

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 preferred 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 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 is 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 than 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 an 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 their 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

COST SECTION

SUMMATION

Gulf Nuclear Inc.
Summation of Both Sites

Cost for Financial Assurance

Planning and Preparation	\$ 38,685.00
Travel/Perdiem/Rental Equipment/Vehicles	\$ 441,837.88
Decontamination/Dismantlement	\$ 259,239.00
Waste Containers	\$ 254,250.00
Waste Shipping	\$ 432,102.50
Waste Disposal	\$ 1,291,835.00
Final Survey	\$ 90,000.00
Final Report	\$ 40,000.00
Total Entire Project	\$ 2,847,949.38

Total On Site Man Hours	10977.5 man hours
Total Off Site Man Hours	472.5 man hours

Total Waste Volume by Type

Waste Type	Volume ft3
Sources	390
2R/Special Form	22.5
Lead	64
Hot Debris	768
Glove Boxes	960
Building Debris	115020
Soil/concrete	71280

Total Waste Volume 188504.5 cubic feet

WEBSTER

Webster Site

Sumation Page

Building	Area	Planning and Preparation	Decontamination and Dismantling
	Office Section	\$ 960.00	\$ 3,920.00
	Laboratory Section	\$ 1,800.00	\$ 9,155.00
	Radiography Room	\$ 1,950.00	\$ 11,700.00
	Machine Shop	\$ 1,200.00	\$ 26,910.00
	Old Cs and Am-Be Labs	\$ 2,850.00	\$ 31,180.00
	Leak Test Lab	\$ 720.00	\$ 11,720.00
	New Cs and Am-Be Labs	\$ 2,800.00	\$ 14,400.00
	Tracer Lab	\$ 2,800.00	\$ 14,400.00
	Storage Area	\$ 2,800.00	\$ 18,780.00
	Operational Support Areas	\$ 1,400.00	\$ 10,180.00
	Subsurface Removal	\$ 2,600.00	\$ 8,620.00
	Travel For Webster	\$ -	\$ 215,805.13
	Final Status Survey/Report	\$ 20,000.00	\$ 45,000.00
	Total Cleaning	\$ 41,880.00	\$ 421,770.13
		Total	
Waste	Containers	\$ 86,650.00	
	Labor	\$ 25,400.00	
Shipping	Transportation	\$ 70,790.00	
	Labor	\$ 31,115.00	
Waste	Disposal	\$ 813,695.00	
* Grounds	Surface Removal	\$ 24,872.00	
Total For Webster		\$ 1,516,172.13	

TAVENOR

Tavenor Site
Sumation Page

Building	Area	Planning and Preparation	Decontamination and Dismantling
	New Waste Storage Building	\$ 4,120.00	\$ 9,390.00
	Brick Office Building	\$ 4,160.00	\$ 6,800.00
	Fabrication/Machine Shop	\$ 1,950.00	\$ 5,740.00
	Am-Be Lab	\$ 1,200.00	\$ 4,430.00
	Radiography Lab	\$ 2,115.00	\$ 4,510.00
	Subsurface Removal	\$ 3,260.00	\$ 14,860.00
	Travel For Webster	\$ -	\$ 226,032.75
	Final Status Survey/Report	\$ 20,000.00	\$ 45,000.00
	Total Cleaning	\$ 36,805.00	\$ 316,762.75

			Total
Waste	Containers		\$ 167,600.00
	Labor		\$ 46,900.00
Shipping	Transportation		\$ 176,935.00
	Labor		\$ 80,962.50
Waste	Disposal	Initial	\$ 478,140.00
Grounds	Surface Removal		\$ 27,672.00
Total For Tavenor			\$ 1,331,777.25

LONG TERM STORAGE

Gulf Nuclear Inc.
Long Term Storage

There has been identified several glove boxes and hot cells that have a large amount of contamination on the internal surfaces. Additionally there are a significant number of sources that do not have adequate markings and identifications. The likely hood of material being identified that will have no disposal option is high.

There are two options for the materials identified as such: 1) Long term Storage at a Texas Licensed Facility, or 2) Long term storage at the Tavenor facility.

Option 1 Estimate:

a. Preparation Shipping:

Item	Number	Cost	
Truck	10	90000 (Type B Box Cask)	3k/day and 3 days each
Packaging	10	4000	Included in Area Sheets
Labor	4	8000 (4 guys 10 days)	
Crane	2	20000 (10 k each time)	
Total		\$ 118,000.00	

This applies to either scenario.

b. Storage at Texas Licensed Facility

Gate Rate estimate: 10 \$/day/drum

Drum Volume 7.5 ft3

	ft3	\$/day/ft3	days/yr.	Total/Year
Webster	768	1.333333333	365	\$ 373,760.00
Tavenor	192	1.333333333	365	\$ 93,440.00
				\$ 467,200.00

c. Storage at Tavenor Site

Cost Savings on Shipping estimated at \$24,000.

		Total/Year
Quarterly Visit Surveillance	5000 qtr	\$ 20,000.00
Alarm Monitor	25 mo.	\$ 300.00
False alarms	500 qtr	\$ 2,000.00
		\$ 22,300.00

First Option Benefit: a. and c.

All material removed from both Sites allowing a closure of the facilities.

First Option Detractor:

Cost of implementation.

Second Option Benefit:

Cost of implementation.

Second Option Detractor:

The time for disposal options to become available may be 2 years or longer.

The only possible future options will be WIPP or storage at Los Alamos, until WIPP.

WEBSTER BREAK DOWN

WEBSTER

Webster Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Certified Health Physicist	80	4	320
Foreman	55	4	220
Craftsman	50	1	50
Health Physics	50	2	100
Clerical	30	1	30
Total			960

Planning and Preparation Total	960
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Facility Description

This room was used for:	Receipt	Use	Storage

Area of:	Square Feet			
floor	1584	18	88	1584
walls	2816	8	176	2
ceilings	1584			

ventilation system	yes	yes/no
plumbing system	yes	yes/no

Components:			No.	Dimensions	Location
sinks and drains	<input type="text" value="yes"/>	<input type="text" value="yes/no"/>	2	normal	restrooms
sinks and drains	<input type="text" value="yes"/>	<input type="text" value="yes/no"/>	1	normal	break room
other:					
showers	<input type="text" value="yes"/>	<input type="text" value="yes/no"/>	2	normal	restrooms
toilets	<input type="text" value="yes"/>	<input type="text" value="yes/no"/>	2	normal	restrooms
a/c drain	<input type="text" value="yes"/>	<input type="text" value="yes/no"/>	1	normal	outside

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

WEBSTER

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	1	50
Health Physics	50	2	100
Laborer	40	2	80
Clerical	30	1	30
Total			720

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	12	8	96
labels	7	1	7
ladders	1	150	150
scaffolding	1	100	100
Total			753

Components to Decontaminate

Monitor for Compliance

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	1	60
Foreman	55	1	55
Technician	45	20	900
Health Physics	50	10	500
Clerical	30	1	30
Total			1545

Components to Disassemble

sinks and drains

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	2	120
Foreman	55	2	110
Craftsman	50	3	150
Technician	45	2	90
Health Physics	50	1	50
Laborer	40	2	80
Clerical	30	1	30
Total			630

ventilation system

Labor

Rate	Time	Total
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WEBSTER

	\$/hr	Hrs	\$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	10	500
Technician	45	5	225
Health Physics	50	3	150
Laborer	40	8	320
Clerical	30	3	90
	Total		1745

Decontamination Cost	\$ 1,545.00
Dismantling Cost	\$ 2,375.00
Total D&D Cost	\$ 3,920.00

WEBSTER

Webster Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	1	50
Health Physics	50	2	100
Clerical	30	3	90
Total			1800

Planning and Preparation Total 1800

Facility Description

	Receipt	Use	Storage
This room was used for:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet			
floor	720	18	40	720
walls	1280	8	80	2
ceilings	720			

ventilation system	<input checked="" type="checkbox"/>	yes/no
plumbing system	<input checked="" type="checkbox"/>	yes/no

Components:	No.	Dimensions	Location
glove boxes	<input checked="" type="checkbox"/>	yes/no	
hot cells	<input checked="" type="checkbox"/>	yes/no	
lab benches	<input checked="" type="checkbox"/>	yes/no	

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720

WEBSTER

Health Physics	50	8	400
Laborer	40	8	320
Clerical	30	3	90
Total			2090

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	16	8	128
labels	12	1	12
ladders	1	150	150
scaffolding	1	100	100
Total			790

Components to Decontaminate

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	1	60
Foreman	55	1	55
Craftsman	50	0	0
Technician	45	20	900
Health Physics	50	10	500
Laborer	40	0	0
Clerical	30	1	30
Total			1545

Components to Disassemble

ventilation system

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	2	120
Foreman	55	2	110
Craftsman	50	3	150
Technician	45	2	90
Health Physics	50	1	50
Laborer	40	2	80
Clerical	30	1	30
Total			630

plumbing system

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	10	500

WEBSTER

Technician
Health Physics
Laborer
Clerical

45	5	225
50	3	150
40	8	320
30	3	90
Total		1745

glove boxes

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	4	240
55	4	220
50	10	500
45	5	225
50	3	150
40	8	320
30	3	90
Total		1745

hot cells

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	4	240
55	4	220
50	10	500
45	5	225
50	3	150
40	8	320
30	3	90
Total		1745

lab benches

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	4	240
55	4	220
50	10	500
45	5	225
50	3	150
40	8	320
30	3	90
Total		1745

Decontamination Cost

\$ 1,545.00

Dismantling Cost

\$ 7,610.00

Total D&D Cost

\$ 9,155.00

WEBSTER

Webster Site Radiography Room

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

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	2	100
Health Physics	50	4	200
Clerical	30	3	90
Total			1950

Planning and Preparation Total 1950

Facility Description

	Receipt	Use	Storage
This room was used for:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet			
floor	<input type="text" value="400"/>	20	20	400
walls	<input type="text" value="640"/>	8	40	2
ceilings	<input type="text" value="400"/>			

ventilation system yes/no

Components:

glove boxes yes/no
lab benches yes/no

No.	Dimensions	Location
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400

WEBSTER

Laborer	40	8	320
Clerical	30	3	90
Total			2090

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	16	8	128
labels	12	1	12
ladders	1	150	150
scaffolding	1	100	100
Total			790

Components to Decontaminate

Floors and Walls

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	4	200
Technician	45	32	1440
Health Physics	50	16	800
Laborer	40	32	1280
Clerical	30	8	240
Total			4880

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Technician	45	20	900
Health Physics	50	10	500
Clerical	30	4	120
Total			1980

Components to Disassemble

ventilation system

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	2	120
Foreman	55	2	110
Craftsman	50	1	50
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	2	60

WEBSTER

Total 1220

glove boxes

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	4	200
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	4	120
Total			1660

lab benches

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	10	500
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	4	120
Total			1960

Decontamination Cost

\$ 6,860.00

Dismantling Cost

\$ 4,840.00

Total D&D Cost

\$ 11,700.00

WEBSTER

Webster Site 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.

Planning and Preparation

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Certified Health Physicist	80	4	320
Foreman	55	4	220
Craftsman	50	2	100
Health Physics	50	4	200
Clerical	30	4	120
Total			1200

Planning and Preparation Total

1200

Facility Description

This room was used for:

Receipt	Use	Storage
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:

Square Feet

floor	1320	44	30	1320
walls	2368	8	148	2
ceilings	1320			

ventilation system

☐ yes ☐ yes/no

plumbing system

☐ yes ☐ yes/no

Components:

lab benches

☐ yes ☐ yes/no

No.	Dimensions	Location
<input type="text"/>	<input type="text"/>	<input type="text"/>

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220

WEBSTER

Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	8	320
Clerical	30	3	90
Total			2090

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	16	8	128
labels	12	1	12
ladders	1	150	150
scaffolding	1	100	100
Total			790

Components to Decontaminate

Floors and Walls

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	16	960
Foreman	55	16	880
Craftsman	50	10	500
Technician	45	80	3600
Health Physics	50	40	2000
Laborer	40	80	3200
Clerical	30	16	480
Total			11620

Monitor for Compliance

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	0	0
Technician	45	40	1800
Health Physics	50	20	1000
Laborer	40	0	0
Clerical	30	8	240
Total			3960

Components to Disassemble

ventilation system

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	2	120
Foreman	55	2	110

WEBSTER

Craftsman	50	1	50
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	2	60
Total			1220

plumbing system

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	8	400
Technician	45	20	900
Health Physics	50	10	500
Laborer	40	20	800
Clerical	30	8	240
Total			3760

lab benches

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	10	600
Foreman	55	10	550
Craftsman	50	10	500
Technician	45	40	1800
Health Physics	50	20	1000
Laborer	40	40	1600
Clerical	30	10	300
Total			6350

Decontamination Cost

\$ 15,580.00

Dismantling Cost

\$ 11,330.00

Total D&D Cost

\$ 26,910.00

WEBSTER

Webster Site Old Cs and 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. 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	10	600
Certified Health Physicist	80	10	800
Foreman	55	10	550
Craftsman	50	2	100
Health Physics	50	10	500
Clerical	30	10	300
Total			2850

Planning and Preparation Total 2850

Facility Description

	Receipt	Use	Storage
This room was used for:		x	

Area of:	Square Feet			
floor	800	20	40	800
walls	1920	8	120	2
ceilings	800			

ventilation system yes yes/no

Components:		No.	Dimensions	Location
glove boxes	yes	yes/no	2	2x3x4
hot cells	yes	yes/no	2	2x2x2 and 4x4x4
lab benches	yes	yes/no		

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
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WEBSTER

Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	8	320
Clerical	30	3	90
Total			2090

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	32	8	256
labels	20	1	20
Total			676

Components to Decontaminate

Floors and Walls

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	16	960
Foreman	55	16	880
Craftsman	50	10	500
Technician	45	80	3600
Health Physics	50	40	2000
Laborer	40	80	3200
Clerical	30	16	480
Total			11620

Monitor for Compliance

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	8	480
Foreman	55	8	440
Technician	45	40	1800
Health Physics	50	20	1000
Clerical	30	8	240
Total			3960

Components to Disassemble

ventilation system

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720

WEBSTER

Health Physics
Laborer
Clerical

50	8	400
40	16	640
30	4	120
Total		2440

glove boxes

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	8	480
55	8	440
50	4	200
45	16	720
50	8	400
40	16	640
30	8	240
Total		3120

hot cells

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	16	960
55	16	880
50	8	400
45	32	1440
50	16	800
40	32	1280
30	16	480
Total		6240

lab benches

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	8	480
55	8	440
50	10	500
45	20	900
50	10	500
40	20	800
30	6	180
Total		3800

Decontamination Cost

\$ 15,580.00

Dismantling Cost

\$ 15,600.00

Total D&D Cost

\$ 31,180.00

WEBSTER

Webster Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	2	120
Certified Health Physicist	80	2	160
Foreman	55	2	110
Craftsman	50	2	100
Health Physics	50	4	200
Clerical	30	1	30
Total			720

Planning and Preparation Total 720

Facility Description

	Receipt	Use	Storage
This room was used for:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet			
floor	<input type="text" value="144"/>	12	12	144
walls	<input type="text" value="768"/>	8	48	2
ceilings	<input type="text" value="144"/>			

ventilation system yes/no

Components:	No.	Dimensions	Location
glove boxes	<input type="text" value="yes"/>	yes/no	<input type="text" value="2"/> small
other:			
wooden shelf's	yes		

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240

WEBSTER

Foreman	55	4	220
Craftsman	50	2	100
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	2	60
Total			1500

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	8	8	64
labels	4	1	4
Total			468

Components to Decontaminate

Floors and Walls

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	4	120
Total			2900

Monitor for Compliance

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	4	240
Foreman	55	4	220
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
Total			1700

Components to Disassemble

ventilation system

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400

WEBSTER

Laborer	40	16	640
Clerical	30	4	120
Total			2440

glove boxes

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	4	120
Total			1560

wooden shelves

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	4	200
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	8	240
Total			3120

Decontamination Cost	\$ 4,600.00
Dismantling Cost	\$ 7,120.00
Total D&D Cost	\$ 11,720.00

WEBSTER

Webster Site New Cs and 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	4	200
Health Physics	50	16	800
Clerical	30	8	240
Total			2800

Planning and Preparation Total 2800

Facility Description

	Receipt	Use	Storage
This room was used for:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet			
floor	400	20	20	400
walls	1280	8	80	2
ceilings	400			

ventilation system yes yes/no

Components:

hot cells yes yes/no
 lab benches yes yes/no
 other:
 concrete blocks yes

No. Dimensions Location

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate	Time	Total
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WEBSTER

	\$/hr	Hrs	\$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	8	240
Total			3020

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	8	8	64
labels	4	1	4
Total			468

Components to Decontaminate

Floors and Walls

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	4	120
Total			2900

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
Total			1700

Components to Disassemble

ventilation system

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100

WEBSTER

Technician
Health Physics
Laborer
Clerical

45	16	720
50	8	400
40	16	640
30	4	120
Total		2440

glove boxes

Labor

Rate \$/hr	Time Hrs	Total \$
60	4	240
55	4	220
50	2	100
45	16	720
50	8	400
40	16	640
30	4	120
Total		2440

concrete blocks

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	8	480
55	8	440
50	16	800
45	16	720
50	8	400
40	40	1600
30	16	480
Total		4920

Decontamination Cost

\$ 4,600.00

Dismantling Cost

\$ 9,800.00

Total D&D Cost

\$ 14,400.00

WEBSTER

Webster Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	4	200
Health Physics	50	16	800
Clerical	30	8	240
Total			2800

Planning and Preparation Total 2800

Facility Description

	Receipt	Use	Storage
This room was used for:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet			
floor	400	20	20	400
walls	1280	8	80	2
ceilings	400			

ventilation system yes yes/no

Components:

		No.	Dimensions	Location
hot cells	yes yes/no			
other:				
concrete blocks	yes			

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

WEBSTER

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	8	240
Total			3020

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	8	8	64
labels	4	1	4
Total			468

Components to Decontaminate

Floors and Walls

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	4	120
Total			2900

Monitor for Compliance

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
Total			1700

Components to Disassemble

ventilation system

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220

WEBSTER

Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	4	120
Total			2440

glove boxes

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	4	120
Total			2440

concrete blocks

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	16	800
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	40	1600
Clerical	30	16	480
Total			4920

Decontamination Cost	\$ 4,600.00
Dismantling Cost	\$ 9,800.00

Total D&D Cost	\$ 14,400.00
----------------	--------------

WEBSTER

Webster Site 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 which is approximately 2" thick.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	4	200
Health Physics	50	16	800
Clerical	30	8	240
Total			2800

Planning and Preparation Total 2800

Facility Description

This room was used for:	Receipt	Use	Storage
	x	x	x

Area of:	Square Feet			
floor	1400	20	70	1400
walls	2880	8	180	2
ceilings	1400			

ventilation system yes yes/no

Components:	No.	Dimensions	Location
other:			
concrete blocks	yes		
empty packaging	yes		

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate	Time	Total
-------	------	------	-------

WEBSTER

	\$/hr	Hrs	\$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	8	240
Total			3020

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	8	8	64
labels	4	1	4
Total			468

Components to Decontaminate

Floors and Walls

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	32	1280
Clerical	30	4	120
Total			3540

Monitor for Compliance

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	8	400
Technician	45	32	1440
Health Physics	50	16	800
Clerical	30	8	240
Total			3800

Components to Disassemble

ventilation system

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	4	240
Foreman	55	4	220

WEBSTER

Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	24	960
Clerical	30	4	120
Total			2760

empty packaging

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	4	200
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	32	1280
Clerical	30	8	240
Total			3760

concrete blocks

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	16	800
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	40	1600
Clerical	30	16	480
Total			4920

Decontamination Cost	\$ 7,340.00
Dismantling Cost	\$ 11,440.00
Total D&D Cost	\$ 18,780.00

WEBSTER

Webster Site Operational Support Area

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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Certified Health Physicist	80	4	320
Foreman	55	4	220
Craftsman	50	2	100
Health Physics	50	8	400
Clerical	30	4	120
Total			1400

Planning and Preparation Total 1400

Facility Description

This room was used for:	Receipt	Use	Storage
	x		x

Area of:	Square Feet			
floor	800	20	40	800
walls	1920	8	120	2
ceilings	800			

ventilation system yes yes/no

Components: No. Dimensions Location
 other:
 wooden cabinets yes

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100

WEBSTER

Technician	45	8	360
Health Physics	50	4	200
Laborer	40	4	160
Clerical	30	4	120
Total			1400

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	8	8	64
labels	4	1	4
Total			468

Components to Decontaminate

Floors and Walls

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	32	1280
Clerical	30	4	120
Total			3540

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	4	200
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
Total			1900

Components to Disassemble

ventilation system

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	24	960

WEBSTER

Clerical	30	4	120
Total			2760

wooden cabinets

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	4	200
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	16	640
Clerical	30	4	120
Total			1980

Decontamination Cost	\$ 5,440.00
Dismantling Cost	\$ 4,740.00
Total D&D Cost	\$ 10,180.00

WEBSTER

Webster Site Subsurface Removal

The entire Septic System to the fence line requires removal. The source holders require removal.

Planning and Preparation

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	8	400
Health Physics	50	8	400
Clerical	30	8	240
Total			2600

Planning and Preparation Total

2600

Facility Description

This room was used for:

Receipt	Use	Storage
	x	x

Area of:

linear feet of piping

plumbing system(including source holders)

Square Feet

200 feet

yes yes/no

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	4	8	32
sampling tools	109	25	2725
sample containers	109	3	327
backhoe	1	1200	1200
Total			4684

Services Required

	Required Number	Cost each	Total \$
Analytical Analysis Soil	109	410	44690
Total			44690

Components to Decontaminate

WEBSTER

Monitor for Compliance

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	4	200
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
Total			1900

Components to Disassemble

plumbing system(including source holders)

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	16	960
Foreman	55	16	880
Craftsman	50	16	800
Technician	45	32	1440
Health Physics	50	16	800
Laborer	40	40	1600
Clerical	30	8	240
Total			6720

Decontamination Cost

\$ 1,900.00

Dismantling Cost

\$ 6,720.00

Total D&D Cost

\$ 8,620.00

Webster Travel

W. GER

Note:

1. Planning to occur 1/2 off site and 1/2 on site.
2. All D&D on Site.
3. Rental Vehicle for Supervisor and Foreman.
4. Rental Truck/ Van for workers.
5. All CHP Time offsite.
6. Per diem rate 115 per day.
7. Plane Tickets 650 round trip.

