirators are worn.
3. All personnel are required to use the Control Point for all access and egress from the Contamination Zone.
4. Any work in posted contaminated areas will require all individuals to meet the requirements marked in Section III - PROTECTIVE CLOTHING AND EQUIPMENT REQUIREMENTS.
5. USACE and USEPA personnel under agency RPP and Dosimetry

Radiation Protection Technician Job Coverage Requirements:

[X] Survey Meter	[ ] Calculate Stay Times	[X] Intermittent
[ ] Initial Survey	[ ] Post All Contaminated Areas	[ ] Continuous
[ ] Upon Breach		

SECTION VI - GENERAL INSTRUCTIONS TO WORKERS

1. Read the permit carefully. By logging on the RWP Sign-In Sheet, you are acknowledging that you have read and understand the RWP requirements. At the job site you must be wearing all the personnel protection equipment checked on this permit.
2. YOU are responsible for your own exposure. Leave the area immediately if your TLD is lost, report to the HP
4. Discuss radiological conditions and requirements with HP prior to starting work

SECTION VII - PREPARATION AND APPROVAL

[signature]	11-7-02		
Prepared By (Signature)	Date	Reviewed By (Signature)	Date
[signature]	11/7/02		
Approved By (Signature)	Date		

SECTION VIII - TERMINATION SECTION

Terminated By (Signature)	Date
Approved By (Signature)	Date

4.2.2 Consumables

Operator

[1] Ensure that the following are available for the performance of this operation:

- 0100 formula
- 0200 formula
- 0300 formula
- DI water
- Wipes

5.0 DIRECTIONS, INSTRUCTIONS, AND INFORMATION

Operator

[1] Prepare the area for the decontamination activity, making sure that the surface area is generally clean and ready to begin the chemical process.

[2] Apply **0300** formula using a light atomized spray sufficient to just wet the surface.

[3] Scrub into the surface with mechanical action, using, for example, scotchbrite, wire brush, or mechanical rotary tool.

[4] Dwell for 11 minutes; then,

[5] **Apply / overlay 0200 over top of the 0300** using a light atomized spray sufficient to wet the surface.

[6] Scrub into the surface with mechanical action, using, for example, scotchbrite, wire brush or mechanical rotary tool.

[7] Dwell for 11 minutes.

[8] Mix **de-ionized or distilled water** with 20% of **0200 formula**, rinse the surface and vacuum.

[9] Repeat steps [2-8].

[10] Apply **0100 formula** using a light atomized spray sufficient to wet the surface.

[11] Scrub into the surface same as above.

[12] Dwell for 20 minutes.

[13] Rinse with 20% 0200 and DI water and vacuum; Repeat steps [10] – [13].

[14] This completes one cycle. Surveys should be performed at this point to confirm results. If necessary repeat entire procedure and perform additional decontamination until desired levels are achieved.

[15] After completing the decontamination phase, package all waste in accordance with applicable Waste Generating Instructions (WGIs).

U.S. EPA Superfund Fact Sheet
Tavenor - Gulf Nuclear Site
Removal Action Update

Houston, Texas

August 26, 2002 DRAFT

U.S. EPA Region 6 Begins Activities to Clean Up Former Manufacturing Facility

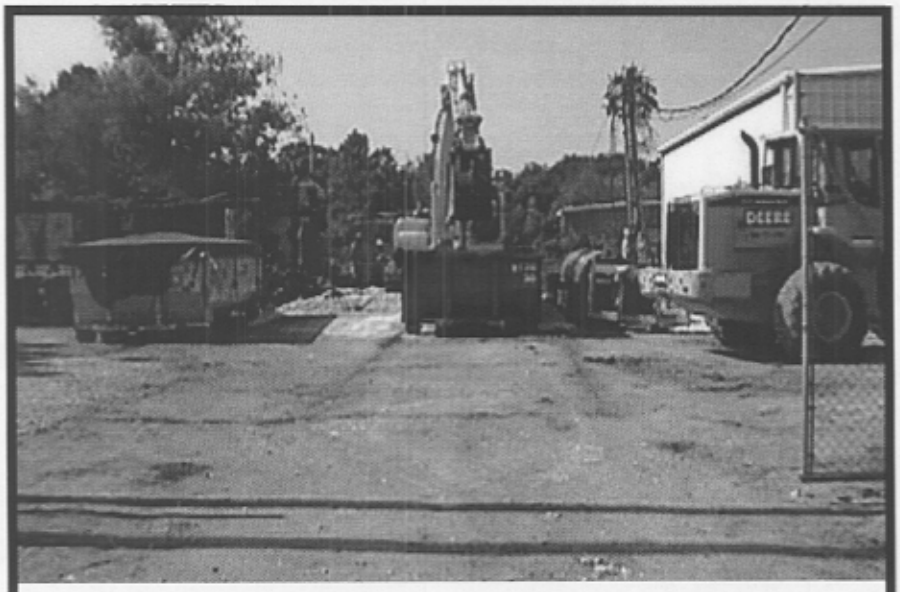
Introduction

The U.S. Environmental Protection Agency (EPA), working with the Texas Department of Health-Bureau of Radiation Control, has started a clean-up action at the Tavenor-Gulf Nuclear Site in Houston, Texas. The EPA has already started the clean up action and has installed air and radiation monitoring equipment at the site. The primary purpose of the monitoring is to check the effectiveness of dust control measures so that no contamination leaves the site. The cleanup has begun with the demolition of buildings on the site.

Background

The Tavenor-Gulf Nuclear Site is located on approximately 5 acres of land at 9320 Tavenor Lane in Houston, Texas. To the south of the Site is Jessup Middle School, separated by a pipeline right-of-way and two fences. Housing subdivisions begin at the southwest and southeast perimeters of the facility. To the north and along Tavenor Street are several industrial enterprises in various states of activity. The Hobby Airport is located nearby.

When in operation, the facility made tracers and sources for the medical, petro-chemical, oil exploration, and other industries.



Cleanup begins on the Tavenor-Gulf Nuclear Site. Workers are removing and properly disposing of radioactive soils, debris and wastes.

There are several buildings remaining at the site that are in serious disrepair and in danger of collapsing. When the facility was operating, waste water containing radioactive material was dispersed from sinks and drains through a lateral system of drainage pipes. The soil from the drainage field was excavated and stored in boxes on-site in a newly built pre-fab building. The remedial action excavated almost all the contaminated soil but a few hot spots remain. There are some contaminated spots on the buildings and that could have led to the limited recontamination of the soil. Almost all the radioactive material on site is located in the boxes. The recorded radioactivity level on portions of the Site would require limiting exposure to people working on the site.

Proposed Actions

The Texas Department of Health-Bureau of Radiation Control, is expected to participate in the removal action, and its involvement will be instrumental in facilitating the proper disposal of the radioactive materials. The radioactive soils, debris, and wastes will be packaged and transported off-site for disposal at a proper facility that is in compliance with the EPA Off-site Rule. The buildings and foundations will be disassembled and disposed of off-site at a proper facility. It is projected

Workers at the Tavenor - Gulf Nuclear Site examine soils for the presence of contaminants.

that the new prefab building at Tavenor will remain as an asset to the property. The material will be screened and segregated to minimize the volume of radioactive material. The Site will be backfilled to a stable grade and viable for unrestricted future use. The investigation conducted by EPA earlier this year indicates that offsite contamination only reached about 3 feet beyond the front fence, in the drainage ditch. The contamination did not come close to the fence line on any other side.

The duration of activities is expected to be four to six months, depending upon weather conditions and scheduling, and the availability of disposal contractors.