	Office Section		Laboratory Section		Radiography Room		Machine Shop	
	Off Site	On Site	Off Site	On Site	Off Site	On Site	Off Site	On Site
Supervisor		2	13	4	27	4	30	2
Certified Health Physicist		4	0	8	0	8	0	4
Foreman		2	13	4	27	4	30	2
Craftsman	0.5		14.5	0.5	45.5	1	22	32
Technician	0	0	27	0	58	0	92	0
Health Physics	1	1	17	1	32	2	48	2
Laborer	0	0	12	0	42	0	64	0
Clerical	0.5		6.5	1.5	18.5	1.5	26.5	2
Total Labor Hours								
	Off Site	On Site	Weeks on Site	Number of personnel	Per Diem	Number Personnel	Total Per Diem	
1 Supervisor	40		553	13,825	1	115	11129.125	
1 Certified Health Physicist	80		0	0	0.0	0	1	0
1 Foreman	40		553	13,825	1.0	115	11129.125	
1 Craftsman	20		444	11.1	0.8	0	1	0
3 Technician	0		1565	39,125	2.8	115	3	94486.875
1.5 Health Physics	49		840	21	1.5	115	2	33810
3 Laborer	0		1446	36.15	2.6	0	3	0
1 Clerical	33		524	13.1	0.9	0	1	0
	262		5925					
						<div>\$ 150,555.13</div>		

\$150,555.13

51600

\$ 215,805.13

W FER

Old Cs and Am-Be Labs		Leak Test Lab		New Cs and Am-Be Labs		Tracer Lab		Storage Area		Operational Support Areas		Subsurface	
Off Site	On Site	Off Site	On Site	Off Site	On Site	Off Site	On Site	Off Site	On Site	Off Site	On Site	Off Site	On Site
5	69	1	33	4	40	4	40	4	48	2	26	4	4
10	0	2	0	8	0	8	0	8	0	4	0	8	8
5	69	1	33	4	40	4	40	4	48	2	26	4	4
1	37	1	13	2	26	2	26	2	36	1	15	4	4
0	220	0	80	0	96	0	96	0	112	0	64	0	0
5	115	2	42	8	56	8	56	8	64	4	36	4	4
0	172	0	64	0	104	0	104	0	144	0	76	0	0
5	66	0.5	26.5	4	44	4	44	4	52	2	22	4	4

WATER

Removal Waste		Grounds	
On Site	Off Site	On Site	Off Site
24	0	89	4
0	0	0	8
24	0	89	4
24	0	89	4
48	0	356	0
28	0	178	4
40	0	356	0
16	0	89	4

WEBSTER

**Webster
Waste**

Container Costs

Waste Type	Volume ft3	Containers		Price each	Total Cost	
		No.	Type			
Sources	375	50	7A Drums	50	2500	
2R/Special Form	7.5	20	Special Form	800	16000	
Lead	54	1	B-12 Boxes	400	400	
Hot Debris	384	4	7A Boxes	500	2000	
Glove Boxes	768	8	7A Boxes	500	4000	
Building Debris	34020	63	Rolloffs	650	40950	drop off
Soil/concrete	17280	32	Rolloffs	650	20800	500
Total Containers					86650	

Labor Cost

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	40	2400
Foreman	55	40	2200
Craftsman	50	40	2000
Technician	45	160	7200
Health Physics	50	80	4000
Laborer	40	160	6400
Clerical	30	40	1200
Total			25400

Transportation Costs

Disposal Facility		Tx Disposal	
Distance to Facility		200	
\$/mile/truck	Unit Cost	1.85	
	Additional Costs	0	
50/hr for 4 hr		weight	0
		surcharge	0
		demurge	200
Truck		Number	Cost
Type			Total
Rolloffs		91	570
			51870
Disposal Facility		Utah Disposal	
Distance to Facility		800	
\$/mile/truck	Unit Cost	1.85	
	Additional Costs	0	
50/hr for 16 hr		weight	0
		surcharge	0
		demurge	800
Truck		Number	Cost
Type			Total

WEBSTER

Rolloffs	4	2280	9120
Flatbed	1	2280	2280
Total			11400

	Disposal Facility	TN Processor
	Distance to Facility	1600
\$/mile/truck	Unit Cost	1.85
	Additional Costs	weight 0
		surcharge 0
	50/hr for 8 hr	demurge 800

Truck	Type	Number	Cost	Total
	Van	2	3760	7520

Total Transportation 70790

Labor Cost

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	49	2940
Foreman	55	49	2695
Craftsman	50	49	2450
Technician	45	196	8820
Health Physics	50	98	4900
Laborer	40	196	7840
Clerical	30	49	1470
Total			31115

Total trucks 98
Truck Factor 2

Disposal

	ft3	cost	Total
Tx Disposal	49140	6	294840
Pa Processing Facility	9000	6	54000
Utah Disposal	2160	103	222480
TN Processor	562.5	278	156375
			813695

Cost on per pound Trans. In Tavenor
140000 mci sur charge

WEBSTER

Webster Site Grounds

This includes removal of building and pavement.

Planning and Preparation

Labor

Supervisor
Certified Health Physicist
Foreman
Craftsman
Health Physics
Clerical

Rate \$/hr	Time Hrs	Total \$
60	8	480
80	8	640
55	8	440
50	8	400
50	8	400
30	8	240
Total		2600

Planning and Preparation Total

2600

Facility Description

This room was used for:

Receipt	Use	Storage
x	x	x

Area of:
grounds

Square Feet	
19550 ft2	230

85

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Equipment Required

survey instruments
personal protective equipment
backhoe

Required Number	Cost each	Total \$
4	100	400
4	8	32
1	1200	1200
Total		1632

Components to Decontaminate

Monitor for Compliance

Labor
Apply Fixative for Raising Building
Supervisor
Foreman
Craftsman
Technician

Rate \$/hr	Time Hrs	Total \$
60	16	960
55	16	880
50	16	800
45	32	1440

WEBSTER

Health Physics
Laborer
Clerical

50	16	800
40	32	1280
30	16	480
Total		6640

Components to Disassemble

Building and pavement

Labor

Supervisor
Foreman
Craftsman
Technician
Health Physics
Laborer
Clerical

Rate \$/hr	Time Hrs	Total \$
60	40	2400
55	40	2200
50	40	2000
45	80	3600
50	40	2000
40	80	3200
30	40	1200
Total		16600

Decontamination Cost

\$ 6,640.00

Dismantling Cost

\$ 16,600.00

Total D&D Cost

\$ 23,240.00

TAVENOR BREAKDOWN

TAVENOR

Tavenor Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	16	960
Certified Health Physicist	80	16	1280
Foreman	55	8	440
Craftsman	50	8	400
Health Physics	50	16	800
Clerical	30	8	240
Total			4120

Planning and Preparation Total 4120

Facility Description

This room was used for:	Receipt	Use	Storage
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet
floor	2800
walls	9800
ceilings	2800

Components:	No.	Dimensions	Location
other:			
machinery	yes	yes/no	2 normal restrooms

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Floors/Walls			
Supervisor	60	16	960

TAVENOR

Foreman	55	16	880
Craftsman	50	4	200
Technician	45	32	1440
Health Physics	50	16	800
Laborer	40	64	2560
Clerical	30	16	480
Total			7320

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	64	8	512
needle guns	2	50	100
labels	10	1	10
ladders	1	150	150
scaffolding	1	100	100
Total			1272

Rental

Components to Decontaminate

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Technician	45	64	2880
Health Physics	50	32	1600
Clerical	30	16	480
Total			5880

Components to Disassemble

machinery

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	3	150
Technician	45	20	900
Health Physics	50	10	500
Laborer	40	20	800
Clerical	30	8	240
Total			3510

Decontamination Cost

\$ 5,880.00

Dismantling Cost

\$ 3,510.00

Total D&D Cost

\$ 9,390.00

TAVENOR

Tavenor Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	16	960
Certified Health Physicist	80	8	640
Foreman	55	16	880
Craftsman	50	16	800
Health Physics	50	8	400
Clerical	30	16	480
Total			4160

Planning and Preparation Total 4160

Facility Description

<p>This room was used for:</p> <p>Area of:</p> <p>floor</p> <p>walls</p> <p>ceilings</p> <p>ventilation system</p> <p>plumbing system</p> <p>Components:</p> <p>shields</p>	<table border="1" style="width: 100%;"> <tr> <th>Receipt</th> <th>Use</th> <th>Storage</th> </tr> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">x</td> <td style="text-align: center;">x</td> </tr> </table> <table border="1" style="width: 100%;"> <tr> <th>Square Feet</th> </tr> <tr> <td style="text-align: center;">4500</td> </tr> <tr> <td style="text-align: center;">15750</td> </tr> <tr> <td style="text-align: center;">4500</td> </tr> </table> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">yes</td> <td style="width: 50%;">yes/no</td> </tr> <tr> <td>yes</td> <td>yes/no</td> </tr> </table> <table border="1" style="width: 100%;"> <tr> <th>No.</th> <th>Dimensions</th> <th>Location</th> </tr> <tr> <td>yes</td> <td>yes/no</td> <td></td> </tr> </table>	Receipt	Use	Storage	x	x	x	Square Feet	4500	15750	4500	yes	yes/no	yes	yes/no	No.	Dimensions	Location	yes	yes/no	
Receipt	Use	Storage																			
x	x	x																			
Square Feet																					
4500																					
15750																					
4500																					
yes	yes/no																				
yes	yes/no																				
No.	Dimensions	Location																			
yes	yes/no																				

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	16	960
Foreman	55	16	880

TAVENOR

Craftsman	50	32	1600
Technician	45	32	1440
Health Physics	50	16	800
Laborer	40	48	1920
Clerical	30	8	240
Total			7840

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	32	8	256
labels	12	1	12
lighting	4	200	800
ladders	5	150	750
scaffolding	3	100	300
Total			2518

Components to Decontaminate

Monitor for Compliance

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	8	480
Foreman	55	8	440
Technician	45	20	900
Health Physics	50	10	500
Clerical	30	8	240
Total			2560

Components to Disassemble

ventilation system

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	2	120
Foreman	55	2	110
Craftsman	50	3	150
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	6	240
Clerical	30	1	30
Total			1210

plumbing system

	Rate \$/hr	Time Hrs	Total \$
Labor			
Supervisor	60	4	240
Foreman	55	4	220

TAVENOR

Craftsman	50	5	250
Technician	45	5	225
Health Physics	50	3	150
Laborer	40	16	640
Clerical	30	4	120
Total			1845

shields

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	2	100
Technician	45	5	225
Health Physics	50	3	150
Laborer	40	4	160
Clerical	30	3	90
Total			1185

Decontamination Cost	\$ 2,560.00
Dismantling Cost	\$ 4,240.00

Total D&D Cost	\$ 6,800.00
----------------	-------------

TAVENOR

Tavenor Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	8	440
Craftsman	50	2	100
Health Physics	50	4	200
Clerical	30	3	90
Total			1950

Planning and Preparation Total 1950

Facility Description

	Receipt	Use	Storage
This room was used for:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet
floor	785
walls	2747.5
ceilings	785

Components:	No.	Dimensions	Location
tools/debris	<input checked="" type="checkbox"/> yes	yes/no	<input type="text"/>

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	2	120
Foreman	55	2	110
Craftsman	50	1	50
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	32	1280
Clerical	30	2	60
Total			2740

TAVENOR

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	8	8	64
labels	4	1	4
Total			468

Components to Decontaminate

Floors and Walls

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	4	200
Technician	45	16	720
Health Physics	50	8	400
Laborer	40	16	640
Clerical	30	4	120
Total			2540

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Technician	45	20	900
Health Physics	50	10	500
Clerical	30	4	120
Total			1980

Components to Disassemble

tools/debris

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	2	120
Foreman	55	2	110
Craftsman	50	1	50
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	8	320
Clerical	30	2	60
Total			1220

Decontamination Cost

\$ 4,520.00

Dismantling Cost

\$ 1,220.00

Total D&D Cost

\$ 5,740.00

TAVENOR

Tavenor Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Certified Health Physicist	80	4	320
Foreman	55	4	220
Craftsman	50	2	100
Health Physics	50	4	200
Clerical	30	4	120
Total			1200

Planning and Preparation Total 1200

Facility Description

	Receipt	Use	Storage
This room was used for:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Area of:	Square Feet			
floor	795	44	30	1320
walls	200	8	148	2
ceilings	10			

Components:	No.	Dimensions	Location
walls/ceiling	<input checked="" type="checkbox"/> yes	yes/no	<input type="text"/>

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	1	50
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	16	640

TAVENOR

Clerical	30	4	120
	Total		1830

Equipment Required	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	16	8	128
labels	12	1	12
	Total		540

Components to Decontaminate

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
	Total		1700

Components to Disassemble

walls/ceiling

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	1	50
Technician	45	8	360
Health Physics	50	4	200
Laborer	40	24	960
Clerical	30	8	240
	Total		2730

Decontamination Cost	\$ 1,700.00
Dismantling Cost	\$ 2,730.00
Total D&D Cost	\$ 4,430.00

TAVENOR

Tavenor Site 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.

Planning and Preparation

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	5	300
Certified Health Physicist	80	8	640
Foreman	55	5	275
Craftsman	50	1	50
Health Physics	50	14	700
Clerical	30	5	150
Total			2115

Planning and Preparation Total	2115
--------------------------------	------

Facility Description

	Receipt	Use	Storage
This room was used for:	x	x	x

Area of:	Square Feet
floor	624
walls	2184
ceilings	624

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	2	100
Technician	45	32	1440
Health Physics	50	16	800
Laborer	40	40	1600
Clerical	30	8	240
Total			5100

TAVENOR

Equipment Required

	Required Number	Cost each	Total \$
survey instruments	4	100	400
personal protective equipment	32	8	256
needle guns	2	50	100
air compressor	1	250	250
labels	20	1	20
	Total		1026

Components to Decontaminate

Floors and Walls

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	5	300
Foreman	55	5	275
Craftsman	50	2	100
Technician	45	8	360
Health Physics	50	8	400
Laborer	40	20	800
Clerical	30	5	150
	Total		2385

Monitor for Compliance

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	5	300
Foreman	55	5	275
Technician	45	20	900
Health Physics	50	10	500
Clerical	30	5	150
	Total		2125

Components to Disassemble

Decontamination Cost	\$ 4,510.00
Dismantling Cost	\$ -
Total D&D Cost	\$ 4,510.00

TAVENOR

Tavenor Site Subsurface Removal

The Entire property surface requires removal of brush and soil to facilitate compliance investigation.

Planning and Preparation

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Certified Health Physicist	80	8	640
Foreman	55	20	1100
Craftsman	50	8	400
Health Physics	50	8	400
Clerical	30	8	240
Total			3260

Planning and Preparation Total

3260

Facility Description

This room was used for:

Receipt	Use	Storage
	x	x

Area of:

linear feet of piping
brush
plumbing system

Square Feet	
1000 feet	
yes	yes/no
yes	yes/no

* Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Equipment Required

survey instruments
personal protective equipment
sampling tools
sample containers
backhoe

Required Number	Cost each	Total \$
4	100	400
4	8	32
109	25	2725
109	3	327
1	1200	1200
Total		4684

Services Required

Analytical Analysis
Soil
Water
other

Required Number	Cost each	Total \$
109	410	44690
10	210	2100
Total		46790

340
30

TAVENOR

Components to Decontaminate

Monitor for Compliance

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	4	240
Foreman	55	4	220
Craftsman	50	4	200
Technician	45	16	720
Health Physics	50	8	400
Clerical	30	4	120
Total			1900

Components to Disassemble

brush

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	4	200
Technician	45	20	900
Health Physics	50	10	500
Laborer	40	120	4800
Clerical	30	8	240
Total			7560

plumbing system

Labor

	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	8	480
Foreman	55	8	440
Craftsman	50	8	400
Technician	45	32	1440
Health Physics	50	16	800
Laborer	40	40	1600
Clerical	30	8	240
Total			5400

Decontamination Cost

\$ 1,900.00

Dismantling Cost

\$ 12,960.00

Total D&D Cost

\$ 14,860.00

**Tavenor
Travel**

Note:

1. Planning to occur 1/2 off site and 1/2 on site.
2. All D&D on Site.
3. Rental Vehicle for Supervisor and Foreman.
4. Rental Truck/ Van for workers.
5. All CHP Time offsite.
6. Per diem rate 115 per day.
7. Plane Tickets 650 round trip

	New Waste Storage Building		Brick Office Building		Fabrication/Machine Shop		Am-8e Lab	
	Off Site	On Site	Off Site	On Site	Off Site	On Site	Off Site	On Site
Supervisor		8		8		4		16
Certified Health Physicist		16		8		8		0
Foreman		4		8		4		16
Craftsman		4		8		1		7
Technician		0		0		0		60
Health Physics		8		4		2		32
Laborer		0		0		0		18
Clerical		4		8		0		40
						1.5		2
						13.5		18
Total Labor Hours			Weeks		Number		Total	
Off Site	On Site	on Site	of personnel	Diem	Personnel	Per Diem		
32.5	392	9.8	1	115	1	7889		
60	0	0	0.0	0	0	1		
34.5	394	9.85	1.0	115	1	7929.25		
26.5	335	8.375	0.9	0	0	1		
0	1188	29.7	3.0	115	3	71725.5		
31	1064	26.6	2.7	115	3	64239		
0	1296	32.4	3.3	0	3	0		
26	383.5	9.5875	1.0	0	1	0		
210.5	5052.5	126.3125	12.9					
No. Personnel	No. Trips	Cost	Total					
7	3	650	13650					
Plane Tickets								
Rental Vehicles								
Number	Months	Cost	Total					
Car	1	3	1000					
Truck	1	3	1200					
Backhoe	2	3	3000					
Bob Cat	3	3	3000					
Dowser	1	3	3000					
			9000					
			60600					

Total Travel and Vehicle Rental

\$ 226,032.75

\$151,782.75

1

T, JOR

Radiography Lab Off Site	On Site	Subsurface Removal		Waste		Grounds	
		Off Site	On Site	Off Site	On Site	Off Site	On Site
2.5	20.5	4	24	0	167.5	4	64
8	0	8	0	0	0	8	0
2.5	20.5	10	30	0	167.5	4	64
0.5	4.5	4	20	0	167.5	8	72
0	60	0	68	0	670	0	112
7	41	4	38	0	765	4	64
0	60	0	160	0	670	0	152
2.5	20.5	4	24	0	167.5	4	64

TAVENOR

**Tavenor Site
Waste**

Container Costs

Waste Type	Volume ft3	Containers		Price each	Total Cost	
		No.	Type			
Sources	15	2	7A Drums	50	100	
2R/Special Form	15	2	Special Form	800	1600	
Hot Debris	384	4	7A Boxes	500	2000	
Lead	10	1	B-12	400	400	
Glove Boxes	192	2	7A Boxes	500	1000	
Building Debris	81000	150	Rolloffs	650	97500	drop off
Soil	54000	100	Rolloffs	650	65000	500

 Total Containers 167600

Labor Cost

Labor	Rate \$/hr	Time Hrs	Total \$
Supervisor	60	40	2400
Foreman	55	40	2200
Craftsman	50	40	2000
Technician	45	160	7200
Health Physics	50	510	25500
Laborer	40	160	6400
Clerical	30	40	1200
Total			46900

Transportation Costs

	Disposal Facility	Texas Burial Site
	Distance to Facility	200
\$/mile/truck	Unit Cost	1.85
	Additional Costs	weight 0
		surcharges 0
	50/hr for 4 hr	demurge 200

Truck	Type	Number	Cost	Total
	Rolloffs	240	570	136800

	Disposal Facility	Pa Processor
	Distance to Facility	1500
\$/mile/truck	Unit Cost	1.85
	Additional Costs	weight 0
		surcharges 0

TAVENOR

50/hr for 4 hr demurge 200

Truck	Type	Number	Cost	Total
	Rolloffs	1	2975	2975

	Disposal Facility	Utah Burial Site
	Distance to Facility	800
\$/mile/truck	Unit Cost	1.85
	Additional Costs	weight 0
		surcharges 0
	50/hr for 16 hr	demurge 800

Truck	Type	Number	Cost	Total
	Rolloffs	10	2280	22800
	Flatbed	3	2280	6840
	Total			29640

	Disposal Facility	TN Process Facility
	Distance to Facility	1600
\$/mile/truck	Unit Cost	1.85
	Additional Costs	weight 0
		surcharges 0
	50/hr for 8 hr	demurge 800

Truck	Type	Number	Cost	Total
	Van	2	3760	7520

Total Transportation 176935

Labor Cost

Labor	Rate \$/hr	Time Hrs	Total \$	Total trucks	Truck Factor
Supervisor	60	127.5	7650	255	2
Foreman	55	127.5	7012.5		
Craftsman	50	127.5	6375		
Technician	45	510	22950		
Health Physics	50	255	12750		
Laborer	40	510	20400		
Clerical	30	127.5	3825		
Total			80962.5		

Disposal	ft3	cost	Total	Cost By Pound
Texas Burial Site	4320	6	25920	
Utah Burial Site	4320	103	444960	
Pa Processor	9000	6	54000	
TN Process Facility	15	484	7260	0 mci sur charge
			478140	

Tavenor Site Grounds

This includes removal of buildings and pavement.

Planning and Preparation

Labor

Supervisor
Certified Health Physicist
Foreman
Craftsman
Health Physics
Clerical

Rate \$/hr	Time Hrs	Total \$
60	8	480
80	8	640
55	8	440
50	16	800
50	8	400
30	8	240
Total		3000

Planning and Preparation Total

3000

Facility Description

This room was used for:

Receipt	Use	Storage
x	x	x

Area of:
grounds

Square Feet	
17000 ft ²	200

85

Facility Characterization

Characterization has been completed prior to this report.