For More information

The Agency for Toxic Substances and Disease Registry (ATSDR) is the Federal agency created under the Superfund Act charged with taking responsive public health actions to prevent harmful exposures and disease related to toxic substances. The ATSDR works in close collaboration with local, state, and other federal agencies, with tribal governments, local communities and with local health care providers. The goal of the Agency is to help prevent or reduce the harmful effects of exposure to hazardous substances on human health. ATSDR encourages active public participation in this process. To address any public health question associated with this EPA Superfund site or learn more about the ATSDR process, please contact George Pettigrew, with the ATSDR Office of Regional Operations, 214-665-8361, or see the ATSDR web site at www.atsdr.cdc.gov.

To learn more about the Tavenor - Gulf Nuclear Site or the Superfund process, please contact:

Greg Fife, Federal On-Scene Coordinator
U.S. EPA Region 6 (6SF-R2)
1445 Ross Avenue
Dallas, TX 75202
(214) 665-5772 or
1-800-533-3508 (toll-free)

Timothy D. Wilson Community Involvement Coordinator/S.E.E.
U.S. EPA Region 6 (6SF-PO)
1445 Ross Avenue
Dallas, TX 75202
(214) 665-2248 or
1-800-533-3508 (toll-free)

Arnold Ondarza, Ombudsman
U.S. EPA Region 8
999 18th Street (EPR)
Denver, CO 80202
1-800-533-3508 (toll-free)

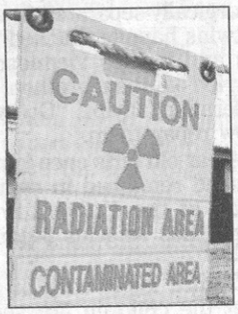
Media inquiries should be directed to Dave Bary, U.S. EPA Region 6 Press Office, at (214) 665-2208.

If you want more information about the Tavenor-Gulf Nuclear Site or would like your name and address added to the site mailing list, please call our toll-free 1-800-533-3508 telephone number. Mailing list information may be shared with local, state, and other federal agencies, members of the public and potentially responsible parties.

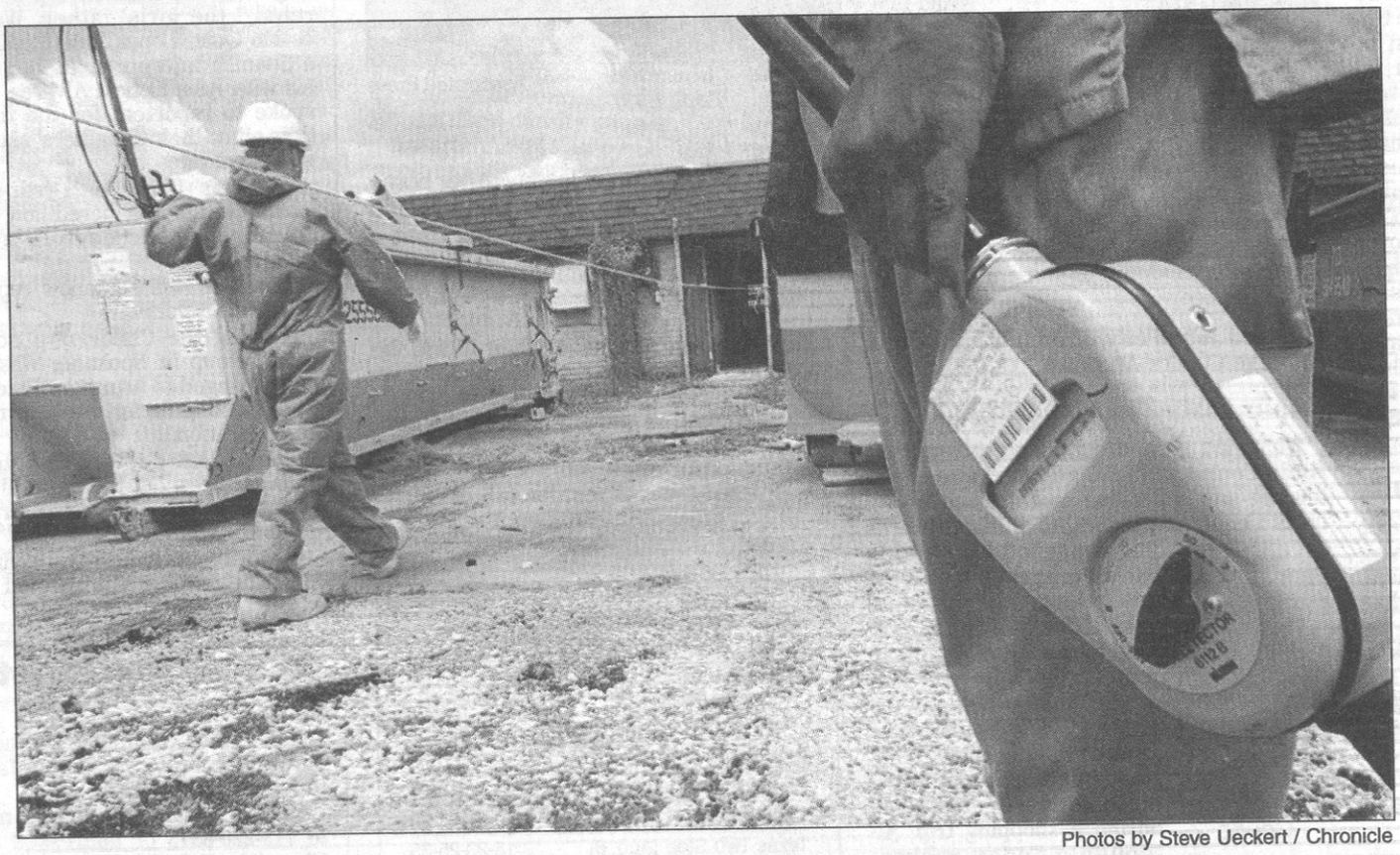
On the Web...

On the Internet, information about U.S. EPA and the Superfund Program can be found at:

U.S. EPA Headquarters: www.epa.gov
U.S. EPA Region 6: www.epa.gov/region6
U.S. EPA Region 6 Superfund Program: www.epa.gov/region6/superfund



Radioactive mess left for taxpayers



Photos by Steve Ueckert / Chronicle

As one Weston Solutions worker monitors radioactivity with a Geiger counter, another prepares to enter the abandoned Gulf Nuclear of Louisiana building in Webster. Radioactive material from the site will be stored in containers like the one at left.

AMERICIUM-241

- Americium (chemical symbol Am) is a man-made radioactive metal produced in nuclear reactors and in nuclear weapons detonations. Americium has several different forms, all of which are radioactive. The most important is Americium-241.
- The most widespread use of Americium-241 is in household and industrial smoke detectors. Other commercial uses include: medical diagnostic devices, research, fluid-density gauges, thickness gauges, aircraft fuel gauges and distance-sensing devices.
- Exposure to Americium-241 is unlikely, but it poses a significant cancer risk if swallowed or inhaled.
- Its radioactivity decreases by 50 percent — also known as its half-life — every 432.7 years.

Cleanup could cost millions, but officials see no health threat

By TONY FREEMANTLE

A local company in bankruptcy abandoned two industrial buildings full of highly radioactive materials, leaving the federal government and taxpayers with a $8.5 million tab for cleaning up a virtually unprecedented and dangerous nuclear mess.

For more than 20 years, Gulf Nuclear of Louisiana Inc. manufactured radioactive materials in a nondescript building in the heart of Webster's medical center and in an equally unremarkable facility near Hobby Airport.

When the company filed for bankruptcy in 1992, it essentially closed the doors and walked away from the Webster location without cleaning its mess, and conducted a cursory cleanup at the other site.

Last year, because Gulf Nuclear still had not done anything to clean the heavily contaminated Webster site, the U.S. Environmental Protection Agency was called to tackle the difficult and dangerous task, using emergency Superfund money.

Some material from the Webster building is so radioactive it cannot legally be disposed of at any existing facility in the United States. It will have to be stored and most likely deposited in the government's proposed high-level nuclear waste repository at Yucca Mountain, Nev.

Moreover, while it poses no immediate threat to public health and safety, the contamination at both sites is bad enough to warrant the destruction of the buildings, which have a combined appraised value of more than $620,000.

Michael Dunn, chief of indus-

See WASTE on Page 10A.

THE SITES

1 9302 Tavenor

Owner: Gamma Industries c/o The GNI Group, parent of Gulf Nuclear of Louisiana.

Status: According to the EPA, Gulf Nuclear made some effort to remove contamination, but there are still some hot spots.

Cleanup cost: $2.5 million

2 202 Medical Center Blvd., Webster

Owner: Gulf Nuclear

Status: Cleanup crews expected to find only 12 sources of radiation; they found more than 360. Some of the material is so contaminated it must be disposed of at the proposed waste dump at Yucca Mountain, Nev.

Cleanup cost: $6 million

Waste

Continued from Page 1A.

trial licensing for the Texas Department of Health's Bureau of Radiation, said there was no indication that any radiation had escaped the building and threatened the surrounding communities.

He said for 15 years the department has monitored the perimeter of the Webster building, but despite occasional readings higher than "ambient levels, we do not have reason to believe that there has been a large" amount of radiation that has made it offsite.

On Wednesday, cleanup operations at the Webster site continued with a team comprising workers from the EPA, the U.S. Army Corps of Engineers and a private environmental cleanup company. Temporary offices have been established on site, where security is now present 24 hours a day.

Greg Fife, an EPA veteran who is the on-site coordinator for the cleanup, said when he and other federal officials first entered the Webster building in January, they expected to find most of the contamination confined to the "hot room," a sealed, lead-lined area where the radioactive materials were kept and handled. They also expected to find the radiation was coming from about 12 sources.

Instead, they found more than 360 sources, and contamination so widespread that workers almost certainly were exposed to very high, very dangerous levels of radioactivity.

In one area outside the "hot room," Fife said workers would have been exposed to one year's worth of acceptable radiation in 38 minutes.

"Anybody that's been in there would have no reluctance to call the operation sloppy and unprofessional," Fife said.

Gulf Nuclear began operations at the two sites in 1971, initially supplying radioactive tracers for the oil industry. Over time it began making devices using Americium-241, beryllium, cesium-137, irridium-192 and other isotopes that were used for a variety of purposes — medical diagnostic devices, aircraft fuel gauges, fluid-density gauges.

Americium-241 is by far the worst isotope, with a half-life of 432.7 years, meaning that it takes that long for the substance to lose half its radioactivity.

Fife said Americium contamination in the Webster building is widespread. About $10,000 of it was found lying in an open box. Glove boxes (the devices used by workers standing outside of the hot room to manipulate chemicals inside) are coated with radioactive powder. Raw materials were spilled on the floor. There was evidence that workers used plastic coffee cups to mix radioactive chemicals, which were stored in plastic ice trays.

Investigators even found a sealed room with fake walls in which was entombed thousands of dollars worth of contaminated equipment, Fife said.

"I've done this for 15 years," the veteran federal environmental regulator said. "I've seen nasty sites where things fell apart because of a lack of money. I've seen cases where the owners of a facility couldn't cope with the problem. But I have never seen such total disregard for the neighbors or the workers."

Virtually all the contamination at both sites occurred between 1971 and 1992 — the year that Gulf Nuclear filed for Chapter 11 bankruptcy, seeking protection from its creditors while it reorganized. The company then filed for Chapter 7 bankruptcy in 2000, seeking to liquidate and close.

From 1992 to 2000, little was done to clean up the Webster facility, Fife said.

"Basically they just walked off," he said. "They got their money during the oil boom and then they just walked off."

The company made an effort to clean up the Hobby Airport site, located in the 9300 block of Tavenor, Fife said. It erected a building to store the hazardous waste from the facility and partially demolished the existing buildings.

Through the federal Nuclear Regulatory Commission, the Texas Department of Health regulates and licenses companies that handle nuclear materials.

Dunn said department inspectors visited the facilities once or twice a year. The reason nothing alerted inspectors to problems that according to Fife were evident, could be that "they weren't told some things," Dunn said.

The Gulf Nuclear operation is one of only two of its kind in the state licensed by the health department, Dunn said.

"This is a rare one," he said.

Carl Shaw, president and CEO of The GNI Group, the parent company of Gulf Nuclear, did not return a phone call to his home seeking comment. Neither did two attorneys representing him. But in an affidavit filed in support of his company's 2000 bankruptcy petition, he states GNI has five wholly owned subsidiaries, including Gulf Nuclear of Louisiana Inc.

On Sept. 12, 2000, a year before any regulatory agencies were involved in the cleanup, Shaw states under oath, that Gulf Nuclear's properties are "currently undergoing decontamination" and that once that is completed they will be "released for sale by the appropriate regulatory authorities."

The EPA's Fife said nothing of any substance had been done to decontaminate the Webster facility before the EPA's involvement in October 2001.

Bill Reeves is a former officer at Gulf Nuclear who now works as vice president for regulatory affairs at Texas Molecular, a Deer Park-based company that bought some of the Gulf Nuclear's assets. During the eight years the company was in Chapter 11, he said, "for whatever reason, they couldn't sell that building."

"Those two buildings are not glow-in-the-dark buildings," Reeves said. "They're not a danger to the community. But there is no doubt they need to be cleaned up. And I'm real glad I never had anything to do with that part of the business."

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER WESTON SOLUTIONS ORDER NO. 205056/276272

Mfg. Ludlum Measurements, Inc. Model 9 Serial No. 88827

Mfg. _____ Model _____ Serial No. _____

Cal. Date 15-Oct-03 Cal Due Date 15-Oct-04 Cal. Interval 1 Year Meterface 200

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 38 % Alt 705.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-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) 2.2 VDC

☐ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☑ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

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

☐ HV Readout (2 points) Ref./Inst. _____ / _____ V Ref./Inst. _____ / _____ 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	4 R/hr	4.1	4
X 1000	1 R/hr	1.1	1
X 100	400 mR/hr	3.9	4
X 100	100 mR/hr	1	1
X 10	40 mR/hr	3.9	4
X 10	10 mR/hr	0.9	1.1
X 1	4 mR/hr	3.9	4
X 1	1 mR/hr	0.9	1

*Uncertainty within ± 10% C.F. within ± 20%

NONE **Range(s) Calibrated Electronically**

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

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
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 ANSI/NCSL Z540-1-1994 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 _____ ☐ Oscilloscope S/N _____ ☐ Multimeter S/N _____

Calibrated By: Moses Campa Date 15-Oct-03

Reviewed By: V. M. Arredondo Date 15 Oct 03

FORM C22A 04/09/2003

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed: _____

Designer and Manufacturer of Scientific and Industrial Instruments

Work Order: 205056

TAG #: 276272

LUDLUM MEASUREMENTS, INC
POST OFFICE BOX 810 PH: 915-235-5494
501 OAK STREET FAX: 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Date Received: 10/15/2003 Received Via: FESON Condition Received: GOOD

SHIP TO:
WESTON SOLUTIONS
6565 AMERICAS PKWY NE
SUITE 200
ALBUQUERQUE NM 87110

BILL TO:
WESTON SOLUTIONS NM
6565 AMERICAS PKWY NE
SUITE 200
ALBUQUERQUE NM 87110

CUSTOMER #:03947

Reason for Return: Calibration Cal Interval \ Special Instructions: 1 / YR

Comments: Cleaned battery Contacts.
Changed out dessicants.
Cal'd Instrument.