Decontamination Efforts

Equipment Required

survey instruments
personal protective equipment
backhoe

Required Number	Cost each	Total \$
4	100	400
4	8	32
2	1200	2400
Total		2832

Components to Decontaminate

Monitor for Compliance

Labor
Apply Fixative for Raising Building
Supervisor
Foreman
Craftsman
Technician

Rate \$/hr	Time Hrs	Total \$
60	16	960
55	16	880
50	16	800
45	32	1440

Health Physics
 Laborer
 Clerical

50	16	800
40	32	1280
30	16	480
Total		6640

Components to Disassemble

Building and pavement

Labor

Supervisor
 Foreman
 Craftsman
 Technician
 Health Physics
 Laborer
 Clerical

Rate \$/hr	Time Hrs	Total \$
60	40	2400
55	40	2200
50	40	2000
45	80	3600
50	40	2000
40	120	4800
30	40	1200
Total		18200

Decontamination Cost

\$ 6,640.00

Dismantling Cost

\$ 18,200.00

Total D&D Cost

\$ 24,840.00

Attachment A

Analytical



FACSIMILE COVER PAGE

DATE: 9-24-01 FAX NUMBER: 865-220-5365

FOR: Neal Whatley

COMPANY: US Ecology

FROM: Michelle Puder

TOTAL NUMBER OF PAGES INCLUDING COVER PAGE: 28

MESSAGE: Final Gamma Report

ETL LABORATORIES OFFERS A FULL SPECTRUM OF LABORATORY SERVICES

- Air Toxics
- Mixed Waste Analysis
- Radionuclide Testing
- Hydrocarbon Characterization and Fingerprinting

PLEASE CALL FOR MORE DETAILS

IF YOU HAVE ANY DIFFICULTY WITH THIS TRANSMISSION, PLEASE CALL 307-235-5741.

Enviro-Test Laboratories LLC.

Chemical Analysis Report

USEcology NMMC Brokerage Services

Date: 24 SEP 2001

Attn: NEAL WHATLEY

109 Flint Road

Oak Ridge TN 37830

Lab Work Order #: L3886

Date Received: 14 SEP 2001

Project P.O. #:

Project Reference:

Comments:

APPROVED BY: _____

Project Manager



**Enviro • Test
LABORATORIES LLC.**

420 West 1st Street Casper, Wyoming 82601
Phone: (307) 235-5741 Fax (307) 266-1676
Toll Free 1(800)668-0304

Results are only applicable to samples submitted for analysis.
Limit of liability. Although care and due diligence is taken in the performance of our services, our liability in no cases is limited to re-analysis at our expense or refunding the analytical costs charged for the work performed.



CHAIN OF CUSTODY RECORD

4054

CUSTOMER INFORMATION				PROJECT INFORMATION				BILLING INFORMATION				ANALYSIS / METHOD				REMARKS / PRECAUTIONS			
COMPANY				PROJECT NAME/NUMBER				PROJECT NAME/NUMBER				ANALYSIS / METHOD				REMARKS / PRECAUTIONS			
SENT REPORT TO				BILL TO				BILLING INFORMATION				ANALYSIS / METHOD				REMARKS / PRECAUTIONS			
ADDRESS:				ADDRESS:				ADDRESS:				ANALYSIS / METHOD				REMARKS / PRECAUTIONS			
PHONE:				PHONE:				PHONE:				ANALYSIS / METHOD				REMARKS / PRECAUTIONS			
FAX:				FAX:				FAX:				ANALYSIS / METHOD				REMARKS / PRECAUTIONS			
SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRIORITY	ANALYSIS / METHOD	REMARKS / PRECAUTIONS											
506	soil	9/9/01	1200	soil	bag	11/4	GOOD & STABLE												
507	Lead	9/9/01	1205	Lead	bag														
514	soil	9/9/01	1210	soil	bag														
515	soil	9/9/01	1215	soil	bag														
516	soil	9/9/01	1220	soil	bag														
517	soil	9/9/01	1225	soil	bag														
518	soil	9/9/01	1230	soil	bag														
519	soil	9/9/01	1235	soil	bag														
520	soil	9/9/01	1240	soil	bag														
521	soil	9/9/01	1245	soil	bag														
SAMPLER METHOD:																			
SAMPLER NO.:																			
REQUIRED TURNAROUND: () SAME DAY () 24 HOURS () 3 DAYS () 10 DAYS () ROUTINE OTHER:																			
1. RELINQUISHED BY: SIGNATURE:				2. RELINQUISHED BY: SIGNATURE:				3. RELINQUISHED BY: SIGNATURE:											
DATE				DATE				DATE											
PRINTED NAME/COMPANY:				PRINTED NAME/COMPANY:				PRINTED NAME/COMPANY:											
1. RECEIVED BY: SIGNATURE:				2. RECEIVED BY: SIGNATURE:				3. RECEIVED BY: SIGNATURE:											
DATE				DATE				DATE											
PRINTED NAME/COMPANY:				PRINTED NAME/COMPANY:				PRINTED NAME/COMPANY:											

[illegible]

ETL Enviro • Test

LABORATORIES LLC.

Sample Receipt Checklist

Client	<i>E US Ecology</i>	Job Number	<i>L3686</i>
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Samples Shipped	<i>UPS</i>	Federal Express	Airborn:
Samples Hand Delivered	Client	ETL Lab Courier	Other:

*Air Bill #: <i>826264624892</i>	# of Packages Received:
----------------------------------	-------------------------

	Yes	No	NA	Comments
1. Chain - of - Custody present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If no, please fill one out.
2. Are the COC and sample labels legible?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Custody Seal on shipping container?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If yes, intact on shipping container?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Custody seals on sample containers?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If yes, intact on sample container?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Samples chilled?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Is temperature of cooler: $4 \pm 2^{\circ}\text{C}$?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*Record temp: <i>21°C</i>
6. Samples received intact (good condition)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If volatiles required, any with headspace?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Adequate sample volume provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Samples preserved correctly? *	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Na ₂ S ₂ O ₃ , ZnAc, HNO ₃ , HCl
Circle preservative types in shipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	H ₂ SO ₄ , NaOH, <u>Plain</u> , Other
9. Correct containers used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Agreement between COC and sample labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. Gamma Screen $\mu\text{R}/\text{Hr}$ @ surface within Bkg?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FOR INTERNAL USE ONLY <i>@ 15kg</i>
13. Samples OK to release to Lab/Screening?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Additional Comments: _____

Sample Container (size/material): *20 bags*Received and inspected by: *FRS*Date/Time: *9/14/01 09:30*

* = for multiple packages, see attached page(s) for shipping numbers and temperatures.

Form SR Checklist.doc Rev 1 Effective Date 5/21/01

Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 18 of 22
PO No.:
WO NO.: L3686

Sample ID: 090901-01F
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-17
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	15.7 +/- 1.5	pCi/g	0.7		19-SEP-01	DMF
Cesium-137	0.7 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.4 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Lead-212	0.9 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	1.0 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.9 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Actinium-228	1.0 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF



Enviro • Test
LABORATORIES LLC.

420 West 1st Street Cooper, Wyoming 82601
Phone: (307) 235-5741 Fax: (307) 266-1678
Toll Free 1(800)666-0306

Results are only applicable to samples submitted for analysis.
Limit of Liability: Although care and due diligence is taken in the performance of our services, our liability in all cases is limited to re-analysis at our expense or returning the analytical costs charged for the work performed.



Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 19 of 22
PO No.:
WO NO.: L3886

Sample ID: 090901-06F
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3886-18
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	13.3 +/- 1.8	pCi/g	1.2		19-SEP-01	DMF
Cesium-137	7.0 +/- 0.3	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.4 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Lead-212	1.1 +/- 0.3	pCi/g	0.2		19-SEP-01	DMF
Lead-214	1.0 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF



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Chemical Analysis Report

ecology NMMC Brokerage Services
109 Flint Road
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ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 20 of 22
PO No.:
WO NO.: L3686

Sample ID: 090901-08F
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-19
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	14.9 +/- 1.4	pCi/g	0.7		19-SEP-01	DMF
Cesium-137	5.6 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.3 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Lead-212	1.0 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	1.0 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.8 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Actinium-228	0.8 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Thorium-234	3.0 +/- 1.9	pCi/g	1		19-SEP-01	DMF



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WO NO.: L3686

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Methodology Reference

<u>FL Test Code</u>	<u>Matrix</u>	<u>Test Description</u>	<u>Methodology Reference</u>
AMMA-ALL-CA	Soil	Gamma Spectroscopy	Mod.EPA.901.1



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GAMMA QA/QC DATA SUMMARY SHEET

Date Analyzed	Work Group	Run ID	Job Numbers
August 14, 2001	WG10283	R12306	L 3686

DUPLICATE	SAMPLE ID		L 3686-9		
ANALYTE	Sample Activity pCi/g	Duplicate Activity pCi/g	Sample Error pCi/g	Duplicate Error pCi/g	Duplicate RER
Potassium 40	14.1	13.5	1.3	1.4	0.3
Cesium 137	11.7	11.4	0.3	0.3	0.7
Thallium 208	0.3	0.3	0.1	0.1	0.0
Bismuth 214	1.4	0.9	0.2	0.2	1.8
Lead 214	0.9	0.8	0.2	0.2	0.4
Actinium 228	1.0	1.0	0.2	0.2	0.0



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Login Chain of Custody Report (In01)

Sep. 18, 2001

08:49 AM

Login Number: L3686

Quote Number:

Account: 10286

USEcology NMMC Brokerage Services

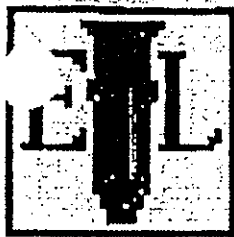
Project:

Page: 1 of 2

Contact: NEAL WHARTON
 Report Address: 109 Elm Road
 Oak Ridge, TN 37830
 Phone: 606-389-3859 Fax: 606-389-3859
 Email: cwharton@americaneecology.com Email Flag: N
 Report Type: Export Type:

Lab SMP#	Client Sample Number	Collect Date	Receive Date	PR	Due Date	Comments
3686-1	090801-S19	08-SEP-01 08:00	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				BAG 1 Bottles
3686-2	090801-S12	08-SEP-01 08:05	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-3	090801-S10	08-SEP-01 08:10	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-4	090801-S01	08-SEP-01 08:15	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-5	090801-S04	08-SEP-01 08:20	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-6	090801-BKG-1	08-SEP-01 08:25	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-7	090801-S8	08-SEP-01 08:30	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-8	090801-S2	08-SEP-01 08:35	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-9	090801-S11	08-SEP-01 08:40	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-10	090801-S00	08-SEP-01 08:45	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 07-MAR-02				
3686-11	090801-S08	08-SEP-01 12:00	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-12	090801-L7	09-SEP-01 12:05	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-13	090801-S5	09-SEP-01 12:10	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-14	090801-S3	09-SEP-01 12:15	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-15	TCSL-S02	09-SEP-01 12:20	14-SEP-01		24-SEP-01	
F--	S GAMMA-ALL-CA	Hold: 08-MAR-02				

Signature: Mickelle BissellDate: 9-18-01



ENVIROTEST LABORATORIES

Login Chain of Custody Report (In01)

Sep. 18, 2001

08:49 AM

Login Number: L3688

Quote Number:

Account: 10286

USEcology NMNC Brokerage Services

Project:

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Contact:

Report Address:

Phone:

Email:

Report Type:

Lab SMP#	Client Sample Number	Collect Date	Receive Date	PR	Due Date	Comments
3686-16	TCSL-S01	09-SEP-01 12:25	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-17	090901-01F	09-SEP-01 12:30	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-18	090901-06F	09-SEP-01 12:35	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				
3686-19	090901-06F	09-SEP-01 12:40	14-SEP-01		24-SEP-01	
S	S GAMMA-ALL-CA	Hold: 08-MAR-02				
20	TCSL-03	09-SEP-01 12:45	14-SEP-01		24-SEP-01	
Soil	S GAMMA-ALL-CA	Hold: 08-MAR-02				

Signature : _____

Date : _____

Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 7 of 22
PO No.:
WO NO.: L3686

Sample ID: 090801-BKG-1
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-6
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	13.5 +/- 1.5	pCi/g	0.6		19-SEP-01	DMF
Cesium-137	0.9 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.2 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-212	1.6 +/- 1.0	pCi/g	0.9		19-SEP-01	DMF
Lead-212	0.7 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	0.7 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Lead-214	0.7 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Actinium-228	0.9 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF



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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 5 of 22
PO No.:
WO NO.: L3586

Sample ID: 090801-S01
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3586-4
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	13.6 +/- 1.6	pCi/g	1.2		19-SEP-01	DMF
Cesium-137	3.5 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.3 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Lead-212	0.9 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Bismuth-214	1.6 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.9 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF



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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 9 of 22
PO No.:
WO NO: L3686

Sample ID: 090801-S2
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-8
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Beryllium-7	4.5 +/- 2.5	pCi/g	2.8		19-SEP-01	DMF
Potassium-40	15.5 +/- 1.6	pCi/g	0.8		19-SEP-01	DMF
Cobalt-60	0.4 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Cesium-137	150 +/- 1.1	pCi/g	0.2		19-SEP-01	DMF
Thallium-208	0.3 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-210	17.3 +/- 8.0	pCi/g	9.2		19-SEP-01	DMF
Lead-212	0.8 +/- 0.3	pCi/g	0.3		19-SEP-01	DMF
Bismuth-214	1.8 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Lead-214	0.9 +/- 0.3	pCi/g	0.5		19-SEP-01	DMF
Actinium-228	0.9 +/- 0.3	pCi/g	0.3		19-SEP-01	DMF



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Chemical Analysis Report

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109 Flint Road
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ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
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PO No.:
WO NO.: L3686

Sample ID: 090801-S3
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-14
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	BY
Misc						
Gamma Spectroscopy						
Potassium-40	13.6 +/- 1.8	pCi/g	1.1		19-SEP-01	DMF
Cesium-137	323 +/- 1.8	pCi/g	0.3		19-SEP-01	DMF
Bismuth-214	1.4 +/- 0.4	pCi/g	0.6		19-SEP-01	DMF



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Chemical Analysis Report

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109 Flint Road
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ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
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PO No.:
WO NO.: L3686

Sample ID: 090801-S04

Job Name:

Sampled By: CLIENT

Date Collected: 08-SEP-01

Lab Sample ID: L3686-5

Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	13.5 +/- 1.6	pCi/g	1		19-SEP-01	DMF
Cobalt-60	0.4 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Cesium-137	89.0 +/- 0.9	pCi/g	0.2		19-SEP-01	DMF



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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
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ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 14 of 22
PO No.:
WO NO.: L3688

Sample ID: 090801-S5
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3688-13
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	14.8 +/- 1.8	pCi/g	0.9		19-SEP-01	DMF
Cesium-137	1.1 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Lead-212	0.3 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Lead-214	0.7 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF



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Chemical Analysis Report

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109 Flint Road
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ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 12 of 22
PO No.:
WO NO.: L3688

Sample ID: 090801-S06
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-11
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Gamma Spectroscopy						
Potassium-40	54.7 +/- 8.5	pCi/g	6.3		19-SEP-01	DMF
Cesium-137	0.9 +/- 0.8	pCi/g	0.7		19-SEP-01	DMF
Bismuth-214	4.7 +/- 1.3	pCi/g	1.4		19-SEP-01	DMF
Lead-214	2.5 +/- 1.1	pCi/g	1.2		19-SEP-01	DMF



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Chemical Analysis Report

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PO No.:

WO NO.: L3686

Sample ID: 090801-L7
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-12
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	1.4 +/- 0.4	pCi/g	0.3		19-SEP-01	DMF
Cobalt-60	0.3 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Cadmium-109	13.8 +/- 1.7	pCi/g	2.3		19-SEP-01	DMF
Cesium-137	345 +/- 0.9	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	3.3 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Lead-214	6.6 +/- 2.9	pCi/g	0.4		19-SEP-01	DMF



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Chemical Analysis Report

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109 Flint Road
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Report Date: 24-SEP-01
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PO No.:
WO NO.: L3686

Sample ID: 090801-S8
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-7
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	9.8 +/- 1.7	pCi/g	0.8		18-SEP-01	DMF
Cobalt-60	0.3 +/- 0.1	pCi/g	0.1		18-SEP-01	DMF
Cesium-137	2132 +/- 8.5	pCi/g	0.9		18-SEP-01	DMF



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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830

ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 11 of 22
PO No.:
WO NO.: L3686

Sample ID: 090801-S09
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-10
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prop Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	11.2 +/- 1.7	pCi/g	1.2		19-SEP-01	DMF
Cesium-137	8.0 +/- 0.3	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.2 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	0.8 +/- 0.3	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.8 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Thorium-234	1.4 +/- 0.7	pCi/g	1		19-SEP-01	DMF



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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 4 of 22
PO No.:
WO NO.: L3686

Sample ID: 090801-S10
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-3
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	18.2 +/- 1.5	pCi/g	0.8		19-SEP-01	DMF
Cobalt-60	0.1 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Cadmium-109	2.5 +/- 1.1	pCi/g	1.5		19-SEP-01	DMF
Cesium-137	11.8 +/- 0.3	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.2 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Lead-212	0.8 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	0.7 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.7 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Actinium-228	1.0 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Thorium-234	3.0 +/- 0.7	pCi/g	1		19-SEP-01	DMF



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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Filint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 10 of 22
PO No.:
WO NO.: L3688

Sample ID: 090801-S11
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-9
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	14.1 +/- 1.3	pCi/g	0.6		19-SEP-01	DMF
Cesium-137	11.7 +/- 0.3	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.3 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-212	1.2 +/- 0.9	pCi/g	0.9		19-SEP-01	DMF
Lead-212	0.8 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	1.4 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.9 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Actinium-228	1.0 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF



Enviro • Test
LABORATORIES LLC.

420 West 1st Street Casper, Wyoming 82801
Phone: (307) 235-5741 Fax (307) 266-1676
Toll-Free 1(800)668-0306

Results are only applicable to samples submitted for analysis
Limit of Liability: Although care and due diligence is taken in the performance of our services, our liability in all cases is limited to re-analysis at our expense or refunding the analytical costs charged for the work performed.



Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 3 of 22
PO No.:
WO NO.: L3886

Sample ID: 090801-S12
Job Name:
Sampled By: CLIENT

Date Collected: 08-SEP-01
Lab Sample ID: L3686-2
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	14.4 +/- 1.6	pCi/g	0.8		19-SEP-01	DMF
Cobalt-60	0.1 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Cesium-137	30.8 +/- 0.5	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.3 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-214	1.2 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.8 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Actinium-228	0.9 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF



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420 West 1st Street Casper, Wyoming 82601
Phone: (307) 235-5741 Fax: (307) 266-1676
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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 2 of 22
PO No.:
WO NO.: L3686

Sample ID: 090801-S13

Job Name:

Sampled By: CLIENT

Date Collected: 08-SEP-01

Lab Sample ID: L3686-1

Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	15.0 +/- 2.1	pCi/g	1.2		18-SEP-01	DMF
Cobalt-60	0.7 +/- 0.1	pCi/g	0.1		18-SEP-01	DMF
Cesium-137	704 +/- 3.3	pCi/g	0.5		18-SEP-01	DMF



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420 West 1st Street Casper, Wyoming 82601
Phone: (307) 235-5741 Fax: (307) 266-1676
Toll-Free 1(800)665-0301

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Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 17 of 22
PO No.:
WO NO.: L3686

Sample ID: TCSL-S01
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-16
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Disc						
Gamma Spectroscopy						
Potassium-40	13.8 +/- 1.9	pCi/g	1.2		19-SEP-01	DMF
Cesium-137	0.4 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Thallium-208	0.5 +/- 0.2	pCi/g	0.1		19-SEP-01	DMF
Lead-212	1.6 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Bismuth-214	1.2 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Lead-214	1.4 +/- 0.2	pCi/g	0.3		19-SEP-01	DMF
Actinium-228	1.2 +/- 0.3	pCi/g	0.5		19-SEP-01	DMF



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420 West 1st Street Casper, Wyoming 82601
Phone: (307) 235-3741 Fax: (307) 266-1676
Toll Free 1(800)666-0000

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Limit of Liability: Although care and due diligence is taken in the performance of our services, our liability in all cases is limited to re-analysis at our expense or refunding the analytical costs charged for the work performed.



Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 16 of 22
PO No:
WO NO.: L3686

Sample ID: TCSL-S02
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-15
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc						
Gamma Spectroscopy						
Potassium-40	14.7 +/- 1.5	pCi/g	0.6		19-SEP-01	DMF
Cesium-137	22.0 +/- 0.4	pCi/g	0.1		19-SEP-01	DMF
Thallium-208	0.4 +/- 0.1	pCi/g	0.1		19-SEP-01	DMF
Bismuth-212	1.9 +/- 1.0	pCi/g	1		19-SEP-01	DMF
Lead-212	1.1 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Bismuth-214	0.8 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Lead-214	0.8 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF
Actinium-228	1.1 +/- 0.2	pCi/g	0.2		19-SEP-01	DMF



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420 West 1st Street Casper, Wyoming 82601
Phone: (307) 235-5741 Fax: (307) 266-1678
Toll Free 1(800)555-0001

Results are only applicable to samples submitted for analysis.
Limit of Liability: Although care and due diligence is taken in the performance of our services, our liability in all cases is limited to the analysis fee and the expense of returning the analytical costs charged for the work performed.



Chemical Analysis Report

Ecology NMMC Brokerage Services
109 Flint Road
Oak Ridge TN 37830
ATTN: NEAL WHATLEY

Report Date: 24-SEP-01
Page: 21 of 22
PO No.:
WO NO.: L3686

Sample ID: TCSL-03
Job Name:
Sampled By: CLIENT

Date Collected: 09-SEP-01
Lab Sample ID: L3686-20
Matrix: SOLID

Test Description	Result	Units of Measure	D.L.	Prep Date	Analyzed	By
Misc 1						
Gamma Spectroscopy						
Cobalt-60	2858 +/- 20.8	pCi/g	5.6		19-SEP-01	DMF
Cesium-137	3357 +/- 26.8	pCi/g	10		19-SEP-01	DMF
Americium-241	142 +/- 10.2	pCi/g	9.2		19-SEP-01	DMF

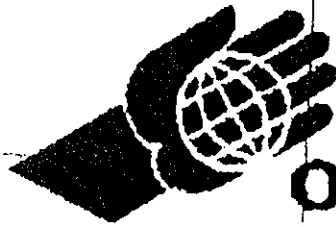


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420 West 1st Street Casper, Wyoming 82601
Phone: (307) 235-5741 Fax: (307) 285-1676
Toll Free 1(800)686-0300

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Limit of Liability: Although care and due diligence is taken in the performance of our services, our liability in all cases is limited to re-analysis at our expense or refunding the analytical costs charged for the work performed.