ITEM	QTY	PART #	DESCRIPTION	PRICE	COST
01	1.00 EA	9	M 9 FOR REPAIR/CAL *88827		

ITEM	QTY	PART #	DESCRIPTION	PRICE	COST
8	8	22-9664	Dessicants	—	—
12	2	21-9313	D Batteries	—	—

Instrument Calibrated: 1 at 50 Total Parts Cost: — Total Calibration, Parts, and Labor: 50.00

Secondary Detectors: ____ at ____ Total Calibration Charge: 50 Shipping Charges: ____

Extended Calibration: ____ at ____ Total Labor: ____ Total Charges: ____

Labor: ____ hour(s) at $ ____ per hour

Signed: Moses Campa Date: 15-Oct-03

QC Released V.W. Ward 15oct03

DO NOT PAY! INVOICE TO FOLLOW

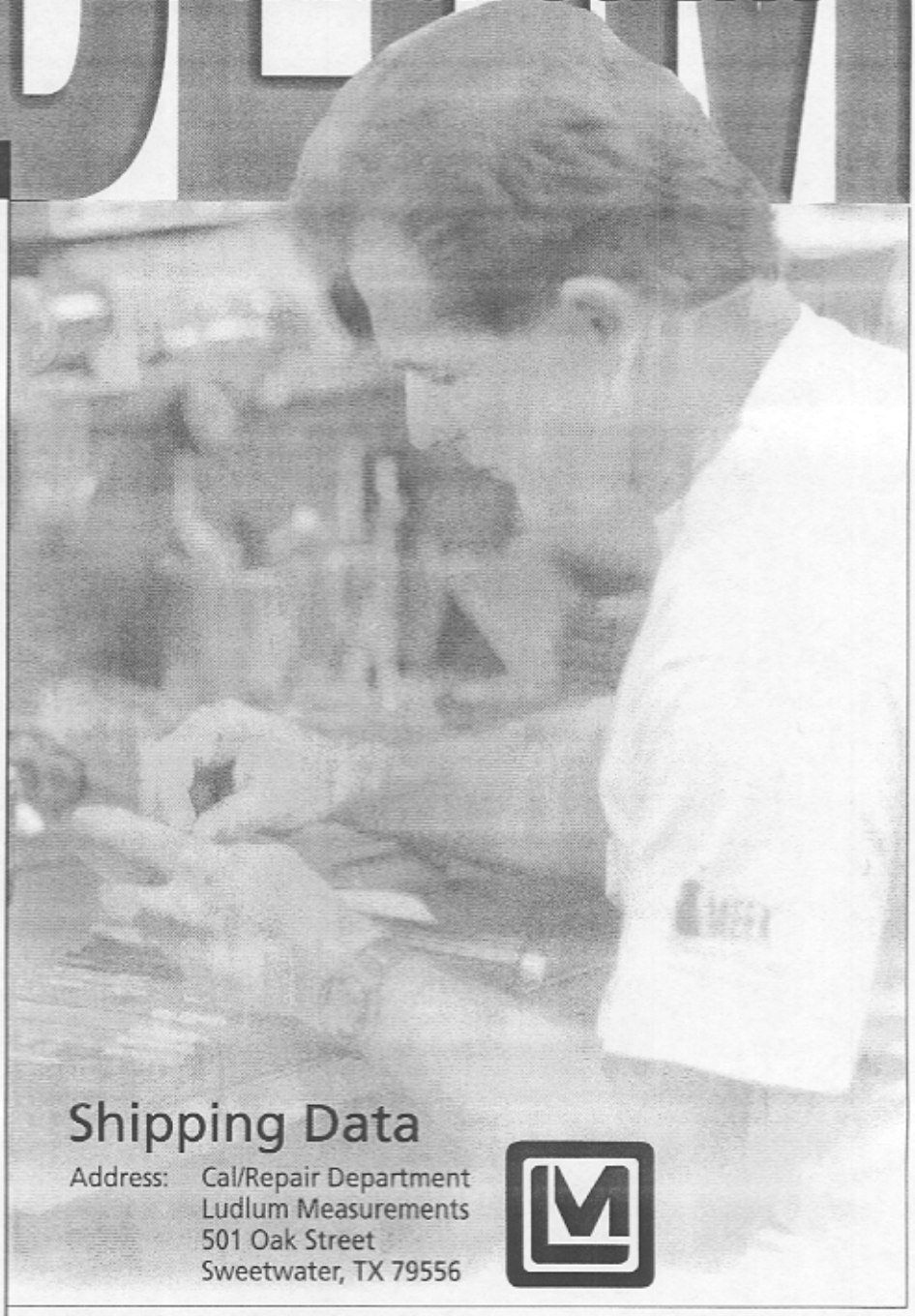
Date: 10/15/03 Contacted: MIKE STUART CLT MC Rush

By: Jason

PO Number: Return Ship: Phone 505-837-6566

LUDLUM

Repair and Calibration Service



RATES

We work on other manufacturer's products as well as our own.

Calibration

Exposure rate calibrations are done with a ^{137}Cs source. Typical calibration turn-around time is 3-5 working days.

Standard	$50 ea.

• Standard calibrations include (1) as found readings, (2) two points per range, (3) single probe (extra probes are $15 ea.), (4) NIST traceable and (5) ANSI N323 compliance.

Specialized	$70 ea.

• Specialized calibrations include (1) Standard calibration and (2) special customer requirements, i.e., extra sources, source efficiencies, etc.

Neutron	$70 ea.

• ^{241} AmBe source utilized

Stretch Scopes	$70 ea.
Pulsers	$70 ea.
Simultaneous Alpha/Beta Meters	$70 ea.
Data Loggers	$70 ea.
Air Monitors	$70 ea.

Quoted prices do not include larger systems (Hand & Shoe monitors, laundry monitors, etc.) Please feel free to call for models not listed.

Repair

Repair charges are based on the following labor rates and parts. There is no minimum time charge. Typical repair turn-around time is 7-10 working days.

Technician	$55/hr.
Engineering Tech	$70/hr.
Shop	$50/hr.

Shipping Data

Address: Cal/Repair Department
Ludlum Measurements
501 Oak Street
Sweetwater, TX 79556

RMA's are not required. Please include a contact name and phone number, brief description of services needed, return shipping address and billing information.

Prices do not include sales tax or freight charges when applicable. If repairs are required, cost of parts and labor are extra.

FOB: Sweetwater TX Terms: Net 30 days
Prices subject to change without prior notice

Prices effective September, 2000

Ludlum Measurements, Inc. • 501 Oak Street P.O. Box 810 Sweetwater, TX 79556
915/235-5494 • FAX 915/ 235-4672 • 800-622-0828 (USA) • e-mail ludlum@ludlums.com • web: www.ludlums.com

LUDLUM MEASUREMENTS, INC.
501 Oak Street
Sweetwater, Texas 79556
800-622-0828 325-235-5494
Fax: 325-235-4672 e-mail:ludlum@ludlums.com
www.ludlums.com

DESIGNER AND MANUFACTURER
OF
Scientific and Industrial Instruments

RETURNED GOODS FORM

(PLEASE FILL IN THE APPROPRIATE INFORMATION FOR EACH SHIPMENT)

Date: _____

Item(s) returned for:

☐ Calibration ☐ Repair ☐ Other _____

Company Name: _____

Contact Person: _____ Phone: (____)_____
(Technical or User)

Bill to Address: Ship to Address: Ship Via: _____

Instrument/Probe Model Number	Serial Number	Instrument/Probe Model Number	Serial Number

Purchase Order # _____ ☐ Call for PO# ☐ Call with Estimate

Contact Person _____ Phone: _(___)_____
(Purchasing)

Fax: _(____)_____ E-mail Address _____

Malfunctioning Symptoms, Special Instructions, etc. _____

ORDER #: 205056
PACKING LIST FROM:
LUDLUM MEASUREMENTS INC
501 OAK ST PO BOX 810
SWEETWATER TEXAS USA 79556
TEL: 325-235-5494
CUST PO #:

SHIP VIA:
FESON (1 DAY PM)
SHIP DATE:
10/15/03
LMI CUST. #:
03947

SHIP TO:
WESTON SOLUTIONS
6565 AMERICAS PKWY NE
SUITE 200
505-884-5050 MAIN
ALBUQUERQUE, NM 87110

Ordered By: MIKE STUART PHONE NUMBER 505-837-6566

BOX# / # OF BOXES:
/

BOX	LN	ORD QTY	SHIP QTY	PART NO.	DESCRIPTION	ADDITIONAL INFO
_____	01	1.00EA	1.00EA	9	M 9 FOR REPAIR/CAL	SN 88827
_____	02	8.00EA	8.00EA	22-9664	DEHYDRATORS-0200033 AG41	✓
_____	03	2.00EA	2.00EA	21-9313	BATTERY-DURACELL "D	✓
_____	04	1.00	1.00	222	STANDARD CALIBRATION	✓

COMMENTS:
FESON
GOOD
1 / YR

1.0 INTRODUCTION

This work plan provides a functional guideline for the excavation of contaminated soils associated with portions of the Gulf Nuclear facility in Webster, Texas. Minor variations in scope and approach may be required as the project is implemented. Major variations in the scope of work, materials, quantities, or schedule that may be caused by unforeseeable field conditions will be addressed as modification or amendments to the original work plan. If properly executed, this work plan will accomplish the fulfillment of this future task order and removal of the Webster-Gulf Nuclear contamination. This plan will provide the methodology, means, and direction for the preplanning, mobilization and long-term response for this project, in a cost effective, efficient and safe manner.

2.0 SITUATION

The Gulf Nuclear facility established in Webster, Texas in 1971 came "under ownership and control of Gulf Nuclear of Louisiana, Inc A Subsidiary of the GNI Group, Inc. in 1992."(CRCPD.org Annual Meeting 2003). Gulf Nuclear manufactured devices containing radioactive material containing americium-241 (^{241}Am), cesium-137 (^{137}Cs), iridium-192 (^{192}Ir), radium-226 (^{226}Ra) (and its progeny), and gadolinium-153 (^{153}Gd), during the period of 1971 and 1987. Gulf Nuclear made devices that were used in a variety of applications such as radioactive tracers for the oil industry, medical diagnostic devices, industrial radiography, oil and gas well logging, and fluid-density gauges. Production of sealed sources ceased in 1987.

> "In 2001, in light of the failure of GNI to conduct its own cleanup… Texas Department of Health (TDH) called upon the Texas Commission on Environmental Quality (TCDEQ) and the federal Environmental Protection Agency (USEPA) for assistance"(CRCPR.org Annual Meeting 2003). During USEPA's involvement with the clean up of the facility over 260 radioactive sources and widespread radiological contamination has been found" (Region 6 Pollution Report May 22, 2002).

The USEPA cleanup team described housekeeping at the Webster-Gulf Nuclear facility as extremely poor. The Federal cleanup team expected to find most of the radioactive contamination confined to hot cells and glove boxes, where the radioactive materials were stored and used to make sealed sources, but found protective containers of radioactive material left open. The building's ventilation system was highly contaminated. Americium contamination was widespread. About $10,000 worth of radioactive americium powder was found lying in an open box. Glove boxes were coated with radioactive powder. Raw materials were found spilled on the floor. Workers apparently used plastic coffee cups to mix radioactive chemicals that they then stored in plastic ice trays. Investigators found a room sealed off from the rest of the building that contained thousands of dollars worth of highly contaminated equipment.

2.1 CERCLA Preplanning, Tasking 4

Earth Tech received tasking 4 under Task Order 1 under USEPA Contract 68-S6-02-02 on 6/6/2003. The delivery order outlined the following tasks:

- Prepare detailed cost estimate for excavation of the contaminated soils.
- Prepare work plan for excavation of contaminated soils.
- Prepare cost estimate and work plan for removal of debris.
- Prepare cost estimate and disposal arrangements for all site wastes.
- Prepare cost estimate for after-hours site security.
- Prepare detailed plans to prevent cross contamination.

2.2 Understandings

Our understanding is that all sealed sources have been removed from the site. Possible radioactive contamination in the soil at the Webster site includes the isotopes, americium-241 (^{241}Am), cesium-137 (^{137}Cs), iridium-192 (^{192}Ir), radium-226 (^{226}Ra) (and its progeny), and gadolinium-153 (^{153}Gd). Gulf Nuclear also manufactured products containing other isotopes with short half-lives that need not be considered for the purposes of this project. We understand that the soil contamination is confined to the top 30 cm of soil, but there are areas with contamination at 30-45 cm below grade. The area of contamination is 95 feet × 300 feet (29 meters × 91 meters). The contamination is not uniform throughout the site.

Results of a characterization survey will be available before this project begins. This site characterization survey will be used to refine and adjust this work plan when it becomes available. However, EPA officials indicated to Earth Tech that the exposure rate at an area near the center of the site is about 500 micro roentgens per hour ($\mu R\ h^{-1}$). Otherwise, exposure rates at most locations at the site are near background levels (approximately 6 $\mu R\ h^{-1}$ to 8 $\mu R\ h^{-1}$).

3.0 TECHNICAL APPROACH

Earth Tech developed this work plan at the request of the On-Scene Coordinator (OSC) and Project Officer to outline cost, schedule, logistics, manpower, equipment and procedures to accomplish this response in a safe and efficient manner. Special consideration will be given to proven radiological work practices that will reduce worker exposures, provide segregation of materials by radioisotope and concentration, and severely reduce cross contamination. Earth Tech's goals for this remediation is to protect the workers, public and the environment; accomplish waste minimization and segregation; provide free release of the site for unrestricted use; complete free release of all equipment; control all releases of contaminants and prevent cross-contamination. Survey design will be in accordance with guidelines in the *Multi-Agency Radiation Survey and Site Investigation Manual* (abbreviated in this work plan as MARSSIM), rev. 1, August 2000 (NUREG-1575, EPA 402-R-97-016, and DOE/EH-0624). Cleanup standards will be determined based on 25 Texas Administrative Code (TAC) 289.

Our approach will be divided into preplanning, mobilization, long term response and close out. Preplanning will involve a full transportation and disposal plan, site-specific health and safety plan (HASP), procurements, and training. Mobilization will involve mobilization of crew and equipment,

collection of initial bioassays, assignment of personal detectors (TLDs), delineation of the work zones, establishment of radiologically controlled areas, review of safety plan and decontamination techniques. The long-term response will be the body of the technical approach including methods for removal of contaminated soils and debris, loading trucks, segregation and minimization of contamination and prevention of cross contamination. Close out will include subcontract close out, site break down, free release of equipment, free release of the site, state notifications, and site restoration.