Outreach Laboratory

Reaching beyond the standard.

311 North Aspen • Broken Arrow, OK 74012 • 918/251-2515 phone • 918/251-0008 fax

Facsimile Transmission

Neal Whittley
To: *Brian Richard* Fax:
From: *Brenda Hugart* Date: *9/28/01*
Re: Pages: *17*
CC:

Presenting Your Report As Promised!	Due Date	Report Date
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Notes:

We need AN Address to
return samples. The levels
in some ARE making us approach
our NRC Limit for Cs137, Sr90.

Thank You!

CHAIN OF CUSTODY

OUTREACH
LABORATORY

311 North Aspen
Burbank, CA 91502
PHONE: (818) 251-2515
FAX: (818) 251-0000

Account No: _____ Company: US Ecology
Name: Neal Whitley
Address: 109 Flint Road
City: Oak Ridge, TN 37830
Phone: 865 220 5210 Fax: 865 220 5365

Bill To: _____ Company: Same
Name: _____
Address: _____
City: _____ State: _____ Zip: _____

PROJECT NO.	PROJECT NAME	REQUESTED TURNAROUND TIME (ADD FIVE DOLLARS PER DAY)	SAMPLE	DATE	TIME	RECEIVED BY	DATE	TIME	RECEIVED BY	DATE	TIME
FS-01-10	GWI-Webster	10-days	090501-8Kc	9/5/01	1630	Soil	Concrete	1	Plastic	N/A	✓
			090501-8Ks	9/5/01	1635	Soil	Plastic	1	Plastic	N/A	✓
			090501-8Kd	9/5/01	1645	Soil	Plastic	1	Plastic	N/A	✓
			090501-15A	9/5/01	1600	Asphalt	Plastic	1	Plastic	N/A	✓
			090501-13A	9/5/01	1530	Asphalt	Plastic	1	Plastic	N/A	✓
			090501-14A	9/5/01	1500	Asphalt	Plastic	1	Plastic	N/A	✓
			090501-16A	9/5/01	1430	Soil	Plastic	1	Plastic	N/A	✓
			090501-16C	9/5/01	1430	Soil	Plastic	1	Plastic	N/A	✓
			090501-17A	9/5/01	1400	Asphalt	Plastic	1	Plastic	N/A	✓
			090501-08P	9/5/01	1330	Paint	Plastic	1	Plastic	N/A	✓
			090501-17L	9/5/01	1300	Soil	Plastic	1	Plastic	N/A	✓
			090501-11S	9/5/01	1230	Soil	Plastic	1	Plastic	N/A	✓
			090501-10C	9/5/01	1130	Soil	Plastic	1	Plastic	N/A	✓
			090501-08L	9/5/01	1100	Soil	Plastic	1	Plastic	N/A	✓

RELINQUISHED BY: Neal Whitley DATE: 9/10/01 TIME: 1730 RECEIVED BY: David Whitley DATE: 9/10/01 TIME: 10:00

REMARKS: _____

LABORATORY USE ONLY: _____

20010819

OUTREACH LABORATORY

311 North Aspen
Broken Arrow, OK 74012
Phone: (918) 251-2515
Fax: (918) 251-0008

CHAIN OF CUSTODY

Reference To: Company US Ecology
Name Neal
Address 109 Flint Road
Cy Oak Ridge Pkwy TN 37923
Phone 865 220 5210 Fax 865 220 5365

File To: Company Same
Name _____
Address _____
City _____ State _____ Zip _____

PROJECT NO. ES-01-10
PROJECT NAME GWI-Webster
RECEIVED TURNAROUND TIME 10 days
ADDITIONAL CHARGES (if any) _____
SAMPLE Neal Webster

DATE	TIME	LOCATION	ANALYSIS	RESULTS	REMARKS
090501-055	9/5/01	1030	Soil	1	Plastic N/A
090501-015	9/5/01	1000	Soil	4	Plastic N/A
090801-018	9/8/01	1600	Swipe	1	Plastic N/A
090801-019	9/8/01	1530	oil	1	Plastic N/A
090801-20	9/7/01	1500	Soil	1	Plastic N/A
090701-21	9/7/01	1430	Paint	1	Plastic N/A
090501-06	9/5/01	930	Soil	1	Plastic N/A
090501-07R	9/5/01	900	Solid	1	Plastic N/A
090501-22	9/7/01	1400	Swipe	1	Plastic N/A
090701-23	9/7/01	1330	Swipe	1	Plastic N/A
090701-24	9/7/01	1300	Spill	1	Plastic N/A
090701-25	9/7/01	1100	Swipe	1	Plastic N/A
090701-26	9/7/01	1030	Swipe	1	Plastic N/A
090701-27	9/7/01	1000	Swipe	1	Plastic N/A

ANALYSIS: TCRP-Lead SR-90 Tritium
RESULTS: Lead SR-90 Tritium
REMARKS: ALL RESULTS IN ACCORDANCE WITH REQUEST

RECEIVED BY: Neal Webster DATE: 9/7/01 TIME: 1700
RECEIVED BY: _____ DATE: _____ TIME: _____
REMARKS: _____

6/18/2007



**Outreach
Laboratory**

1 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
X (918) 251-0008

PRELIMINARY REPORT

Client:

Client Project:

Lab Number:

Date Reported:

Date Received:

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U S Ecology Inc.

GNI-Webster FS-01-10

20010819

9/28/2001

9/10/01

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Analytical Report

Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID: 20010819-01						
Client ID: 090501-BKGC						
Date Sampled: 9/5/2001 4:30:00 PM						
Matrix: Other						
Radiochemical Analyses						
K-40	HASL 300	3.90 +/- 0.377	pCi/g	0.622	9/25/2001	SD
Tl-208	HASL 300	BDL	pCi/g	0.074	9/25/2001	SD
Bi-212	HASL 300	BDL	pCi/g	0.581	9/25/2001	SD
Pb-212	HASL 300	0.174 +/- 0.018	pCi/g	0.060	9/25/2001	SD
Bi-214	HASL 300	0.399 +/- 0.046	pCi/g	0.144	9/25/2001	SD
Pb-214	HASL 300	0.373 +/- 0.031	pCi/g	0.086	9/25/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.242	9/25/2001	SD
34	HASL 300	BDL	pCi/g	1.29	9/25/2001	SD
35	HASL 300	BDL	pCi/g	0.338	9/25/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.181	9/25/2001	SD
Am-241	HASL 300	ND	pCi/g	0.551	9/25/2001	S/D
Co-60	HASL 300	BDL	pCi/g	0.078	9/25/2001	SD
Cs-137	HASL 300	1.40 +/- 0.069	pCi/g	0.088	9/25/2001	SD
Metals Analyses						
TCLP-Lead	EPA 1311/6010B	BDL	mg/l	0.035	9/12/2001	9/21/2001 KS
Lab ID: 20010819-02						
Client ID: 090501-BKGS						
Date Sampled: 9/5/2001 4:35:00 PM						
Matrix: Soil						
Radiochemical Analyses						
K-40	HASL 300	12.4 +/- 0.936	pCi/g	1.40	9/18/2001	SD
Tl-208	HASL 300	0.360 +/- 0.032	pCi/g	0.082	9/18/2001	SD
Bi-212	HASL 300	0.473 +/- 0.247	pCi/g	0.096	9/18/2001	SD
Pb-212	HASL 300	1.14 +/- 0.085	pCi/g	0.331	9/18/2001	SD
Bi-214	HASL 300	0.537 +/- 0.084	pCi/g	0.358	9/18/2001	SD
Pb-214	HASL 300	0.869 +/- 0.077	pCi/g	0.363	9/18/2001	SD
Ac-228	HASL 300	0.769 +/- 0.102	pCi/g	0.498	9/18/2001	SD
Th-234	HASL 300	BDL	pCi/g	1.85	9/18/2001	SD
35	HASL 300	BDL	pCi/g	0.755	9/18/2001	SD
4	HASL 300	BDL	pCi/g	0.172	9/18/2001	SD

BDL = Below Detection Limit



**Outreach
Laboratory**
North Aspen
Ken Arrow, OK 74012
918-251-2515
(918) 251-0008

PRELIMINARY REPORT

Client:
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U S Ecology Inc.
GNI-Webster FS-01-10
20010819
9/28/2001
9/10/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Am-241	HASL 300	ND	pCi/g	0.147		9/18/2001	S/D
Co-60	HASL 300	BDL	pCi/g	0.139		9/18/2001	SD
Cs-137	HASL 300	BDL	pCi/g	0.136		9/18/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	BDL	mg/l	0.035	9/12/2001	9/21/2001	KS
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Lab ID: 20010819-03
Client ID: 090501-BKGA
Date Sampled: 9/5/2001 4:15:00 PM
Matrix: Other

Radiochemical Analyses

K-40	HASL 300	7.43 +/- 0.604	pCi/g	0.870		9/17/2001	SD
	HASL 300	0.091 +/- 0.027	pCi/g	0.084		9/17/2001	SD
Ba-132	HASL 300	BDL	pCi/g	0.085		9/17/2001	SD
Pb-212	HASL 300	0.174 +/- 0.061	pCi/g	0.788		9/17/2001	SD
Bi-214	HASL 300	0.242 +/- 0.080	pCi/g	0.318		9/17/2001	SD
Pb-214	HASL 300	0.266 +/- 0.077	pCi/g	0.320		9/17/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.361		9/17/2001	SD
Th-234	HASL 300	BDL	pCi/g	1.57		9/17/2001	SD
U-235	HASL 300	BDL	pCi/g	0.602		9/17/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.301		9/17/2001	SD
Am-241	HASL 300	ND	pCi/g	0.108		9/17/2001	S/D
Co-60	HASL 300	BDL	pCi/g	0.116		9/17/2001	SD
Cs-137	HASL 300	0.347 +/- 0.050	pCi/g	0.140		9/17/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	BDL	mg/l	0.035	9/12/2001	9/21/2001	KS
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Lab ID: 20010819-04
Client ID: 090501-15A
Date Sampled: 9/5/2001 4:00:00 PM
Matrix: Other

Radiochemical Analyses

K-40	HASL 300	10.7 +/- 0.765	pCi/g	1.10		9/17/2001	SD
Tl-208	HASL 300	BDL	pCi/g	0.210		9/17/2001	SD
	HASL 300	0.445 +/- 0.183	pCi/g	0.235		9/17/2001	SD
	HASL 300	BDL	pCi/g	0.312		9/17/2001	SD
Bi-214	HASL 300	0.305 +/- 0.072	pCi/g	0.244		9/17/2001	SD

BDL = Below Detection Limit



Outreach Laboratory PRELIMINARY REPORT

North Aspen
 1000 Arrow, OK 74012
 (918) 251-2515
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U S Ecology Inc.
 GNI-Webster FS-01-10
 20010819
 9/28/2001
 9/10/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Pb-214	HASL 300	BDL	pCi/g	0.359		9/17/2001	SD
Ac-228	HASL 300	0.268 +/- 0.054	pCi/g	0.227		9/17/2001	SD
Th-234	HASL 300	BDL	pCi/g	1.85		9/17/2001	SD
U-235	HASL 300	BDL	pCi/g	0.928		9/17/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.474		9/17/2001	SD
Am-241	HASL 300	2.33 +/- 0.168	pCi/g	0.548		9/17/2001	S/D
Co-60	HASL 300	BDL	pCi/g	0.082		9/17/2001	SD
Cs-137	HASL 300	46.0 +/- 1.40	pCi/g	0.188		9/17/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	0.025	mg/l	0.007	9/12/2001	9/21/2001	KS
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Lab ID: 20010819-05
 Client ID: 090501-13A
 Sampled: 9/5/2001 3:30:00 PM
 Matrix: Other

Radiochemical Analyses

K-40	HASL 300	6.35 +/- 0.533	pCi/g	0.844		9/18/2001	SD
Tl-208	HASL 300	BDL	pCi/g	0.089		9/18/2001	SD
Bi-212	HASL 300	BDL	pCi/g	0.622		9/18/2001	SD
Pb-212	HASL 300	BDL	pCi/g	0.080		9/18/2001	SD
Bi-214	HASL 300	0.234 +/- 0.056	pCi/g	0.170		9/18/2001	SD
Pb-214	HASL 300	0.135 +/- 0.026	pCi/g	0.121		9/18/2001	SD
Ac-228	HASL 300	0.197 +/- 0.053	pCi/g	0.195		9/18/2001	SD
Th-234	HASL 300	BDL	pCi/g	1.70		9/18/2001	SD
U-235	HASL 300	BDL	pCi/g	0.447		9/18/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.235		9/18/2001	SD
Am-241	HASL 300	2.89 +/- 0.205	pCi/g	0.534		9/18/2001	S/D
Co-60	HASL 300	BDL	pCi/g	0.094		9/18/2001	SD
Cs-137	HASL 300	8.11 +/- 0.274	pCi/g	0.095		9/18/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	BDL	mg/l	0.035	9/12/2001	9/21/2001	KS
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Lab ID: 20010819-06
 Client ID: 090501-14A
 Sampled: 9/5/2001 3:00:00 PM
 Matrix: Other

Radiochemical Analyses

BDL = Below Detection Limit



OUTREACH LABORATORY PRELIMINARY REPORT

North Aspen
 Ken Arrow, OK 74012
 (918) 251-2515
 (918) 251-0008

Client:

U S Ecology Inc.

Client Project:

GNI-Webster FS-01-10

Lab Number:

20010819

Date Reported:

9/28/2001

Date Received:

9/10/01

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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
K-40	HASL 300	10.3 +/- 0.672	pCi/g	0.721		9/18/2001	SD
Tl-208	HASL 300	0.093 +/- 0.025	pCi/g	0.077		9/18/2001	SD
Bi-212	HASL 300	BDL	pCi/g	0.202		9/18/2001	SD
Pb-212	HASL 300	0.419 +/- 0.036	pCi/g	0.160		9/18/2001	SD
Bi-214	HASL 300	0.358 +/- 0.059	pCi/g	0.204		9/18/2001	SD
Pb-214	HASL 300	0.268 +/- 0.040	pCi/g	0.190		9/18/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.264		9/18/2001	SD
Th-234	HASL 300	1.38 +/- 0.148	pCi/g	1.06		9/18/2001	SD
U-235	HASL 300	BDL	pCi/g	0.770		9/18/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.411		9/18/2001	SD
Am-241	HASL 300	5.43 +/- 0.225	pCi/g	0.382		9/18/2001	SD
Co-60	HASL 300	0.152 +/- 0.026	pCi/g	0.080		9/18/2001	SD
	HASL 300	15.3 +/- 0.483	pCi/g	0.141		9/18/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	1.16	mg/l	0.035	9/12/2001	9/21/2001	KS
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Lab ID: 20010819-07

Client ID: 090501-16 comp.

Date Sampled: 9/5/2001 2:30:00 PM

Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	8.05 +/- 0.607	pCi/g	0.877		9/18/2001	SD
Tl-208	HASL 300	BDL	pCi/g	0.279		9/18/2001	SD
Bi-212	HASL 300	BDL	pCi/g	0.090		9/18/2001	SD
Pb-212	HASL 300	0.481 +/- 0.101	pCi/g	0.519		9/18/2001	SD
Bi-214	HASL 300	BDL	pCi/g	0.600		9/18/2001	SD
Pb-214	HASL 300	BDL	pCi/g	0.842		9/18/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.766		9/18/2001	SD
Th-234	HASL 300	BDL	pCi/g	2.47		9/18/2001	SD
U-235	HASL 300	BDL	pCi/g	1.95		9/18/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.993		9/18/2001	SD
Am-241	HASL 300	95.8 +/- 2.99	pCi/g	0.433		9/18/2001	SD
Co-60	HASL 300	7.73 +/- 0.177	pCi/g	0.178		9/18/2001	SD
Cs-137	HASL 300	174 +/- 5.25	pCi/g	0.420		9/18/2001	SD

Metals Analyses

Lead	EPA 1311/6010B	28.6	mg/kg	0.007	9/12/2001	9/21/2001	KS
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BDL = Below Detection Limit



PRELIMINARY REPORT

North Aspen
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251-2515
(18) 251-0008

Client: U S Ecology Inc
Client Project: GNI-Webster FS-01-10
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Analytical Report

Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
ab ID:	20010819-08					
Client ID:	090501-12A					
Date Sampled:	9/5/2001 2:00:00 PM					
Matrix:	Other					

Radiochemical Analyses

-40	HASL 300	7.55 +/- 0.625	pCi/g	1.07	9/18/2001	SD
l-208	HASL 300	BDL	pCi/g	0.100	9/18/2001	SD
i-212	HASL 300	BDL	pCi/g	0.738	9/18/2001	SD
p-212	HASL 300	1.48 +/- 0.396	pCi/g	0.218	9/18/2001	SD
i-214	HASL 300	0.230 +/- 0.071	pCi/g	0.224	9/18/2001	SD
p-214	HASL 300	BDL	pCi/g	0.223	9/18/2001	SD
r-228	HASL 300	BDL	pCi/g	0.251	9/18/2001	SD
t	HASL 300	BDL	pCi/g	1.86	9/18/2001	SD
u-235	HASL 300	BDL	pCi/g	0.629	9/18/2001	SD
a-234	HASL 300	BDL	pCi/g	0.212	9/18/2001	SD
m-241	HASL 300	BDL	pCi/g	0.753	9/18/2001	SD
o-60	HASL 300	BDL	pCi/g	0.094	9/18/2001	SD
s-137	HASL 300	21.4 +/- 0.675	pCi/g	0.138	9/18/2001	SD

ab ID: 20010819-09
Client ID: 090501-09 P
Date Sampled: 9/5/2001 1:30:00 PM
Matrix: Other

Radiochemical Analyses

-40	HASL 300	6.73 +/- 0.852	pCi/g	2.38	9/18/2001	SD
l-208	HASL 300	BDL	pCi/g	2.71	9/18/2001	SD
i-212	HASL 300	BDL	pCi/g	3.43	9/18/2001	SD
b-212	HASL 300	BDL	pCi/g	4.49	9/18/2001	SD
i-214	HASL 300	BDL	pCi/g	0.859	9/18/2001	SD
b-214	HASL 300	BDL	pCi/g	6.21	9/18/2001	SD
c-228	HASL 300	BDL	pCi/g	3.72	9/18/2001	SD
h-234	HASL 300	BDL	pCi/g	20.5	9/18/2001	SD
l-235	HASL 300	BDL	pCi/g	14.1	9/18/2001	SD
a-234	HASL 300	BDL	pCi/g	7.13	9/18/2001	SD
11	HASL 300	34.1 +/- 1.45	pCi/g	3.24	9/18/2001	SD
u	HASL 300	3.90 +/- 0.132	pCi/g	0.359	9/18/2001	SD

BDL - Below Detection Limit



Outreach
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PRELIMINARY REPORT

Client:

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20010819

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Analytical Report

Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Cs-137	HASL 300	18800 +/- 554	pCi/g	2.11		
Metals Analyses						
TCLP-Lead	EPA 1311/6010B	1.71	mg/l	0.035	9/12/2001	9/21/2001 KS

Lab ID: 20010819-10

Client ID: 090501-17 L

Date Sampled: 9/5/2001 1:00:00 PM

Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	0.802 +/- 0.095	pCi/g	0.225	9/18/2001	SD
Tl-208	HASL 300	0.021 +/- 0.006	pCi/g	0.020	9/18/2001	SD
Bi-212	HASL 300	0.059 +/- 0.030	pCi/g	0.038	9/18/2001	SD
F	HASL 300	0.176 +/- 0.014	pCi/g	0.054	9/18/2001	SD
	HASL 300	0.056 +/- 0.011	pCi/g	0.037	9/18/2001	SD
Pb-214	HASL 300	0.071 +/- 0.009	pCi/g	0.044	9/18/2001	SD
Ac-228	HASL 300	0.103 +/- 0.020	pCi/g	0.061	9/18/2001	SD
Th-234	HASL 300	BDL	pCi/g	0.364	9/18/2001	SD
U-235	HASL 300	BDL	pCi/g	0.167	9/18/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.088	9/18/2001	SD
Am-241	HASL 300	0.461 +/- 0.020	pCi/g	0.040	9/18/2001	SD
Co-60	HASL 300	0.044 +/- 0.005	pCi/g	0.016	9/18/2001	SD
Cs-137	HASL 300	3.64 +/- 0.114	pCi/g	0.030	9/18/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	680	mg/l	0.035	9/12/2001	9/21/2001 KS
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Lab ID: 20010819-11

Client ID: 090501-11 S

Date Sampled: 9/5/2001 12:30:00 PM

Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	8.54 +/- 0.353	pCi/g	0.542	9/19/2001	SD
Tl-208	HASL 300	0.292 +/- 0.035	pCi/g	0.101	9/19/2001	SD
Bi-212	HASL 300	0.229 +/- 0.257	pCi/g	0.037	9/19/2001	SD
Pb-212	HASL 300	13.5 +/- 0.054	pCi/g	0.204	9/19/2001	SD
Pb-214	HASL 300	0.578 +/- 0.052	pCi/g	0.308	9/19/2001	SD
I	HASL 300	0.528 +/- 0.066	pCi/g	0.402	9/19/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.580	9/19/2001	SD

DL = Below Detection Limit



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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
234	HASL 300	BDL	pCi/g	17.1		9/19/2001	SD
35	HASL 300	BDL	pCi/g	0.291		9/19/2001	SD
234	HASL 300	BDL	pCi/g	0.273		9/19/2001	SD
-241	HASL 300	0.242 +/- 0.021	pCi/g	0.096		9/19/2001	SD
60	HASL 300	BDL	pCi/g	0.095		9/19/2001	SD
137	HASL 300	16.9 +/- 0.520	pCi/g	0.084		9/19/2001	SD

Metals Analyses

P-Lead	EPA 1311/6010B	BDL	mg/l	0.035	9/12/2001	9/21/2001	KS
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ID: 20010819-12
ent ID: 090501-10 C
e Sampled: 9/5/2001 11:30:00 AM
ix: Soil