3.1 Preplanning

Preplanning will involve the completion of the transportation and disposal plan, site-specific health and safety plan (HASP), procurements, quality assurance protection plan (QAPP) and training. We will also complete logistics for crew mobilizations, trailer setup, and utilities.

Earth Tech will develop a full transportation and disposal plan prior to mobilization. An OSC/Contracting Officer (CO) consent package will be included for completion of the transportation procurement for delivery of the radioactive contaminated soil to Envirocare of Utah. The consent package will include competitive pricing for rail and road transportation of the radioactive waste, a contract with the winning vendor, and our justification for the award. The transportation and disposal plan will include completed waste profiles for radioactive and nonhazardous waste streams. The plan will include documentation for competitive bids for radioactive disposal, radioactive waste transportation, nonhazardous landfill disposal, and nonhazardous landfill transportation. A soil-sampling event and disposal analytical may be needed for each waste stream profile.

Earth Tech's Health and Safety Department in Grand Rapids, Michigan will develop a comprehensive site-specific HASP with aid from our radiological department in San Antonio, Texas. This plan will address the physical hazard associated with the site including debris, traffic, excavations, and heat stress. The HASP will discuss the chemical hazards associated with the sites such as beryllium. A detailed section completed by the Certified Health Physicist (CHP) or Radiation Safety Officer (RSO) will address the hazards from radioactive elements, primarily cesium and americium but will also include sections on iridium, radium, gadolinium, and uranium. Detailed procedures will be outlined for handling the radioactive contaminated materials at the Gulf Nuclear Site and the decontamination of workers, equipment and trucks.

A purchasing agent will be assigned to the project accompanying the Response Manager (RM) and Field Cost Accountant (FCA), and Transportation and Disposal (T&D) Coordinator. They will be directly involved with the procurement of the necessary supplies, equipment, and subcontractors. The purchasing agent and T&D coordinator will complete the transportation subcontract and disposal subcontract for the radioactive and nonhazardous waste streams. The purchasing agent and RM will complete a contract for after hours site security. The RM, FCA and purchasing agent will competitively bid heavy equipment pieces required at this site. The anticipated main heavy equipment pieces will be a mini-excavator, excavator, large forklift, and rental cars. Procurements will also be completed for site trailers, PPE, and office supplies.

The RSO will work with the FCA and purchasing agent for procurement of the radioactive detection equipment and supplies for site activities. Rental equipment will include a portable Berkeley Surveillance and Measurement System (SAMS), a Ludlum 12 rate meter, two Ludlum Model 2221 scaler rate meters with 44-9 or 44-10 probes, Ludlum Model 2224 Alpha/Beta scaler rate meter with a 43-89 probe, Eberline Hand$_E$Count sample counting system, and possibly a Teledyne FIDLER. The CHP will also conduct an 8 hr radiation awareness class for any employees scheduled to work at the Webster Gulf Nuclear site, that have not had this training previously.

The RSO and RM will take soil and debris samples, if necessary for profiling of the site waste at Envirocare or the nonhazardous landfill during this phase of the project. If the current body of data is not sufficient to support the disposal waste profiles, the T&D Coordinator will set up a lab for the necessary analytical test such as heavy metals and alpha, beta or gamma activity surveys.

The CHP and RM will work with Earth Tech's Quality Control (QC) Manager to complete the QAPP. This plan will assure that correct sampling methods are used for collection of samples. It will also address the acceptable level of quality control for the analysis performed and the data is accurate and within acceptable quality levels. The QC Manager will perform data validation on 10% of samples collect by Earth Tech at the Webster-Gulf Nuclear site.

3.2 Mobilization

Earth Tech will mobilize a Response Manager (RM), Field Cost Accountant (FCA), Radiation Safety Officer (RSO), two Radiation Technicians (RT), three Clean-up Technicians (CT) and two Equipment Operator (ET). The site trailer will be set up and equipment inspected. Electrical power will be established for the office trailer and two mobile home trailers. Site security arrangement will be finalized. The RSO will issue personal dosimeter as outlined in the HASP.

3.2.1 Work Zones

Work zones will be established in accordance with 29 CFR 1910.120 and the site-specific HASP. The support zone (SZ) will consist of the dark asphalt area of the Medical Center parking lot and the grassy area between Blossom Street and the site. This is the uncontaminated portion of the site, which will contain Earth Tech's administrative facilities, equipment, and project supplies for decontamination, health and safety, worker breaks, personal protective equipment (PPE) and other appropriate safety support equipment. Project trailers will be located in this zone and will be supplied with electricity, water, and phone service. Portable sanitary facilities will be provided. Lined roll-off boxes will be placed in this zone to receive contaminated soil from the exclusion zone. Eating, smoking, and drinking will only be allowed within designated areas in the support zone. A shaded break area will be set up for the radiation and clean-up technicians.

The contamination reduction zone (CRZ) will be established on the asphalt area just outside the personnel fence gate. We will utilize the same area that was established during the previous removal. The CRZ is the transition zones between the exclusion zone and the support zone and will be used as a controlled area for workers to don or doff PPE and completely decontaminate, prior to entering the support zone. All exiting, screening, and decontamination of personnel and equipment from the support zone will occur within the CRZ. The decontamination process will be supervised, monitored, and documented by the

radiation technician in charge of decontamination. This area will also be used for transfer of contaminated soil from the exclusion zone to the roll off container.

The existing fence surrounding the buildings will delineate the exclusion zone (EZ). Earth Tech will control access to the exclusion zone by maintaining the fence around the exclusion zone and monitoring the personnel entry gate. This administrative measure will prevent the spread of radioactive material by personnel or equipment. The personnel gate will be the only utilized EZ access. The truck access on Texas Street will be closed and locked unless a truck is moving in or out of this gate. Truck movements through this gate and throughout the Gulf Nuclear site will be supervised by an Earth Tech representative.

After the work zones are established the RM and CHP will conduct a thorough review of the HASP with all Earth Tech and Team Subcontractor Employees working at the site. Emphasis will be placed on radiation hazards, donning and doffing PPE, and minimizing cross contamination. Air monitoring will be set up prior to the work activities so baseline levels of particulates and radiation can be established.

3.2.2 Training

General and site specific training will be provided at the beginning of the project. A detailed oral review of the HASP, conducted by the RM and RSO will be completed after each site employee reads and studies the HASP. Daily safety tailgate briefings will be provided at the beginning of each workday. Training records will be continually updated to ensure that all employees are current with Hazwopper, radiation work and other site-specific training. The HASP describes and details the required training requirements in greater detail.

3.2.3 Establishment of Radiologically Controlled Area

The Webster-Gulf Nuclear Site is controlled for radiological purposes. Earth Tech will establish and maintain radiological controls for the duration of the project. Applicable documents for this purpose include Earth Tech SOP 9, Administration of Field Activities; SOP 11, Radiological Surveys and Postings; SOP 13, Radiation Training; SOP 14, Radioactive Materials Release; SOP 16, Respiratory Protection; SOP 19, Air Monitoring; and SOP 20, Site Ionizing Radiation Protection Plan.

Surface contamination guidelines are in Table 1. ^{241}Am and ^{226}Ra are Group 1 radionuclides and ^{137}Cs is a Group 4 radionuclide.

Table 1 Surface Contamination Guidelines For Unrestricted Release*

Radionuclide[a]	Allowable Total Residual Surface Contamination (dpm (100 cm^2)$^{-1}$) [b]		
	Average[c, d]	Maximum[d, e]	Removable[d, f]
Group 1: Transuranics, ^{125}I, ^{129}I, ^{227}Ac, ^{226}Ra, ^{228}Ra, ^{228}Th, ^{230}Th, ^{231}Pa	100	300	20
Group 2: $^{natural}Th$, ^{90}Sr, ^{126}I, ^{131}I, ^{133}I, ^{223}Ra, ^{224}Ra, ^{232}U, ^{232}Th	1000	3000	200
Group 3: $^{natural}U$, ^{235}U, ^{238}U, and associated decay products, alpha emitters	5000	15 000	1000
Group 4: Beta/gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous[g] fission) except ^{90}Sr and others noted above	5000	15 000	1000
Tritium (applicable to surface and subsurface)	—	—	10 000

3.2.4 Selecting a Reference Area

^{137}Cs are present in background because of nuclear weapons atmospheric testing fallout. ^{226}Ra is a natural constituent of background radionuclides. (^{241}Am does not occur in nature.) Establishing background concentrations that describe a distribution of measurement data is necessary to identify and evaluate contributions attributable to Webster-Gulf Nuclear operations. Determining background levels for comparison with the conditions determined in specific survey units entails conducting surveys in a reference area to define the radiological conditions of the Webster-Gulf Nuclear Site.

A reference area should have similar physical, chemical, geological, radiological, and biological characteristics as the survey units being evaluated. Reference areas provide a location for background

[a] Where surface contamination by both alpha- and beta/gamma-emitting radionuclides exists, the limits established for alpha- and beta/gamma-emitting radionuclides should apply independently.
[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrument.
[c] Measurements of average contamination should be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.
[d] The average and maximum dose rates associated with surface contamination resulting from beta/gamma emitters should not exceed 0.2 mrad h^{-1} and 1.0 mrad h^{-1}, respectively, at 1 cm.
[e] The maximum contamination level applies to an area of not more than 100 cm^2.
[f] The amount of removable material per 100 cm^2 of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. With removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct-scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.
[g] This category of radionuclides includes mixed fission products, including the ^{90}Sr that is present in them. It does not apply to ^{90}Sr that has been separated from the other fission products or mixtures in which the ^{91}Sr has been enriched.

measurements that are used for comparisons with survey unit data. The radioactivity present in a reference area would be ideally the same as the survey unit had it never been contaminated.

The approximate location of a single reference area has been chosen near the Webster-Gulf Nuclear Site. This location is in the same block as the Site and has no permanent structures on it.

3.3 Long-Term Response

The focuses of the long-term response operations will be the removal of the contaminated soil and debris from the exclusion zone and a free release of the site to the Medical Center. Screening and decontamination procedures will ensure the free release of equipment utilized on the project. Our initial entries will be to establish work grids within the exclusion zone and clean the work pad within the exclusion zone. Equipment operators will work off of this pad during removal of contaminated soil. The pad will be scanned and any contaminated areas removed. Loose contamination will be removed by hand with brooms. Any fixed contamination will be removed by scrabbling the contaminated concrete portion of the pad. After the pad is decontaminated the operator will move the excavator onto the pad, while the RSO and radiation technicians continue establishment of the 3-meter square girds outlined in Earth Tech SOP7, Grid Systems and Surveys. They will measure the background radiation levels and determine the primary radionuclide in each grid square.

3.3.1 Air Sampling

Air sampling stations will be established and maintained around the site for the duration of the project in accordance with Earth Tech SOP 19. Air samplers will be operated at all times when heavy equipment movement or soil disturbance is underway. These air samples will be analyzed on site for radiological contamination. If contamination is found, work operations will be modified to lower dust levels by application of a water mist or changed operator procedures.

3.3.2 Soil

An excavator will be staged on the decontaminated concrete pad in the exclusion zone to remove the radiologically impacted soil and debris identified by the RSO, Radiation Technicians, START and the USEPA. Contaminated soil will be removed by the excavator in the EZ and transferred to the polyethylene-lined front-end loader staged in the CRZ. The front-end loader will move the material from the CRZ into the lined roll-off container in the support zone immediately adjacent to the CRZ. Polyethylene sheeting will be placed under the front-end loader during transfer, to catch any soil that is spilt in the transfer processes. Care by the operators in placing the contaminated material into the bag without spilling is critical. Soil, which is contaminated and requires removal but is low enough in activity for transport to the designated non-hazardous landfill, will be placed in a non-hazardous roll off box also located on the SZ.

Each bucket load of soil will be screened in the CRZ for radiological contamination by Earth Tech's radiation technician. The screened loads will be segregated based upon radiological activity and placed into the appropriate roll off container in the support zone. The loader bucket will be subjected to

additional radiological screening and inspection following dumping of material and any switching of loads from the radiological box to the nonhazardous box. The front-end loader bucket will be decontaminated when a switch occurs or contamination is found in the bucket to prevent cross contamination.

Initially the equipment operator will be limited to removal of the top six inches of soil as designated on the site maps and confirmed by START and the USEPA. The "Removal Assessment Report" will be the primary guide for excavations confirmed by the radiation technicians in the EZ. The equipment operator will scrape using the excavator with a flat blade. Earth Tech will continually survey excavation activities with a transit, level and measuring stick to insure that the six-inch excavation depth is maintained. The radiation technician will continue to monitor radiation levels within each bucket load to determine classification of material as nonhazardous or requiring transport to Envirocare. The monitoring will also confirm that excavation activities are limited to the removal of only contaminated soil. Correlations developed by START and the USEPA will be used to relate measured activity to contaminant concentrations. Random samples will be analyzed to confirm that the viability of the correlations for removed soil.

Equipment will be operated in a manner to prevent the spread of contaminated soil being removed in the EZ to areas adjacent to this contaminated area. This will prevent cross contamination. The tracks of the excavator will only be in contact with excavated or clean areas. After the first six inches of contaminated soil is removed, Earth Tech's radiation technicians along with START personnel will survey the area after the excavated area. If additional areas require excavation the operator will use precision excavation techniques, utilizing the mini-excavator or excavator to remove soil to the required depths and perimeters identified through field radiological measurements, provided by Earth Tech and START surveys. Care will be taken to minimize cross contamination between grid squares with different predominant radionuclides. Soil will not be allowed to migrate between grid squares. Heavy equipment will not travel over unremediated areas. Radioactive waste roll off containers will be positioned so that their movement during the project is minimal. They will be placed in the support zone on the asphalt area adjacent to the CRZ.

Earth Tech will work grid by grid in an L pattern to remove the exposed layers of contaminated soil estimated at 424 cubic yards. Equipment will always be working from a clean area, so contamination of the equipment is minimized. Earth Tech's RSO or RT will continually monitor excavation activities for gamma radiation using sodium iodide detectors. Following excavation of an impacted area, EPA and START will confirm the removal of contamination through field screening and laboratory analysis. Any anomalies identified during the survey will be investigated and removed.

One exception may present itself. A grid square near the center of the Site exhibited exposure rates as high as 500 $\mu R\ h^{-1}$. Earth Tech will remediate this grid square first to keep radiation exposure as low as reasonably achievable and to lower the overall site background to enhance subsequent measurement precision and accuracy.

3.3.3 Debris

Debris will be segregated from the soil and decontaminated. Waste minimization techniques will be use to reduce disposal cost. If possible, loose contamination will be removed by dry decontamination techniques such as brushing and scraping. The radiation technician will scan the debris and classify the material as radioactive debris or nonhazardous debris. If the debris is nonhazardous, it will be staged on polyethylene sheeting until enough nonhazardous debris is collected for loading in a roll off box. If the debris is still above the acceptable level for nonhazardous debris following decontamination, the clean-up technician will again remove any loose contamination. If the contamination is fixed, the portion of the debris that is contaminated will be cut out or the nonhazardous section will be removed, reducing the amount of radioactive debris for disposal. The amount of debris requiring radiological disposal will be kept to a minimum and within the debris portion of our Envirocare profile. Earth Tech will monitor the decontamination effort to determine if the decontamination cost is exceeding the disposal cost.