Radiochemical Analyses

0	HASL 300	7.21 +/- 0.399	pCi/g	0.514		9/19/2001	SD
208	HASL 300	BDL	pCi/g	0.381		9/19/2001	SD
212	HASL 300	BDL	pCi/g	0.497		9/19/2001	SD
212	HASL 300	BDL	pCi/g	0.691		9/19/2001	SD
214	HASL 300	BDL	pCi/g	0.291		9/19/2001	SD
214	HASL 300	BDL	pCi/g	1.14		9/19/2001	SD
228	HASL 300	BDL	pCi/g	0.283		9/19/2001	SD
234	HASL 300	BDL	pCi/g	8.21		9/19/2001	SD
35	HASL 300	BDL	pCi/g	2.69		9/19/2001	SD
234	HASL 300	BDL	pCi/g	0.467		9/19/2001	SD
-241	HASL 300	BDL	pCi/g	3.28		9/19/2001	SD
60	HASL 300	0.419 +/- 0.021	pCi/g	0.063		9/19/2001	SD
137	HASL 300	1490 +/- 44.6	pCi/g	0.656		9/19/2001	SD

ID: 20010819-13
ent ID: 090501-08 C
e Sampled: 9/5/2001 11:00:00 AM
rix: Soil

Radiochemical Analyses

0	HASL 300	8.93 +/- 0.474	pCi/g	0.492		9/19/2001	SD
208	HASL 300	BDL	pCi/g	0.452		9/19/2001	SD
212	HASL 300	BDL	pCi/g	0.591		9/19/2001	SD
212	HASL 300	BDL	pCi/g	0.821		9/19/2001	SD

DL = Below Detection Limit



**Outreach
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North Aspen
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817-251-2515
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U S Ecology Inc.
GNI-Webster FS-01-10
20010819
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Bi-214	HASL 300	BDL	pCi/g	0.346		9/19/2001	SD
Pb-214	HASL 300	BDL	pCi/g	1.36		9/19/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.336		9/19/2001	SD
Th-234	HASL 300	BDL	pCi/g	9.76		9/19/2001	SD
U-235	HASL 300	BDL	pCi/g	3.20		9/19/2001	SD
Am-241	HASL 300	3.34 +/- 0.124	pCi/g	0.161		9/19/2001	SD
Co-60	HASL 300	BDL	pCi/g	0.001		9/19/2001	SD
Cs-137	HASL 300	70.4 +/- 2.11	pCi/g	0.245		9/19/2001	SD

Metals Analyses

TCLP-Lead	EPA 1311/6010B	0.083	mg/l	0.035	9/12/2001	9/21/2001	KS
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Lab ID: 20010819-14
Client ID: 090501-05 S
Date Sampled: 9/5/2001 10:30:00 AM
Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	7.81 +/- 0.729	pCi/g	1.91		9/20/2001	SD
Tl-208	HASL 300	0.307 +/- 0.028	pCi/g	0.081		9/20/2001	SD
Bi-212	HASL 300	0.103 +/- 0.315	pCi/g	0.039		9/20/2001	SD
Pb-212	HASL 300	1.46 +/- 0.053	pCi/g	0.160		9/20/2001	SD
Bi-214	HASL 300	0.609 +/- 0.059	pCi/g	0.314		9/20/2001	SD
Pb-214	HASL 300	0.741 +/- 0.077	pCi/g	0.341		9/20/2001	SD
Ac-228	HASL 300	0.543 +/- 0.119	pCi/g	0.575		9/20/2001	SD
Th-234	HASL 300	BDL	pCi/g	1.70		9/20/2001	SD
U-235	HASL 300	BDL	pCi/g	0.255		9/20/2001	SD
Co-60	HASL 300	BDL	pCi/g	0.084		9/20/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.213		9/20/2001	SD
Am-241	HASL 300	1.11 +/- 0.043	pCi/g	0.074		9/20/2001	SD
Cs-137	HASL 300	3.55 +/- 0.121	pCi/g	0.052		9/20/2001	SD

Lab ID: 20010819-15
Client ID: 090501-01 S
Date Sampled: 9/5/2001 10:00:00 AM
Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	6.52 +/- 0.394	pCi/g	0.513		9/21/2001	SD
Tl-208	HASL 300	0.281 +/- 0.028	pCi/g	0.081		9/21/2001	SD

BDL = Below Detection Limit



**Outreach
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1 North Aspen
Aven Arrow, OK 74012
81 251-2915
C (918) 251-0008

PRELIMINARY REPORT

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Analytical Report

Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Bi-212	HASL 300	0.418 +/- 0.119	pCi/g	0.405	9/21/2001	SD
Pb-212	HASL 300	0.657 +/- 0.030	pCi/g	0.050	9/21/2001	SD
Bi-214	HASL 300	0.514 +/- 0.037	pCi/g	0.126	9/21/2001	SD
Pb-214	HASL 300	0.433 +/- 0.027	pCi/g	0.076	9/21/2001	SD
Ac-228	HASL 300	0.794 +/- 0.051	pCi/g	0.215	9/21/2001	SD
Th-234	HASL 300	BDL	pCi/g	0.872	9/21/2001	SD
U-235	HASL 300	BDL	pCi/g	0.299	9/21/2001	SD
Co-60	HASL 300	BDL	pCi/g	0.061	9/21/2001	SD
Pa-234	HASL 300	BDL	pCi/g	0.872	9/21/2001	SD
Am-241	HASL 300	BDL	pCi/g	0.297	9/21/2001	SD
Cs-137	HASL 300	3.82 +/- 0.128	pCi/g	0.080	9/21/2001	SD

Lab ID: 20010819-16

Client ID: 090801-018

Date Sampled: 9/8/2001 4:00:00 PM

Matrix: Other

Radiochemical Analyses

K-40	HASL 300	ND	pCi/sample	4490	9/27/2001	RE
Bi-214	HASL 300	ND	pCi/sample	1220	9/27/2001	RE
Pb-214	HASL 300	ND	pCi/sample	17500	9/27/2001	RE
Co-60	HASL 300	ND	pCi/sample	944	9/27/2001	RE
Cs-137	HASL 300	56400 +/- 16900	pCi/sample	1360	9/27/2001	RE
Sr-90	ASTM	5.34 +/- 0.013	uCi/F	0.000335		RE

Lab ID: 20010819-17

Client ID: 090801-20

Date Sampled: 9/7/2001 3:00:00 PM

Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	8.70 +/- 1.18	pCi/g	2.16	9/20/2001	SD
Tl-208	HASL 300	BDL	pCi/g	0.296	9/20/2001	SD
Bi-212	HASL 300	BDL	pCi/g	0.812	9/20/2001	SD
Pb-212	HASL 300	BDL	pCi/g	1.24	9/20/2001	SD
Th-232	HASL 300	BDL	pCi/g	1.09	9/20/2001	SD
U-238	HASL 300	BDL	pCi/g	1.75	9/20/2001	SD

BDL = Below Detection Limit



**Outreach
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PRELIMINARY REPORT

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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ac-228	HASL 300	BDL	pCi/g	2.48		9/20/2001	SD
Th-234	HASL 300	BDL	pCi/g	9.71		9/20/2001	SD
U-235	HASL 300	BDL	pCi/g	3.51		9/20/2001	SD
Co-60	HASL 300	8.93 +/- 0.203	pCi/g	0.278		9/20/2001	SD
Pa-234	HASL 300	BDL	pCi/g	1.87		9/20/2001	SD
Am-241	HASL 300	2710 +/- 84.2	pCi/g	2.22		9/20/2001	SD
Cs-137	HASL 300	246 +/- 7.38	pCi/g	0.766		9/20/2001	SD

Lab ID: 20010819-18

Client ID: 090701-21

Date Sampled: 9/7/2001 2:30:00 PM

Matrix: Other

Radiochemical Analyses

Ac-228	HASL 300	2.74 +/- 0.545	pCi/g	1.51		9/21/2001	SD
Tl-208	HASL 300	BDL	pCi/g	0.349		9/21/2001	SD
Bi-212	HASL 300	BDL	pCi/g	1.31		9/21/2001	SD
Pb-212	HASL 300	BDL	pCi/g	0.432		9/21/2001	SD
Bi-214	HASL 300	BDL	pCi/g	0.477		9/21/2001	SD
Pb-214	HASL 300	1.33 +/- 0.438	pCi/g	0.578		9/21/2001	SD
Ac-228	HASL 300	BDL	pCi/g	0.603		9/21/2001	SD
Th-234	HASL 300	15.3 +/- 2.44	pCi/g	7.56		9/21/2001	SD
U-235	HASL 300	BDL	pCi/g	1.70		9/21/2001	SD
Co-60	HASL 300	0.579 +/- 0.043	pCi/g	0.121		9/21/2001	SD
Pa-234	HASL 300	BDL	pCi/g	1.03		9/21/2001	SD
Am-241	HASL 300	BDL	pCi/g	35.6		9/21/2001	SD
Cs-137	HASL 300	223 +/- 6.73	pCi/g	0.557		9/21/2001	SD

Lab ID: 20010819-19

Client ID: 090501-06

Date Sampled: 9/5/2001 9:30:00 AM

Matrix: Soil

Radiochemical Analyses

K-40	HASL 300	8.03 +/- 0.683	pCi/g	1.35		9/21/2001	SD
Tl-208	HASL 300	0.355 +/- 0.050	pCi/g	0.217		9/21/2001	SD
?	HASL 300	0.673 +/- 0.321	pCi/g	0.136		9/21/2001	SD
?	HASL 300	0.951 +/- 0.131	pCi/g	0.659		9/21/2001	SD
Bi-214	HASL 300	BDL	pCi/g	0.635		9/21/2001	SD

BDL = Below Detection Limit



Outreach Laboratory
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 1 Arrow, OK 74011
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PRELIMINARY REPORT

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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
d-214	HASL 300	BDL	pCi/g	0.895		9/21/2001	SD
c-228	HASL 300	BDL	pCi/g	1.14		9/21/2001	SD
n-234	HASL 300	BDL	pCi/g	3.71		9/21/2001	SD
-235	HASL 300	BDL	pCi/g	1.28		9/21/2001	SD
o-60	HASL 300	BDL	pCi/g	0.227		9/21/2001	SD
s-234	HASL 300	BDL	pCi/g	0.642		9/21/2001	SD
m-241	HASL 300	16.5 +/- 0.536	pCi/g	0.330		9/21/2001	SD
s-137	HASL 300	119 +/- 3.63	pCi/g	0.365		9/21/2001	SD

Lab ID: 20010819-20

Client ID: 090501-07 R

Date Sampled: 9/5/2001 9:00:00 AM

Matrix: Other

Radiochemical Analyses

-40	HASL 300	ND	pCi/sample	444		9/27/2001	RE
i-214	HASL 300	ND	pCi/sample	252		9/27/2001	RE
b-214	HASL 300	ND	pCi/sample	20000		9/27/2001	RE
o-60	HASL 300	BDL	pCi/sample	127		9/27/2001	RE
s-137	HASL 300	543000 +/- 39900	pCi/sample	754		9/27/2001	RE
m-241	HASL 300	4570 +/- 575	pCi/sample	1820		9/27/2001	RE

Lab ID: 20010819-21

Client ID: 090501-22

Date Sampled: 9/7/2001 2:00:00 PM

Matrix: Other

Radiochemical Analyses

-40	HASL 300	237 +/- 58	pCi/sample	172		9/26/2001	E/D
Bi-214	HASL 300	ND	pCi/sample	29.9		9/26/2001	E/D
Pb-214	HASL 300	ND	pCi/sample	49.2		9/26/2001	E/D
Co-60	HASL 300	BDL	pCi/sample	6.6		9/26/2001	E/D
Ss-137	HASL 300	4240 +/- 130	pCi/sample	23.2		9/26/2001	E/D
Am-241	HASL 300	9620 +/- 309	pCi/sample	23.1		9/26/2001	E/D

BDL = Below Detection Limit



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Lab ID: 20010819-22

Client ID: 090701-23

Date Sampled: 9/7/2001 1:30:00 PM

Matrix: Other

Radiochemical Analyses

K-40	HASL 300	ND	pCi/sample	175	9/26/2001	E/D
Bi-214	HASL 300	ND	pCi/sample	86	9/26/2001	E/D
Pb-214	HASL 300	ND	pCi/sample	58	9/26/2001	E/D
Co-60	HASL 300	ND	pCi/sample	20.6	9/26/2001	E/D
Cs-137	HASL 300	619000 +/- 63800	pCi/sample	431	9/26/2001	E/D
Am-241	HASL 300	ND	pCi/sample	17.7	9/26/2001	E/D

Lab ID: 20010819-23

Client ID: 090701-24

Date Sampled: 9/7/2001 1:00:00 PM

Matrix: Water

Radiochemical Analyses

K-40	HASL 300	ND	pCi/l	530	9/20/2001	E/D
Bi-214	HASL 300	ND	pCi/l	74	9/20/2001	E/D
Pb-214	HASL 300	ND	pCi/l	79	9/20/2001	E/D
Co-60	HASL 300	ND	pCi/l	37.4	9/20/2001	E/D
Cs-137	HASL 300	BDL	pCi/l	27	9/20/2001	E/D
Am-241	HASL 300	ND	pCi/l	19.7	9/20/2001	E/D
H-3	EPA 906	70.1 +/- 0.16	uCi/L	0.004	9/20/2001	M/E

Lab ID: 20010819-24

Client ID: 090701-25

Date Sampled: 9/7/2001 11:00:00 AM

Matrix: Other

Radiochemical Analyses

K-40	HASL 300	220 +/- 72	pCi/sample	184	9/26/2001	E/D
Bi-214	HASL 300	ND	pCi/sample	52	9/26/2001	E/D
Pb-214	HASL 300	ND	pCi/sample	74	9/26/2001	E/D
	HASL 300	ND	pCi/sample	25	9/26/2001	E/D
	HASL 300	1220 +/- 49	pCi/sample	33	9/26/2001	E/D

IDL - Below Detection Limit



**Outreach
Laboratory**

North Aspen
Ten Arrow, CO 81612
313 251-2515
(918) 251-0008

Client:

U S Ecology Inc.

Client Project:

GNI-Webster FS-01-10

Lab Number:

20010819

Date Reported:

9/28/2001

Date Received:

9/10/01

Page Number:

13 of 14

PRELIMINARY REPORT

Analytical Report

Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Am-241	879000 +/- 27600	pCi/sample	364		9/26/2001	E/D

Lab ID: 20010819-25

Client ID: 090701-26

Date Sampled: 9/7/2001 10:30:00 AM

Matrix: Other

Radiochemical Analyses

K-40	HASL 300	ND	pCi/sample	262	9/26/2001	E/D
Bi-214	HASL 300	ND	pCi/sample	55	9/26/2001	E/D
Pb-214	HASL 300	ND	pCi/sample	131	9/26/2001	E/D
Co-60	HASL 300	ND	pCi/sample	24	9/26/2001	E/D
C-14	HASL 300	19300 +/- 567	pCi/sample	57	9/26/2001	E/D
A-241	HASL 300	119000 +/- 3980	pCi/sample	104	9/26/2001	E/D

Lab ID: 20010819-26

Client ID: 090701-27

Date Sampled: 9/7/2001 10:00:00 AM

Matrix: Other

Radiochemical Analyses

K-40	HASL 300	ND	pCi/sample	68	9/26/2001	E/D
Bi-214	HASL 300	ND	pCi/sample	14	9/26/2001	E/D
Pb-214	HASL 300	ND	pCi/sample	22	9/26/2001	E/D
Co-60	HASL 300	36 +/- 3.1	pCi/sample	4.6	9/26/2001	E/D
Cs-137	HASL 300	4630 +/- 387	pCi/sample	16	9/26/2001	E/D
Am-241	HASL 300	ND	pCi/sample	94	9/26/2001	E/D

Lab ID: 20010819-27

Client ID: 090801-019

Date Sampled: 9/7/2001 3:30:00 PM

Matrix: Other

Radiochemical Analyses

K-40	HASL 300	1.69 +/- 0.270	pCi/ml	0.635	9/24/2001	SD
Th-232	HASL 300	0.091 +/- 0.022	pCi/ml	0.067	9/24/2001	SD
	HASL 300	BDL	pCi/ml	0.448	9/24/2001	SD
Pb-212	HASL 300	BDL	pCi/ml	0.160	9/24/2001	SD

BDL = Below Detection Limit



**Outreach
Laboratory**

North Aspen
Ten Arrow, OK 74083
3) 251-2515
(918) 251-0008

PRELIMINARY REPORT

Client: U S Ecology Inc.
Client Project: GNI-Webster FS-01-10
Lab Number: 20010819
Date Reported: 9/28/2001
Date Received: 9/10/01
Page Number: 14 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Bi-214	HASL 300	BDL	pCi/ml	0.111		9/24/2001	SD
Pb-214	HASL 300	BDL	pCi/ml	0.957		9/24/2001	SD
Ac-228	HASL 300	BDL	pCi/ml	0.311		9/24/2001	SD
Th-234	HASL 300	BDL	pCi/ml	1.25		9/24/2001	SD
U-235	HASL 300	BDL	pCi/ml	0.631		9/24/2001	SD
Co-60	HASL 300	BDL	pCi/ml	0.089		9/24/2001	SD
Cs-137	HASL 300	0.471 +/- 0.036	pCi/ml	0.075		9/24/2001	SD
Am-241	HASL 300	1230 +/- 39.6	pCi/ml	3.41		9/24/2001	SD

QC Report

Parameter	Blank	LCS %REC	LCSD %REC RPD	DUP RPD	MS %REC	MSD %REC RPD	Date
Ac-228	BDL			4.1			9/26/2001
Co-57		76.2					9/26/2001
Co-60		94.5					9/26/2001
Co-60		99.0					9/27/2001
Cs-137	BDL	88.3		0.0			9/26/2001
Cs-137	BDL	96.3		17.1			9/27/2001
H-3	BDL	115.0		NC	105.0		9/27/2001
K-40							9/25/2001
K-40	BDL	116.0		19.2			9/26/2001
Mn-54		111.0					9/26/2001
Mn-54		103.0					9/27/2001
Pb-212	BDL			18.7			9/26/2001
Pb-214	BDL			35.6			9/26/2001
TCLP-Lead	BDL	97.0			DO	DO	9/21/2001
TCLP-Lead	BDL	121.0			129.0	136.0 5.1	9/13/2001

Reviewed By:

Lab Approval:

BDL = Below Detection Limit



MICROTEC SERVICES, INC.

110 Charles Street • Pasadena, TX 77506
Tel (713) 475-2274 Fax (713) 475-2362

LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

August 3, 2001

Elick Acre
The GNI Group, Inc.
P.O. Box 220
Deer Park, Tx. 77536

REF: Soil sample analysis

The following are analysis results of the 66 soil samples we received on August 2, 2001.

Description of Analysis:

In order to get a representative sample for counting, a portion of each sample was divided into 3 test tubes measuring 12mm X 75mm and weighed (approximately 6 grams in each test tube). These were counted for 1 minute each using a Packard Instruments model 5003 Cobra Automatic Gamma Counter with a 3"x3" NaI well detector and MCA. Since Cs-137 was the only isotope of interest, a NIST traceable Cs-137 rod standard (0.0911 uCi. on 8-2-2001) was counted for 15 minutes to calculate counting efficiency for the 662 keV photopeak. Background was counted for 60 minutes to establish minimum detection limits. Counts and weights from the 3 test tubes for each sample were averaged. Results of the analysis are attached.

If you have any questions concerning this report, please call me at 713-475-2274. Thank you.

Regards,

Quintin A. Stokley
President
Microtec Services, Inc.



MICROTEC SERVICES, INC.

110 Charles Street • Pasadena, TX 77506
Tel (713) 475-2274 Fax (713) 475-2362

LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***

DATE: August 3, 2001 PAGE 1 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET	
		ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
1	B-1-1	408.8	22.5
2	B-1-2	173.3	14.6
3	B-2-1	56.5	10.2
4	B-2-2	77.4	12.3
5	B-3-1	395.9	22.2
6	B-3-2	428.2	23.3
7	B-4-1	28.0	7.0
8	B-4-2	57.1	10.2
9	B-5-1	5.9	4.2
10	B-5-2	5.5	4.3

NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY

SIGNATURE

8-3-01

DATE



MICROTEC SERVICES, INC.

110 Charles Street • Pasadena, TX 77506
Tel (713) 475-2274 Fax (713) 475-2362

LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***

DATE: August 3, 2001 PAGE 2 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
(ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
11	B-6-1	222.9	19.0
12	B-6-2	115.9	14.5
13	B-7-1	46.7	8.9
14	B-7-2	209.4	17.0
15	B-8-1	62.2	10.6
16	B-8-2	28.2	7.6
17	B-9-1	35.7	7.8
18	B-9-2	182.2	15.8
19	B-10-1	58.1	9.3
20	B-10-2	19.6	6.3

NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY

SIGNATURE

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LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***

DATE: August 3, 2001 PAGE 3 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
(ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
21	B-11-1	343.1	20.8
22	B-11-2	529.3	26.5
23	B-12-1	114.1	14.4
24	B-12-2	187.7	18.6
25	B-13-1	735.0	32.1
26	B-13-2	341.9	21.6
27	B-14-1	22.5	6.1
28	B-14-2	5304.1	83.3
29	B-15-1	120.0	15.2
30	B-15-2	3.6	3.7

NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY

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LEAK TESTING
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NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***

DATE: August 3, 2001 PAGE 4 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
31	B-16-1	17.4	6.4
32	B-16-2	31.4	7.7
33	B-17-1	6.5	4.7
34	B-17-2	5.0	4.4
35	B-18-1	97.8	11.9
36	B-18-2	92.9	12.2
37	B-19-1	197.8	18.0
38	B-19-2	1267.9	43.6
39	B-20-1	29.1	7.8
40	B-20-2	140.6	15.3

NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY

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Tel (713) 475-2274 Fax (713) 475-2362

LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***


DATE: August 3, 2001 PAGE 5 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
41	B-21-1	16.8	6.6
42	B-21-2	5.3	4.6
43	B-22-1	351.7	24.9
44	B-22-2	168.2	16.4
45	B-23-1	15.8	6.0
46	B-23-2	21.2	7.1
47	B-24-1	45.8	8.7
48	B-24-2	43.7	9.1
49	B-25-1	287.8	20.3
50	B-25-2	1115.8	40.0

NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY


SIGNATURE

8-3-01
DATE



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Tel (713) 475-2274 Fax (713) 475-2362

LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***

DATE: August 3, 2001 PAGE 6 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
(ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
51	B-26-1	167.3	13.4
52	B-26-2	201.1	16.6
53	B-27-1	398.8	24.6
54	B-27-2	214.5	17.6
55	B-28-1	23.5	6.3
56	B-28-2	3.1	3.4
57	B-29-1	20.1	6.3
58	B-29-2	13.1	5.5
59	B-30-1	15.6	5.5
60	B-30-2	14.6	5.2

NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY

SIGNATURE

DATE

8-3-01



MICROTEC SERVICES, INC.

110 Charles Street • Pasadena, TX 77506
Tel (713) 475-2274 Fax (713) 475-2362

LEAK TESTING
CALIBRATIONS
REPAIR
NEW INSTRUMENTS

*** SOIL SAMPLE ANALYSIS FOR Cs-137 ***

DATE: August 3, 2001 PAGE 7 OF 7

ELICK ACREE
THE GNI GROUP, INC.
P.O. BOX 220
DEER PARK, TX. 77536

COUNTING EFF = 25.69%
AVERAGE BKG (CPM) = 15.8
MDA (pCi/g) = 0.7897 pCi/g +/- 0.2117 pCi/g
ERRORS QUOTED AT 2 SIGMA)

SAMPLE NUMBER	SAMPLE DESCRIPTION	NET	
		ACTIVITY (pCi/g)	ERROR +/- (pCi/g)
61	B-31-1	7.5	2.5
62	B-31-2	10.9	2.5
63	B-32-1	89.2	11.7
64	B-32-2	19.2	6.1
65	B-33-1	42.7	9.1
66	B-33-2	43.7	9.4

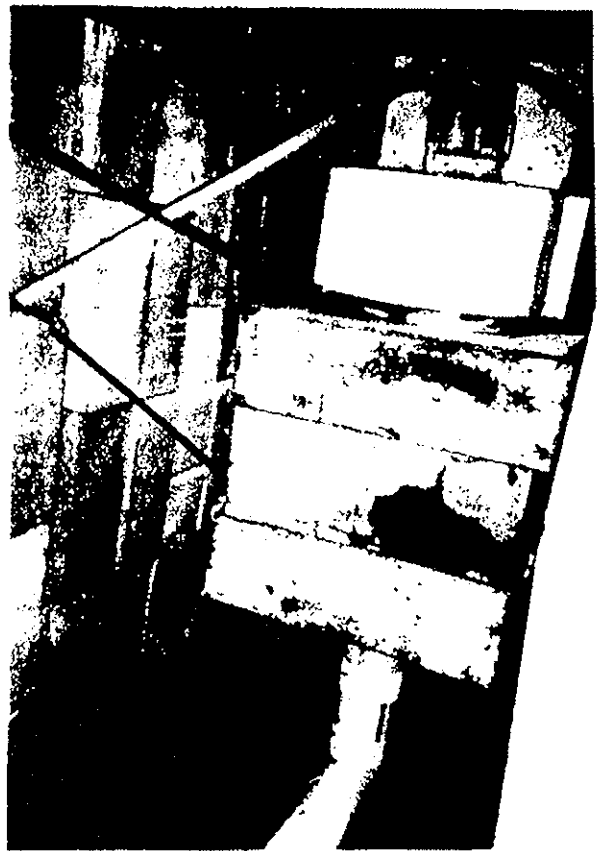
NOTE: * INDICATES LESS THAN MINIMUM DETECTABLE ACTIVITY

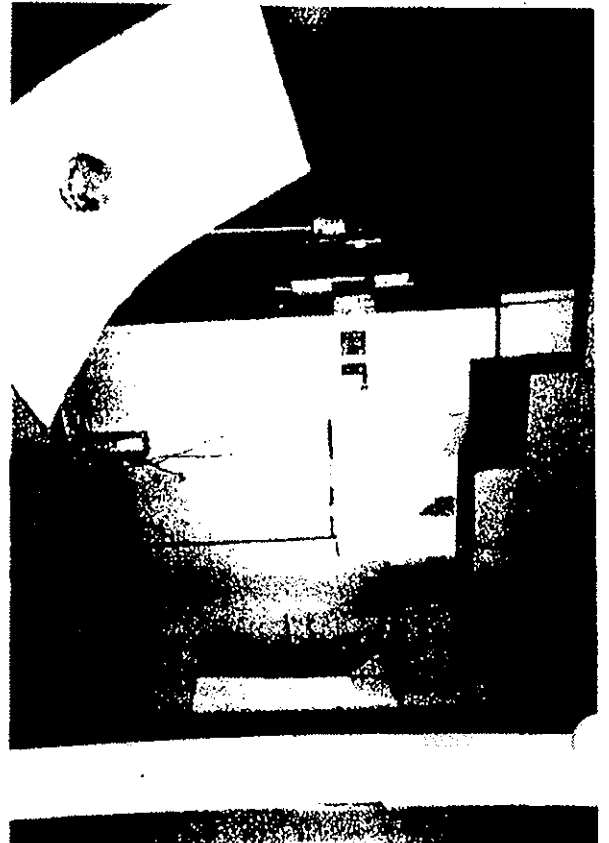
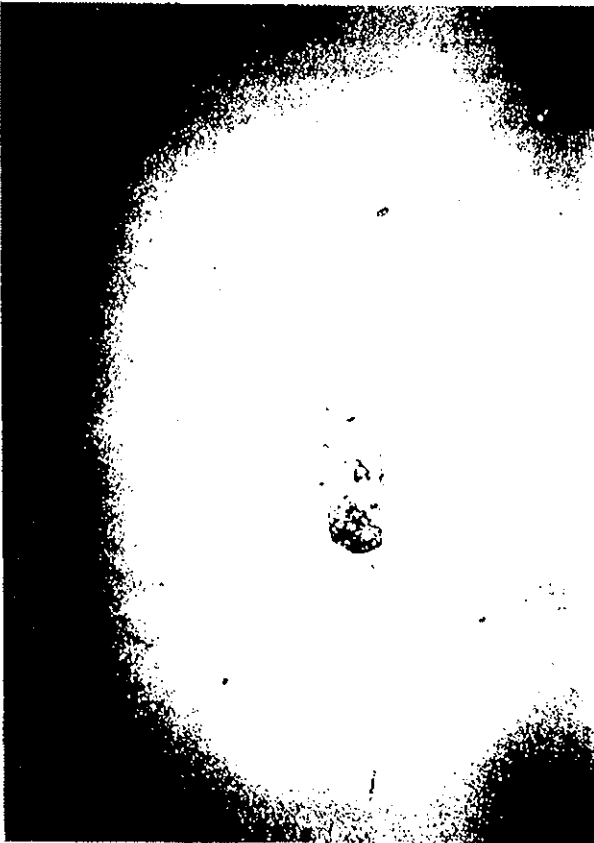
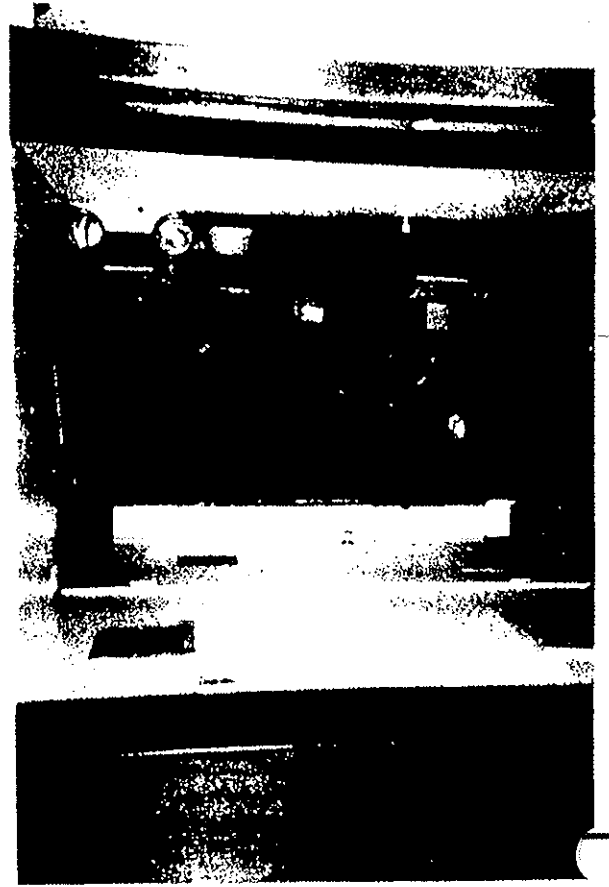
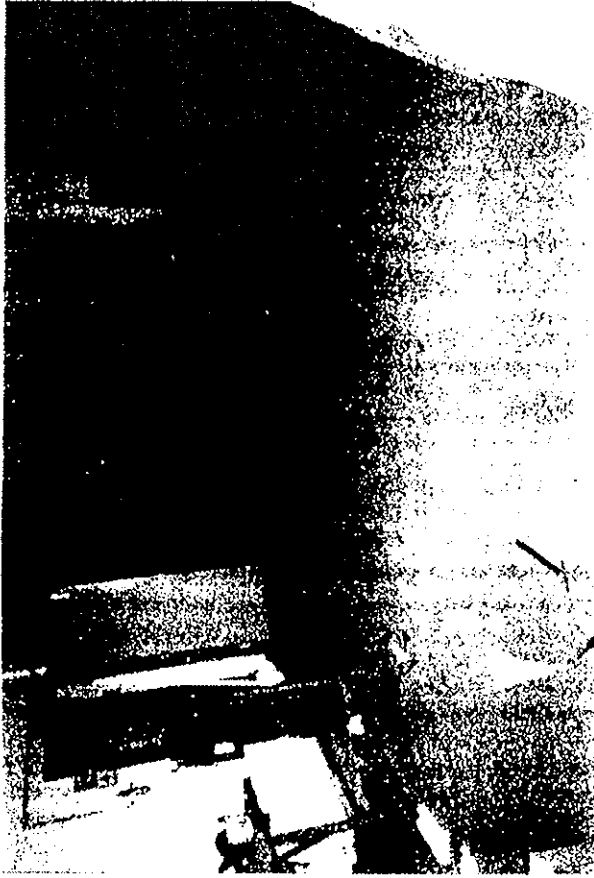

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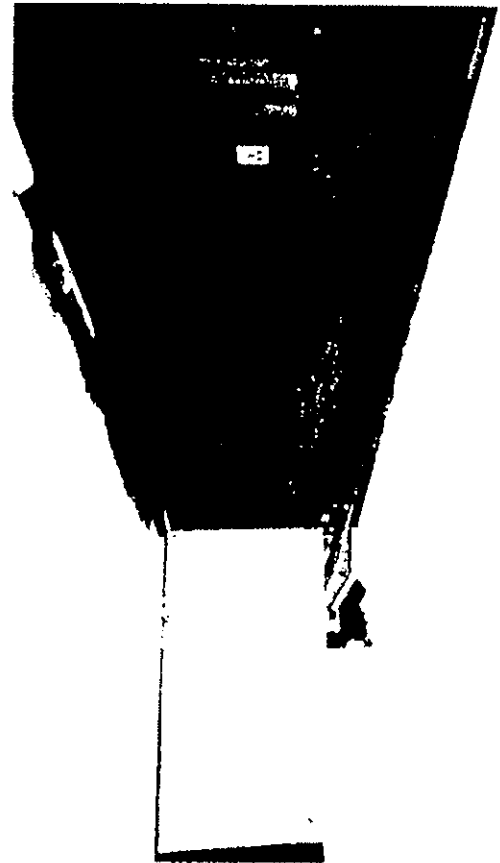
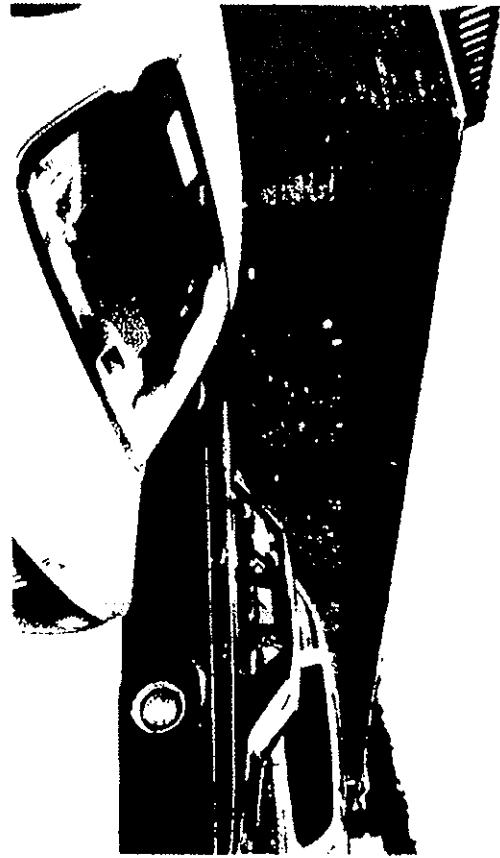
8-3-01
DATE

Attachment B

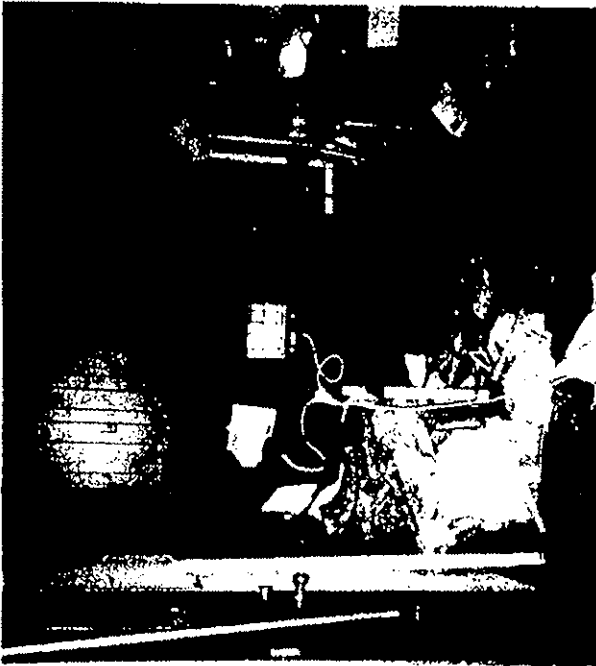
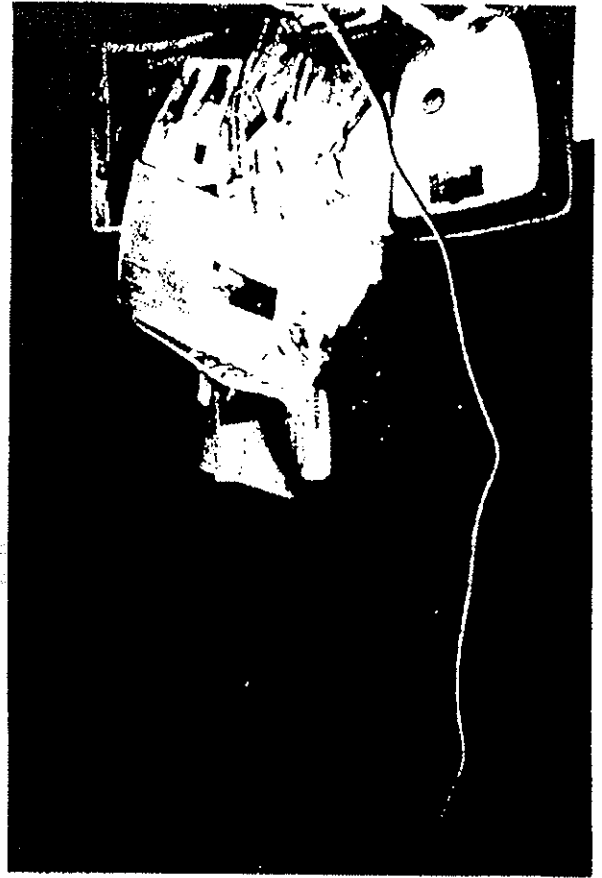
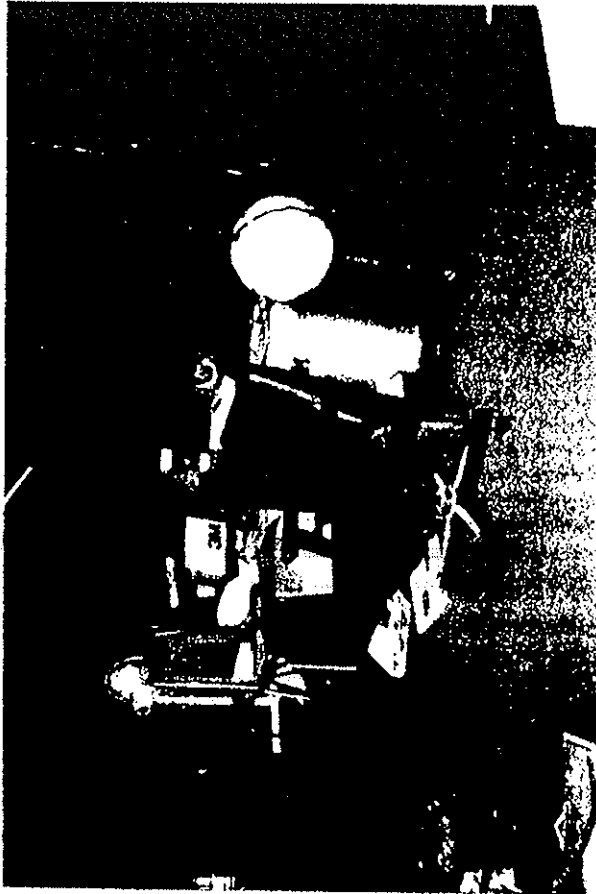
Photographs

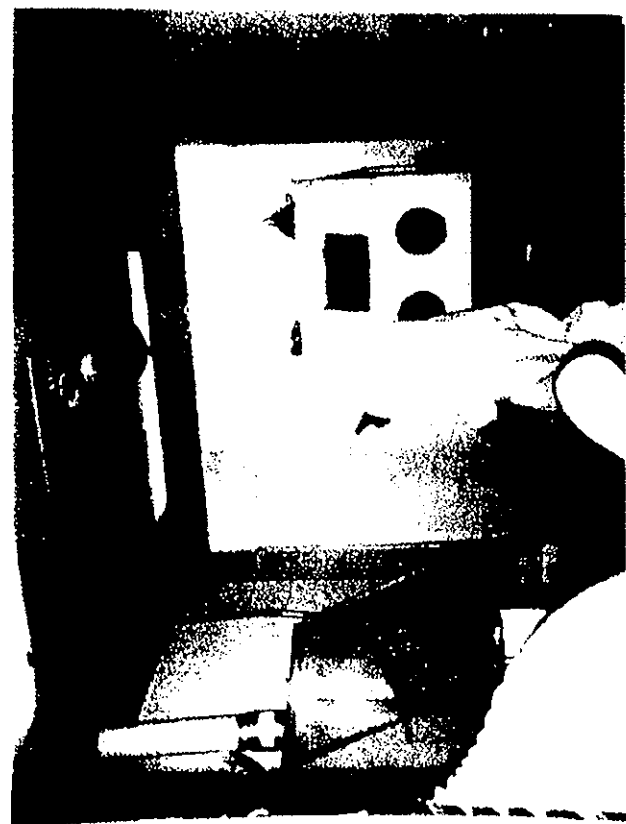
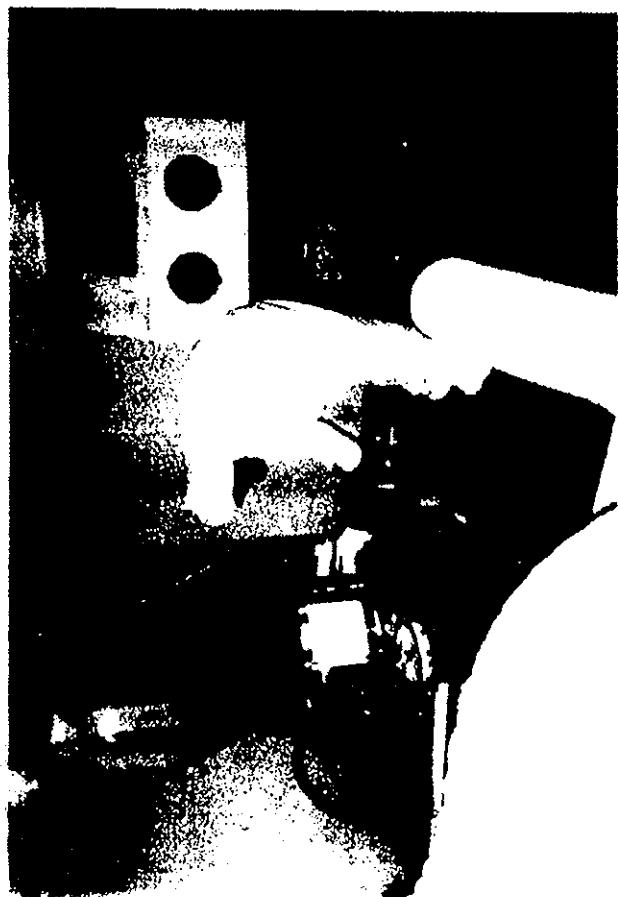
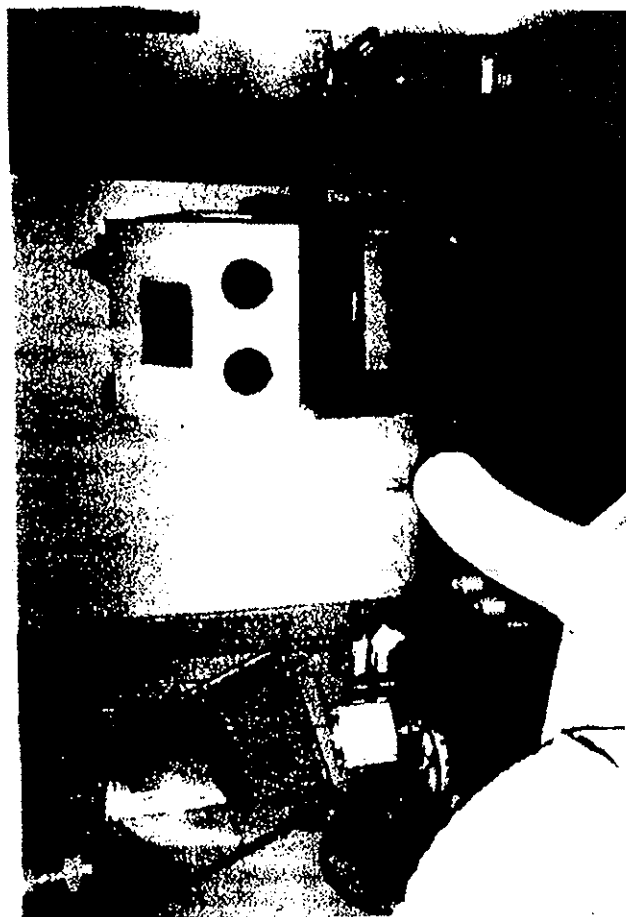
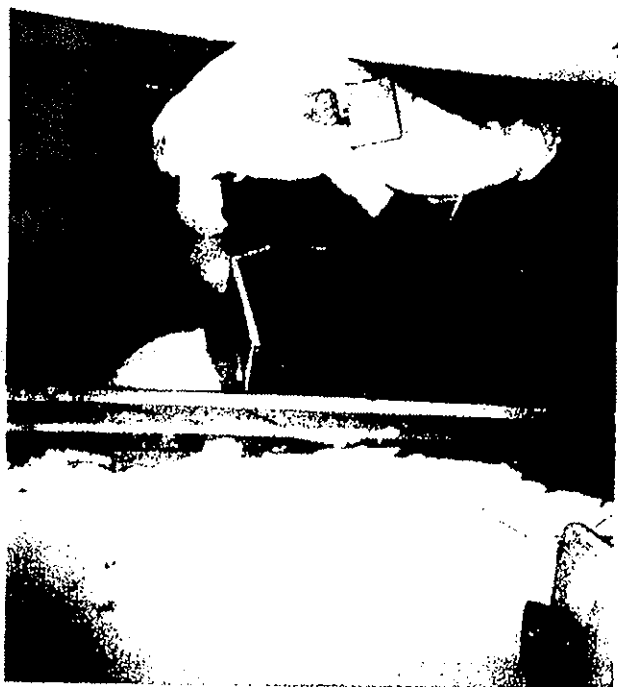