The concrete pad will be the last item removed from the EZ. After all the contaminated soil is removed from the accessible grid areas, the operator will start pulling up the concrete pad with the excavator. A ram hoe attachment or a pile driver will be rented to break sections of the concrete, if the pad is to thick to pull up by the edges. Concrete removed during this operation will be placed on polyethylene sheeting and radiologically screened. The loose contamination will be removed by dry techniques and if it is necessary wet decontamination methods. The radiation technicians will screen the decontaminated concrete piece to determine if the contamination remains if the contamination is fixed or loose. Fixed contamination areas will be removed or separated from the noncontaminated areas through chipping or scabbling, significantly reducing the volume of debris that will require radioactive disposal. Care will be taken to reduce dust emissions. The contaminated soil under the concrete pad will be removed through precision techniques as outlined in the section **3.3.2 Soil**.

3.3.4 Transportation Logistics

The Webster-Gulf Nuclear site has severe space limitations, so only the minimal number of roll off boxes will be staged at the site. Trucks that are actively staging boxes in the support zone will enter the site on Blossom Street, travel across the recently seeded field area, over the ramped curb and onto the black asphalt adjacent to the CRZ.

Earth Tech will try to have only one roll-off box staged for nonhazardous soils and one box for radioactive material staged at the site. Debris boxes will only be staged when enough debris to fill a box is accumulated. The debris box will be staged, loaded and discharged.

Earth Tech proposes to utilize roll-offs for the hauling of the radioactive contaminated soil by rail or truck. The threat of cross contamination by stockpiling of soils and the small exclusion zone make loading the boxes in the support zone the best choice. Boxes will be loaded as the material is excavated. Radioactive area rope and radioactive work signs will demarcate the roll off area of the support zone.

Transportation may occur by road or rail and will be determine in the preplanning portion of the project, when competitive bids are taken for the transportation and disposal of the radioactive waste. Manifest

will be completed at the site and faxed to the Transportation and Disposal Coordinator for review. The CHP will also certify each manifest. The reviewed document will be faxed to Envirocare, prior to shipment. Nonhazardous loads will be shipped on a nonhazardous manifest generated by the RM, and reviewed by the T&D Coordinator prior to presentation to the OSC for signature.

3.3.5 Cross Contamination Minimization

Cross contamination can be a serious problem during this type of removal. Earth Tech will minimize cross contamination by working the excavator and mini-excavator from clean areas within the EZ. Equipment will not track from a contaminated area to a clean area; only the active end of the equipment will be in the contaminated zone. Earth Tech will maintain the clean area within the exclusion zone; this area will originally be the concrete pad. The front-end loader will work in the CRZ and SZ. This piece of equipment will be maintained as clean with only the bucket, potentially, contacting contaminated material. Contamination will be minimized by maintaining poly sheeting on the bucket and continually scanning of the bucket by the RT in the CRZ.

Work will progress from the pad in an L shape. The remediated areas will be maintained as clean. The RTs will monitor the remediated portions of the exclusion zone and assure that they are maintained. Cleanup technicians will remove any spills immediately. Awareness by the operators and technicians to the problems of cross contamination and importance of taking quick action when a spill or a potential cross contamination event occurs is critical to reduce or eliminate cross contamination. The RM and CHP will stress the importance and steps taken to eliminate cross contamination.

3.3.6 Decontamination

A remediation project cannot be successfully completed unless an effective decontamination program is implemented to prevent both worker contamination and cross-migration of contaminants into the adjacent community. Earth Tech personnel cannot enter the exclusion zone, without first passing through the CRZ wearing the proper PPE outlined in the HASP. Crews will not directly handle or touch contaminated materials unless they are outfitted with the appropriate PPE. PPE will be visually inspected for wear, tear and proper donning by the radiation technician monitoring the CRZ and the "buddy system" within the exclusion zone. Earth Tech employees will leave the work zone if the integrity of PPE is compromised in any way. All personnel and equipment must pass through the CRZ when exiting the EZ as specified in the site-specific HASP. Upon exiting the CRZ personnel are expected to wash their hands, neck, face, and arms before eating, drinking or smoking in the designated areas of the support zone.

When any piece of heavy equipment is utilized in the EZ it will be decontaminated prior to leaving the EZ. Gross contamination will be removed by dry techniques and followed by a wet decontamination, when necessary to remove the contamination. The radiation technicians will screen the equipment to, confirm the successful removal of contamination. Decontamination will be continued until the radiation technicians release the equipment. Earth Tech will store equipment within the EZ on top of the working concrete pad during off hours.

Small pieces of equipment such as hand tools that may have come into contact with the contaminated soil, will be subjected to screening dry decontamination and wet decontamination if necessary before transitioning through the CRZ. All discarded materials, waste materials, or other objects will be handled in such a way as to minimize their volume and preclude the potential for spreading contamination, creating a sanitary hazard, or causing debris to remain on site. All potentially contaminated disposable materials (i.e., PPE, sampling instruments, etc.) will be bagged or drummed as necessary, labeled, and segregated for disposal. Rinse water used for decontamination will be placed on the contaminated soil and adsorbed. Mandated soil moisture content will not be exceeded. The contaminated particles will be removed during future excavation activities. Contaminated liquids inappropriate for this method will be drummed and disposed according to RCRA and Texas Code Statues. Earth Tech understands that accumulated water containing cesium-contaminated soil or debris will be analyzed for Cs 137 activity.

3.3.7 Site Restoration

Upon completion of the excavation activities within the exclusion zone, Earth Tech will await results from START and the USEPA OSC on the final status survey prior to backfilling and restoration activities. We will not proceed with restoration activities, until notification from the OSC, that the results of the final status survey are acceptable. Backfill material will be comparable to the surrounding soil and procured locally. Earth Tech will seek pre-approval from the OSC for compatibility to the existing material. RCRA metal results will be required from the winning soil vendor. The backfill material will also be evaluated for debris content, radioactive content, moisture content, ability to support grass growth and compatibility. The RM will visit the source location for the fill to examine the fill removal operation.

Backfill will be placed in eight-inch lifts and worked in with bulldozer. Soil will be compacted and uniformly graded to the existing contour of the site. Soil will also be graded to aid runoff to flow away from the surrounding buildings and toward the street drain. The final overall grade will be similar to the original. The final grade will be reseeded with grass and watered.

3.4 Close Out

Earth Tech's close out will begin with the radiation technicians aiding START and the USEPA with final surveys of the exclusion, contamination reduction and support zones. This will assure that all the radioactive contamination has been removed from the site.

After the surveys are completed and any additional contamination is removed, the break down of the site will commence with the office trailer and mobile homes being disconnected from the power grid. The port toilets will be returned and the water source capped. The final roll off boxes will be shipped with the nonhazardous debris and soil and the final roll off will be loaded with the last radioactive contaminated waste and discharged to Envirocare.

The FCA will focus on clearing up the pending items on the 1900-55 finalizing vendor invoices and auditing PPE inventories. The purchasing agent and FCA will close out the subcontractors that are now longer needed and will confirm with vendors that their final invoices have been submitted and that partial month rents are prorated, when acceptable by contract. The FCA will check with the vendors that all the