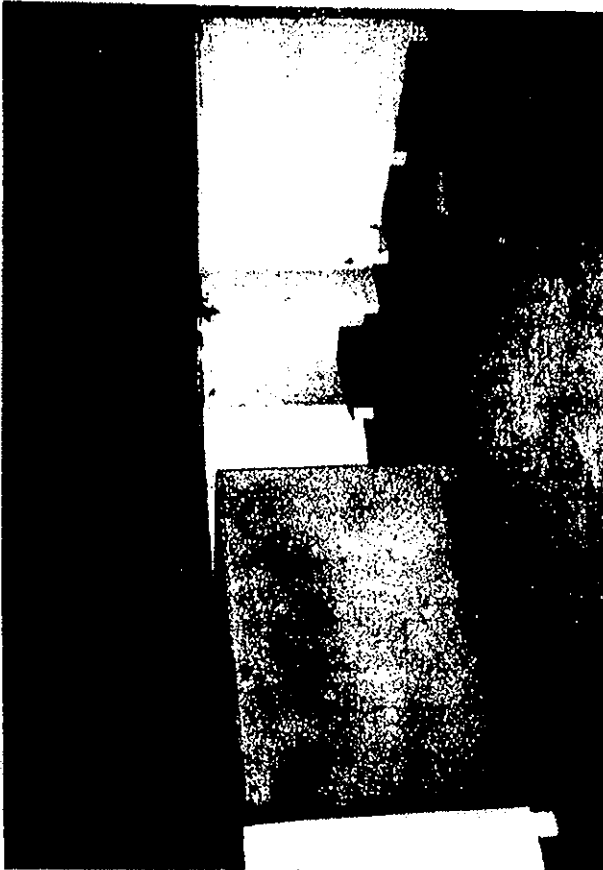


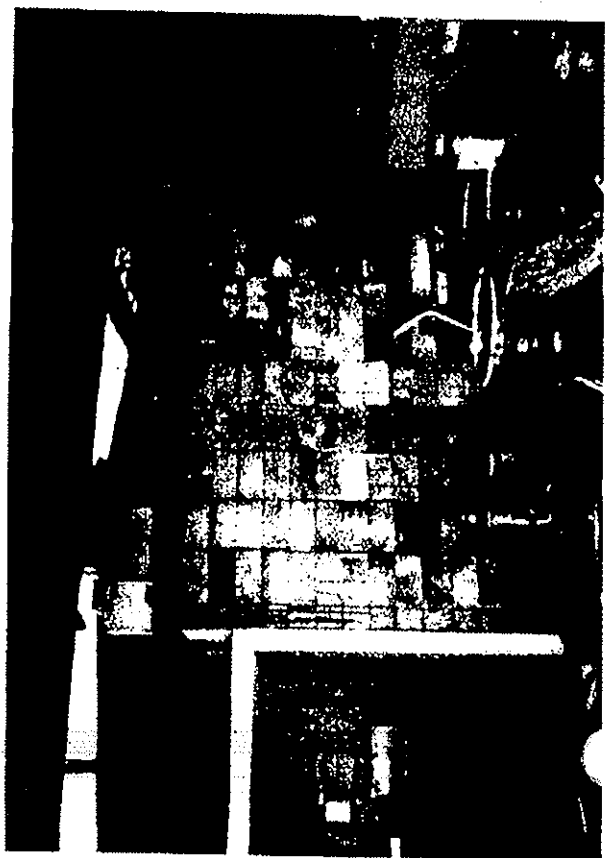
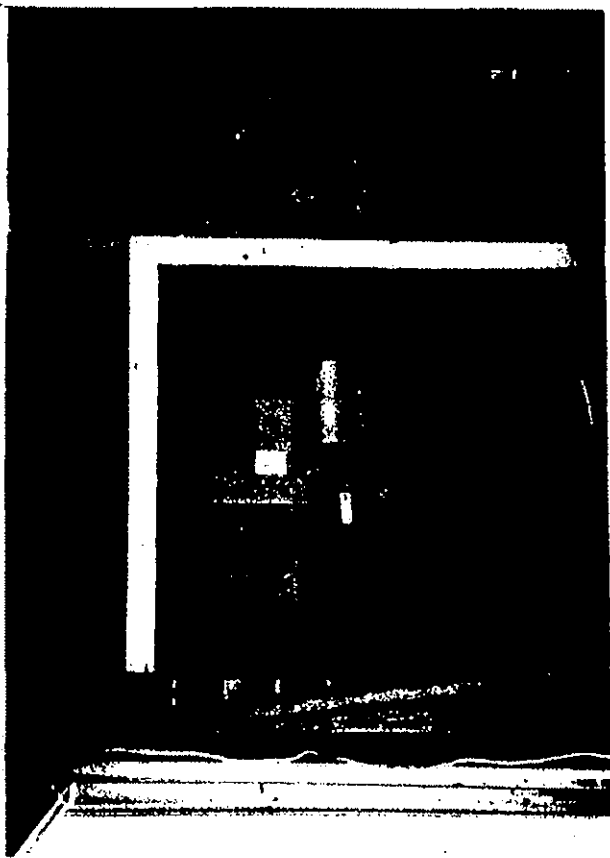


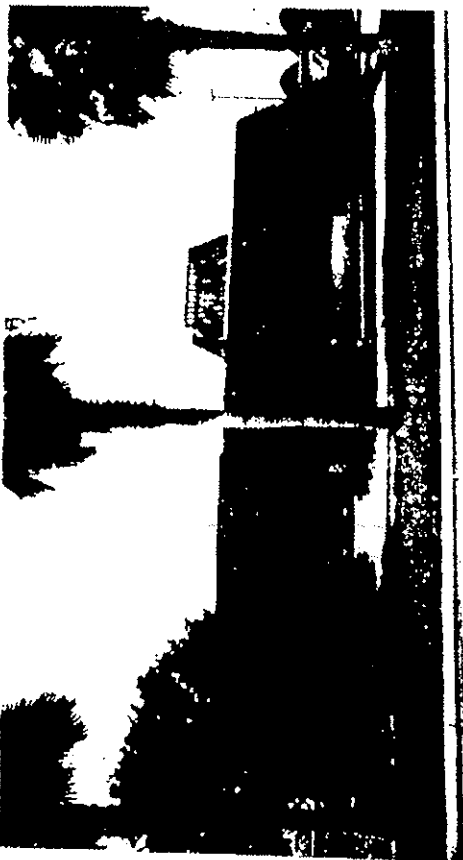
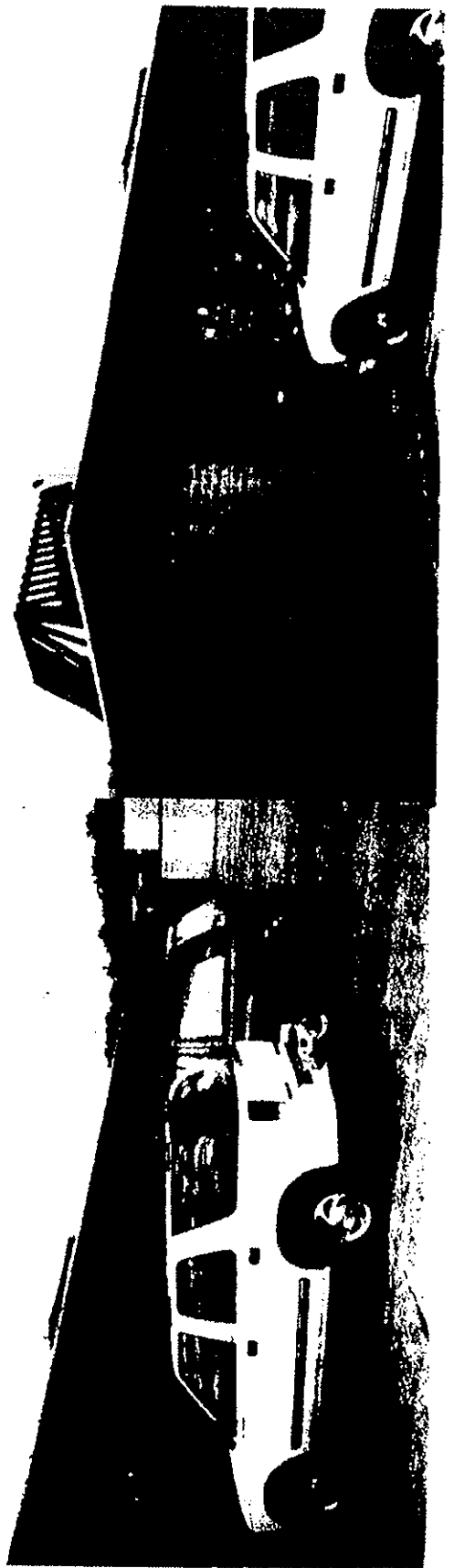


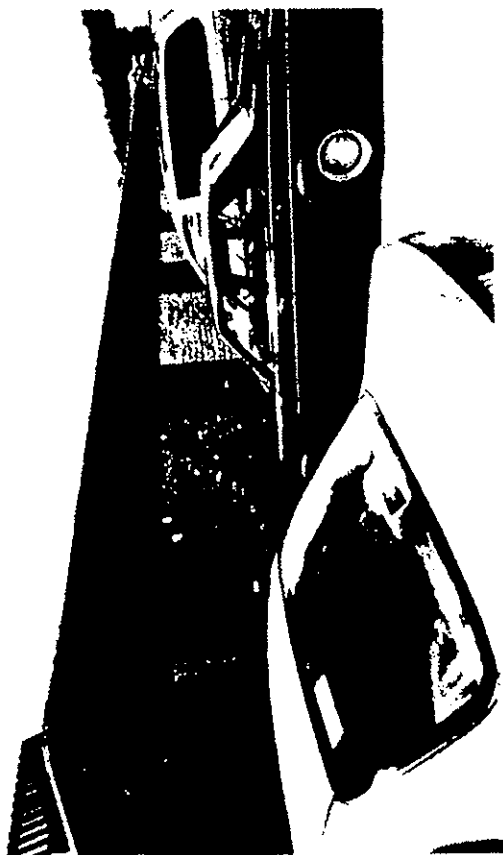
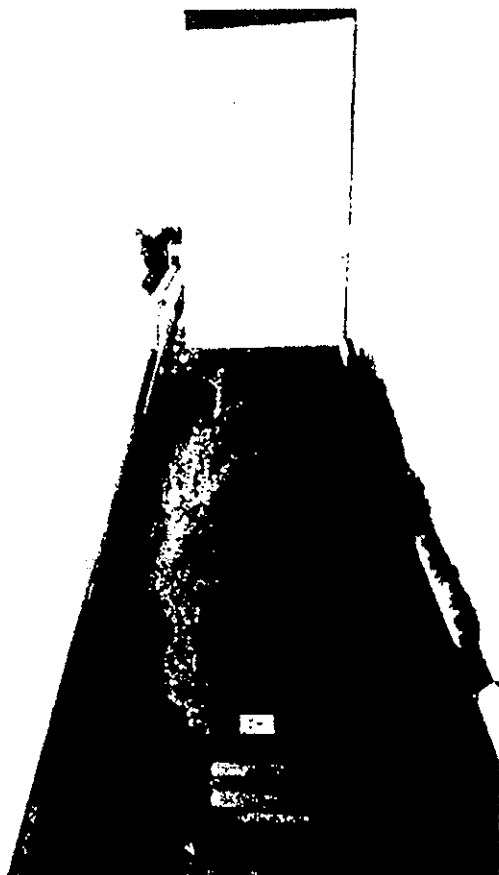


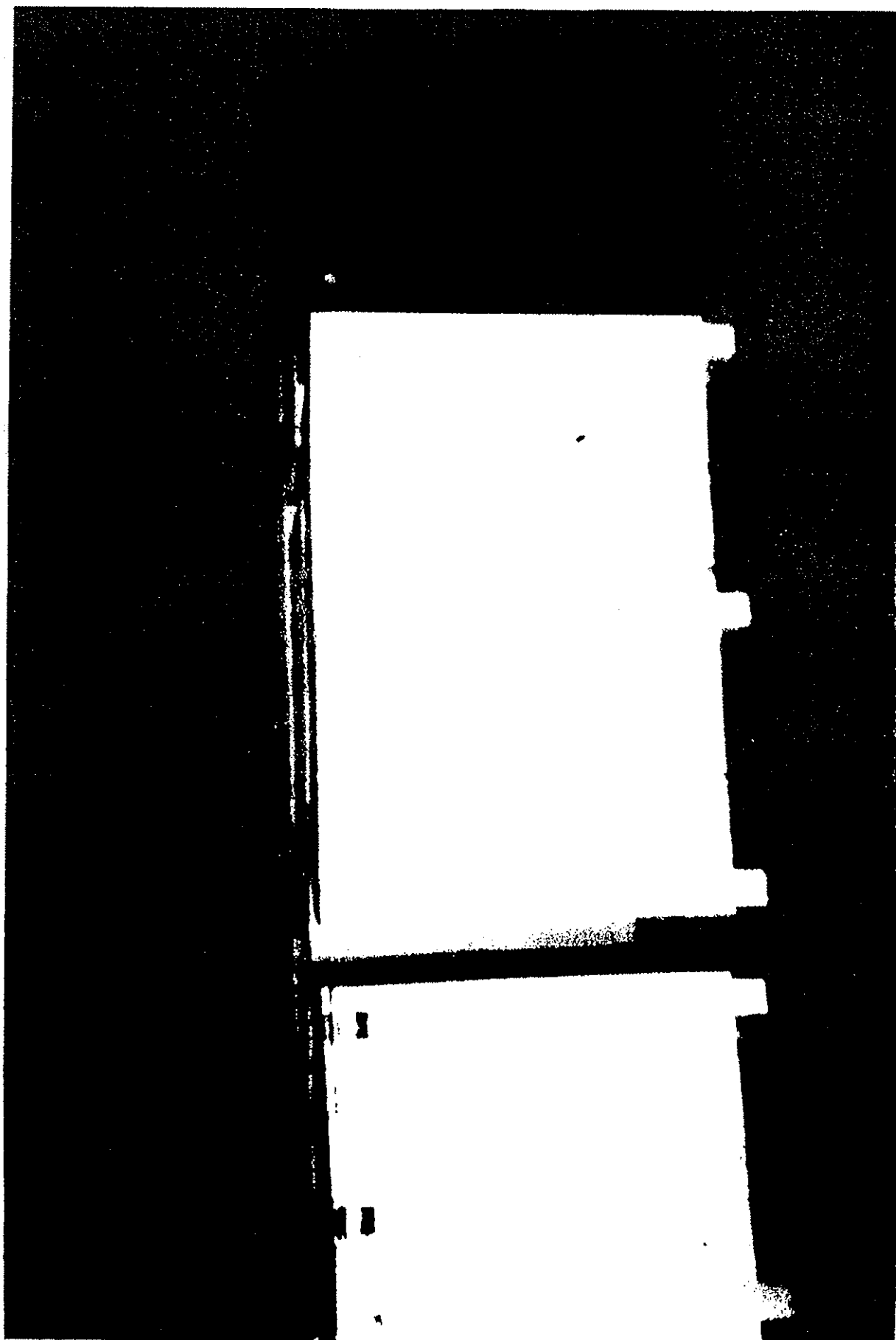


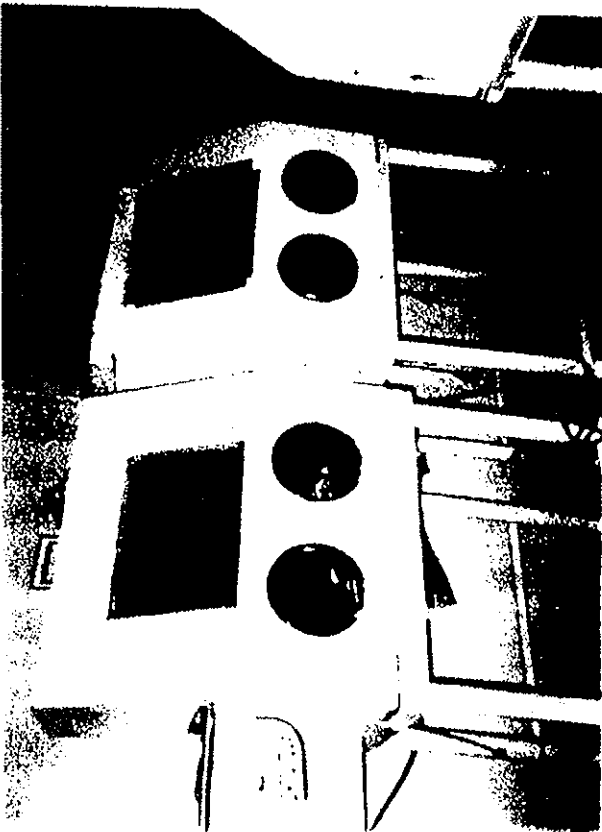
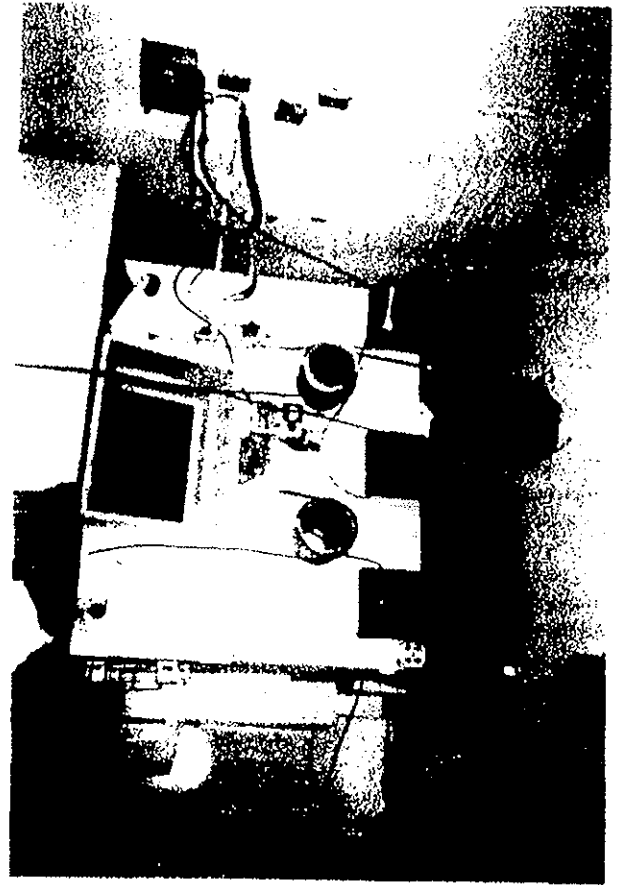
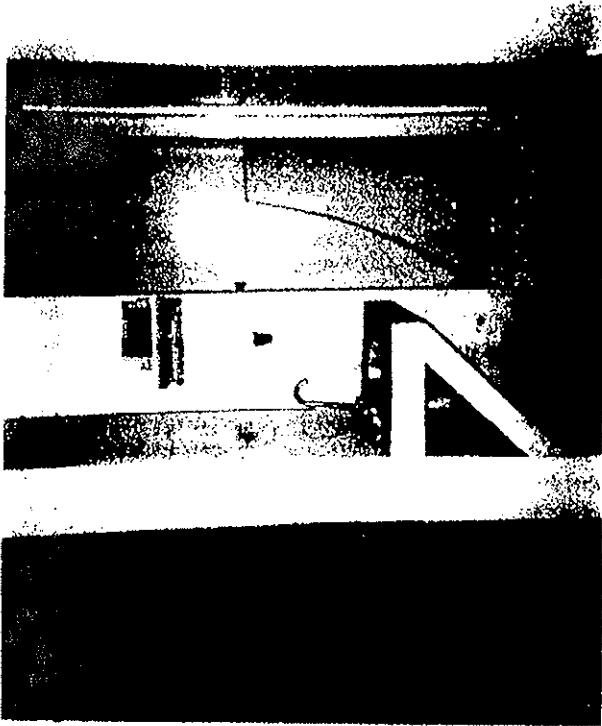












Attachment C

25 Texas Administrative Code 289.202

25 TEXAS ADMINISTRATIVE CODE

§289.202

Standards for Protection Against Radiation
from Radioactive Material

Texas Regulations for Control of Radiation

(effective June 1, 1996)

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(October 2000)

25 TAC §289.202

Standards for Protection Against Radiation
from Radioactive Material (Continued)

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The following example is the outline format used for all agency rules. This explanation will help you locate the different references stated throughout the rule:

289.252 Licensing of Radioactive Material.

(a) Appendices.

(1) Criteria relating to use of financial tests and parent company...

(A) Financial test.

(j) To pass the financial test, the parent company...

(1) The parent company shall have:

(-a-) two of the following...

(-1-) a ratio of total liabilities to...

When the rule states "paragraph (1) of this subsection", the rule is referring to paragraph "(1)" within subsection "(a)". When the rule states "subsection (d) of this section", the rule is referring to subsection "(d)" within the section, for example, §289.252.

**WHERE CAN THE FORMS REFERENCED
WITHIN THE RULE BE FOUND?**

Forms that are referenced in this rule can be downloaded from
the Bureau of Radiation Control web site at:

www.tdh.state.tx.us/ech/rad/pages/brc.htm

Or call (512) 834-6688 to request a copy of the forms

(October 2000)

25 TEXAS ADMINISTRATIVE CODE

§289.202 Standards for Protection Against Radiation from Radioactive Material.

(a) Purpose.

(1) This section establishes standards for protection against ionizing radiation resulting from activities conducted in accordance with licenses issued by the agency.

(2) The requirements in this section are designed to control the receipt, possession, use, and transfer of sources of radiation by any licensee so the total dose to an individual, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation prescribed in this section. However, nothing in this section shall be construed as limiting actions that may be necessary to protect health and safety in an emergency.

(b) Scope.

(1) Except as specifically provided in other sections of this chapter, this section applies to persons who receive, possess, use, or transfer sources of radiation, unless otherwise exempted. No person may use, manufacture, produce, transport, transfer, receive, acquire, own, possess, process, or dispose of sources of radiation unless that person has a license or exemption from the agency. The dose limits in this section do not apply to doses due to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, to exposure from individuals administered radioactive material and released in accordance with this chapter, or to voluntary participation in medical research programs. However, no radiation may be deliberately applied to human beings except by or under the supervision of an individual authorized by and licensed in accordance with Texas' statutes to engage in the healing arts.

(2) Licensees who are also registered by the agency to receive, possess, use, and transfer radiation machines must also comply with the requirements of §289.231 of this title (relating to General Provisions and Standards for Protection Against Machine-Produced Radiation).

(c) Definitions. The following words and terms when used in this section shall have the following meaning, unless the context clearly indicates otherwise.

(1) Annual limit on intake (ALI) - The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by Reference Man that would result in a committed effective dose equivalent of 5 rems (0.05 sievert (Sv)) or a committed dose equivalent of 50 rems (0.5 Sv) to any individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Columns 1 and 2 of Table I of subsection (ggg)(2) of this section.

§289.202(c)(2)

(2) Class - A classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials are classified as D, W, or Y, which apply to a range of clearance half-times: for Class D, Days, of less than 10 days; for Class W, Weeks, from 10 to 100 days, and for Class Y, Years, of greater than 100 days. For purposes of this section, lung class and inhalation class are equivalent terms.

(3) Declared pregnant woman - A woman who has voluntarily informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman voluntarily withdraws the declaration in writing or is no longer pregnant.

(4) Derived air concentration (DAC) - The concentration of a given radionuclide in air that, if breathed by Reference Man for a working year of 2,000 hours under conditions of light work, results in an intake of 1 ALI. For purposes of this section, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. DAC values are given in Column 3 of Table I of subsection (ggg)(2) of this section.

(5) Derived air concentration-hour (DAC-hour) - The product of the concentration of radioactive material in air, expressed as a fraction or multiple of the derived air concentration for each radionuclide, and the time of exposure to that radionuclide, in hours. A licensee may take 2,000 DAC-hours to represent ALI, equivalent to a committed effective dose equivalent of 5 rems (0.05 Sv).

(6) Dosimetry processor - A registrant that processes and evaluates personnel monitoring devices in order to determine the radiation dose delivered to the monitoring devices.

(7) Inhalation class (see definition for Class).

(8) Lung class (see definition for Class).

(9) Nonstochastic effect - A health effect, the severity of which varies with the dose and for which a threshold is believed to exist. Radiation-induced cataract formation is an example of a nonstochastic effect. For purposes of this section, deterministic effect is an equivalent term.

(10) Planned special exposure - An infrequent exposure to radiation, separate from and in addition to the annual occupational dose limits.

(11) Quarter - A period of time equal to one-fourth of the year observed by the licensee, approximately 13 consecutive weeks, providing that the beginning of the first quarter in a year coincides with the starting date of the year and that no day is omitted or duplicated in consecutive quarters.

§289.202(c)(12)

(12) Reference man - A hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics may be used by researchers and public health employees to standardize results of experiments and to relate biological insult to a common base. A description of Reference Man is contained in the International Commission on Radiological Protection report, ICRP Publication 23, "Report of the Task Group on Reference Man."

(13) Respiratory protective equipment - An apparatus, such as a respirator, used to reduce an individual's intake of airborne radioactive materials.

(14) Sanitary sewerage - A system of public sewers for carrying off waste water and refuse, but excluding sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee or registrant.

(15) Stochastic effect - A health effect that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects. For purposes of this section probabilistic effect is an equivalent term.

(16) Weighting factor w_T for an organ or tissue (T) - The proportion of the risk of stochastic effects resulting from irradiation of that organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly. For calculating the effective dose equivalent, the values of w_T are:

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ORGAN DOSE WEIGHTING FACTORS

Organ or Tissue	w_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30*
Whole Body	1.00**

* 0.30 results from 0.06 for each of five "remainder" organs, excluding the skin and the lens of the eye, that receive the highest doses.

** For the purpose of weighting the external whole body dose, for adding it to the internal dose, a single weighting factor, $w_T = 1.0$, has been specified. The use of other weighting factors for external exposure will be approved on a case-by-case basis until such time as specific guidance is issued.

(d) Implementation.

(1) Any existing license condition that is more restrictive than this section remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

(2) If a license condition exempts a licensee from a provision of this section in effect on or before January 1, 1994, it also exempts the licensee from the corresponding provision of this section.

(3) If a license condition cites provisions of this section in effect prior to January 1, 1994, that do not correspond to any provisions of this section, the license condition remains in force until there is an amendment or renewal of the license that modifies or removes this condition.

§289.202(e)

(e) Radiation protection programs.

(1) Each licensee shall develop, document, and implement a radiation protection program sufficient to ensure compliance with the provisions of this section. See subsection (mm) of this section for recordkeeping requirements relating to these programs. Documentation of the radiation protection program may be incorporated in the licensee's operating, safety, and emergency procedures.

(2) The licensee shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and public doses that are as low as is reasonably achievable (ALARA).

(3) The licensee shall, at intervals not to exceed 12 months, ensure the radiation protection program content and implementation is reviewed.

(4) To implement the ALARA requirement in paragraph (2) of this subsection and notwithstanding the requirements in subsection (n) of this section, a constraint on air emissions of radioactive material to the environment, excluding radon-222 and its daughters, shall be established by licensees such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 millirems (mrem) (0.1 mSv) per year from these emissions. If a licensee subject to this requirement exceeds this dose constraint, the licensee shall report the exceedance as required in subsection (yy) of this section and promptly take appropriate corrective action.

(f) Occupational dose limits for adults.

(1) The licensee shall control the occupational dose to individuals, except for planned special exposures in accordance with subsection (k) of this section, to the following dose limits.

(A) An annual limit shall be the more limiting of:

(i) the total effective dose equivalent being equal to 5 rems (0.05 Sv); or

(ii) the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems (0.5 Sv).

(B) The annual limits to the lens of the eye, to the skin, and to the extremities shall be:

§289.202(f)(1)(B)(i)

- (i) a lens dose equivalent of 15 rems (0.15 Sv); and
- (ii) a shallow dose equivalent of 50 rems (0.5 Sv) to the skin or to any extremity.

(2) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime. See subsection (k)(6)(A) and (B) of this section.

(3) The assigned deep dose equivalent and shallow dose equivalent shall be for the portion of the body receiving the highest exposure.

(4) The deep dose equivalent, lens dose equivalent and shallow dose equivalent may be assessed from surveys, calculations, or radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure, or the results of individual monitoring are unavailable.

(5) Derived air concentration (DAC) and annual limit on intake (ALI) values are specified in Table I of subsection (ggg)(2) of this section and may be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits. See subsection (rr) of this section.

(6) Notwithstanding the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams (mg) in a week in consideration of chemical toxicity. See footnote 3 of subsection (ggg)(2) of this section.

(7) The licensee shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person. See subsection (j)(4) of this section.

(g) Compliance with requirements for summation of external and internal doses.

(1) If the licensee is required to monitor in accordance with both subsection (q)(1) and (3) of this section, the licensee shall demonstrate compliance with the dose limits by summing external and internal doses. If the licensee is required to monitor only in accordance with subsection (q)(1) of this section or only in accordance with subsection (q)(3) of this section, then summation is not required to demonstrate compliance with the dose limits. The licensee may demonstrate compliance with the requirements for summation of external and internal doses in accordance with paragraphs (2)-(4) of this subsection. The dose equivalents for the lens of the eye, the skin, and the extremities are not included in the summation, but are subject to separate limits.

§289.202(g)(2)

(2) If the only intake of radionuclides is by inhalation, the total effective dose equivalent limit is not exceeded if the sum of the deep dose equivalent divided by the total effective dose equivalent limit, and one of the following, does not exceed unity:

(A) the sum of the fractions of the inhalation ALI for each radionuclide;
or

(B) the total number of derived air concentration-hours (DAC-hours) for all radionuclides divided by 2,000; or

(C) the sum of the calculated committed effective dose equivalents to all significantly irradiated organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit. For purposes of this requirement, an organ or tissue is deemed to be significantly irradiated if, for that organ or tissue, the product of the weighting factors, w_T , and the committed dose equivalent, $H_{T,50}$, per unit intake is greater than 10% of the maximum weighted value of $H_{T,50}$, that is, $w_T H_{T,50}$, per unit intake for any organ or tissue.

(3) If the occupationally exposed individual receives an intake of radionuclides by oral ingestion greater than 10% of the applicable oral ALI, the licensee shall account for this intake and include it in demonstrating compliance with the limits.

(4) The licensee shall evaluate and, to the extent practical, account for intakes through wounds or skin absorption. The intake through intact skin has been included in the calculation of DAC for hydrogen-3 and does not need to be evaluated or accounted for in accordance with this paragraph.

(h) Determination of external dose from airborne radioactive material.

(1) Licensees shall, when determining the dose from airborne radioactive material, include the contribution to the deep dose equivalent, eye dose equivalent, and shallow dose equivalent from external exposure to the radioactive cloud. See footnotes 1 and 2 of subsection (ggg)(2) of this section.

(2) Airborne radioactivity measurements and DAC values shall not be used as the primary means to assess the deep dose equivalent when the airborne radioactive material includes radionuclides other than noble gases or if the cloud of airborne radioactive material is not relatively uniform. The determination of the deep dose equivalent to an individual shall be based upon measurements using instruments or individual monitoring devices.

§289.202(i)

(i) Determination of internal exposure.

(1) For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee shall, when required in accordance with subsection (q) of this section, take suitable and timely measurements of:

- (A) concentrations of radioactive materials in air in work areas;
- (B) quantities of radionuclides in the body;
- (C) quantities of radionuclides excreted from the body; or
- (D) combinations of these measurements.

(2) Unless respiratory protective equipment is used, as provided in subsection (x) of this section, or the assessment of intake is based on bioassays, the licensee shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

(3) When specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior of the material in an individual is known, the licensee may:

(A) use that information to calculate the committed effective dose equivalent, and, if used, the licensee shall document that information in the individual's record;

(B) upon prior approval of the agency, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material, for example, aerosol size distribution or density; and

(C) separately assess the contribution of fractional intakes of Class D, W, or Y compounds of a given radionuclide to the committed effective dose equivalent. See subsection (ggg)(2) of this section.

(4) If the licensee chooses to assess intakes of Class Y material using the measurements given in paragraph (1)(A) or (B) of this subsection, the licensee may delay the recording and reporting of the assessments for periods up to seven months, unless otherwise required by subsections (xx) or (yy) of this section. This delay permits the licensee to make additional measurements basic to the assessments.

§289.202(i)(5)

(5) If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in calculating DAC-hours shall be either:

(A) the sum of the ratios of the concentration to the appropriate DAC value, that is, D, W, or Y, from subsection (ggg)(2) of this section for each radionuclide in the mixture; or

(B) the ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

(6) If the identity of each radionuclide in a mixture is known, but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

(7) When a mixture of radionuclides in air exists, a licensee may disregard certain radionuclides in the mixture if:

(A) the licensee uses the total activity of the mixture in demonstrating compliance with the dose limits in subsection (f) of this section and in complying with the monitoring requirements in subsection (q)(3) of this section;

(B) the concentration of any radionuclide disregarded is less than 10% of its DAC; and

(C) the sum of these percentages for all of the radionuclides disregarded in the mixture does not exceed 30%.

(8) When determining the committed effective dose equivalent, the following information may be considered.

(A) In order to calculate the committed effective dose equivalent, the licensee may assume that the inhalation of 1 ALI, or an exposure of 2,000 DAC-hours, results in a committed effective dose equivalent of 5 rems (0.05 Sv) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

(B) For an ALI and the associated DAC determined by the nonstochastic organ dose limit of 50 rems (0.5 Sv), the intake of radionuclides that would result in a committed effective dose equivalent of 5 rems (0.05 Sv), that is, the stochastic ALI, is listed in parentheses in Table I of subsection (ggg)(2) of this section. The licensee may, as a simplifying assumption, use the stochastic ALI to determine committed effective dose equivalent. However, if the licensee uses the stochastic ALI, the licensee shall also demonstrate that the limit in subsection (f)(1)(A)(ii) of this section is met.

§289.202(j)

(j) Determination of occupational dose for the current year.

(1) For each individual who is likely to receive, in a year, an occupational dose requiring monitoring in accordance with subsection (q) of this section, the licensee shall determine the occupational radiation dose received during the current year.

(2) In complying with the requirements of paragraph (1) of this subsection, a licensee may:

(A) accept, as a record of the occupational dose that the individual received during the current year, BRC Form 202-2 from prior or other current employers, or other clear and legible record, of all information required on that form and indicating any periods of time for which data are not available; or

(B) accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's prior or other current employer(s) for work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual received during the current year; or

(C) obtain reports of the individual's dose equivalent from prior or other current employer(s) for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee, by telephone, telegram, facsimile, or letter. The licensee shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(3) The licensee shall record the exposure data for the current year, as required by paragraph (1) of this subsection, on BRC Form 202-3, or other clear and legible record, of all the information required on that form.

(4) If the licensee is unable to obtain a complete record of an individual's current occupational dose while employed by any other licensee, the licensee shall assume in establishing administrative controls in accordance with subsection (f)(8) of this section for the current year, that the allowable dose limit for the individual is reduced by 1.25 rems (12.5 millisieverts (mSv)) for each quarter; or 416 mrem (4.16 mSv) for each month for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure.

(5) If an individual has incomplete (e.g., a lost or damaged personnel monitoring device) current occupational dose data for the current year and that individual is employed solely by the licensee during the current year, the licensee shall:

§289.202(j)(5)(A)

(A) assume that the allowable dose limit for the individual is reduced by 1.25 rems (12.5 mSv) for each quarter;

(B) assume that the allowable dose limit for the individual is reduced by 416 mrem (4.16 mSv) for each month; or

(C) assess an occupational dose for the individual during the period of missing data using surveys, radiation measurements, or other comparable data for the purpose of demonstrating compliance with the occupational dose limits.

(6) Administrative controls established in accordance with paragraph (4) of this subsection shall be documented and maintained for inspection by the agency. Occupational dose assessments made in accordance with paragraph (5) of this subsection and records of data used to make the assessment shall be maintained for inspection by the agency. The licensee shall retain the records in accordance with subsection (rr) of this section.

(k) **Planned special exposures.** A licensee may authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in subsection (f) of this section provided that each of the following conditions is satisfied.

(1) The licensee authorizes a planned special exposure only in an exceptional situation when alternatives that might avoid the doses estimated to result from the planned special exposure are unavailable or impractical.

(2) The licensee and employer, if the employer is not the licensee, specifically authorizes the planned special exposure, in writing, before the exposure occurs.

(3) Before a planned special exposure, the licensee ensures that each individual involved is:

(A) informed of the purpose of the planned operation;

(B) informed of the estimated doses and associated potential risks and specific radiation levels or other conditions that might be involved in performing the task; and

(C) instructed in the measures to be taken to keep the dose ALARA considering other risks that may be present.

(4) Prior to permitting an individual to participate in a planned special exposure, the licensee shall determine:

§289.202(k)(4)(A)

(A) the internal and external doses from all previous planned special exposures;

(B) all doses in excess of the limits, including doses received during accidents and emergencies, received during the lifetime of the individual; and

(C) all lifetime cumulative occupational radiation doses.

(5) In complying with the requirements of paragraph (4)(C) of this subsection, a licensee may:

(A) accept, as the record of lifetime cumulative radiation dose, an up-to-date BRC Form 202-2 or equivalent, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee; and

(B) obtain reports of the individual's dose equivalent from prior employer(s) for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee, by telephone, telegram, facsimile, or letter. The licensee shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(6) Subject to subsection (f)(2) of this section, the licensee shall not authorize a planned special exposure that would cause an individual to receive a dose from all planned special exposures and all doses in excess of the limits to exceed:

(A) the numerical values of any of the dose limits in subsection (f)(1) of this section in any year; and

(B) five times the annual dose limits in subsection (f)(1) of this section during the individual's lifetime.

(7) The licensee maintains records of the conduct of a planned special exposure in accordance with subsection (qq) of this section and submits a written report to the agency in accordance with subsection (zz) of this section.

(8) The licensee records the best estimate of the dose resulting from the planned special exposure in the individual's record and informs the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures shall not be considered in controlling future occupational dose of the individual in accordance with subsection (f)(1) of this section but shall be included in evaluations required by paragraphs (4) and (6) of this subsection.

§289.202(k)(9)

(9) The licensee shall record the exposure history, as required by paragraph (4) of this subsection, on BRC Form 202-2, or other clear and legible record, of all the information required on that form. The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee shall use the dose shown in the report in preparing BRC Form 202-2 or equivalent.

(l) Occupational dose limits for minors. The annual occupational dose limits for minors are 10% of the annual occupational dose limits specified for adult workers in subsection (f) of this section.

(m) Dose equivalent to an embryo/fetus.

(1) If a woman declares her pregnancy, the licensee shall ensure that the dose equivalent to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv). If a woman chooses not to declare pregnancy, the occupational dose limits specified in subsection (f)(1) of this section are applicable to the woman. See subsection (rr) of this section for recordkeeping requirements.

(2) The licensee shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph (1) of this subsection. The National Council on Radiation Protection and Measurements recommended in NCRP Report No. 91 "Recommendations on Limits for Exposure to Ionizing Radiation" (June 1, 1987) that no more than 0.05 rem (0.5 mSv) to the embryo/fetus be received in any one month.

(3) The dose equivalent to an embryo/fetus shall be taken as:

(A) the dose equivalent to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman; and

(B) the dose equivalent that is most representative of the dose equivalent to the embryo/fetus from external radiation, that is, in the mother's lower torso region.

(i) If multiple measurements have not been made, assignment of the highest deep dose equivalent for the declared pregnant woman shall be the dose equivalent to the embryo/fetus.

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(ii) If multiple measurements have been made, assignment of the deep dose equivalent for the declared pregnant woman from the individual monitoring device that is most representative of the dose equivalent to the embryo/fetus shall be the dose equivalent to the embryo/fetus. Assignment of the highest deep dose equivalent for the declared pregnant woman to the embryo/fetus is not required unless that dose equivalent is also the most representative deep dose equivalent for the region of the embryo/fetus.

(4) If by the time the woman declares pregnancy to the licensee, the dose equivalent to the embryo/fetus has exceeded 0.45 rem (4.5 mSv), the licensee shall be deemed to be in compliance with paragraph (1) of this subsection, if the additional dose equivalent to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy.

(n) Dose limits for individual members of the public.

(1) Each licensee shall conduct operations so that:

(A) except as provided in subparagraph (B) of this paragraph, the total effective dose equivalent to individual members of the public from the licensed and/or registered operation does not exceed 0.1 rem (1 mSv) in a year, exclusive of the dose contribution from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with this chapter, from voluntary participation in medical research programs, and from the licensee's disposal of radioactive material into sanitary sewerage in accordance with subsection (gg) of this section; and

(B) the dose in any unrestricted area from licensed and/or registered external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with this chapter, does not exceed 0.002 rem (0.02 mSv) in any one hour.

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

(3) A licensee or an applicant for a license may apply for prior agency authorization to operate up to an annual dose limit for an individual member of the public of 0.5 rem (5 mSv). This application shall include the following information:

(A) demonstration of the need for and the expected duration of operations in excess of the limit in paragraph (1) of this subsection;

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

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(C) the procedures to be followed to maintain the dose ALARA.

(4) In addition to the requirements of this section, a licensee subject to the provisions of the United States Environmental Protection Agency's (EPA) generally applicable environmental radiation standards in 40 Code of Federal Regulations (CFR), §190 shall comply with those requirements.

(5) The agency 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.

(o) Compliance with dose limits for individual members of the public.

(1) The licensee shall make or cause to be made surveys of radiation levels in unrestricted areas and radioactive materials in effluents released to unrestricted areas to demonstrate compliance with the dose limits for individual members of the public as required in subsection (n) of this section.

(2) A licensee shall show compliance with the annual dose limit in subsection (n) of this section by:

(A) demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or

(B) demonstrating that:

(i) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table II of subsection (ggg)(2) of this section; and

(ii) if an individual were continuously present in an unrestricted area, the dose from external sources of radiation would not exceed 0.002 rem (0.02 mSv) in an hour and 0.05 rem (0.5 mSv) in a year.

(3) Upon approval from the agency, the licensee may adjust the effluent concentration values in Table II, of subsection (ggg)(2) of this section, for members of the public, to take into account the actual physical and chemical characteristics of the effluents, such as, aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form.

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(p) General surveys and monitoring.

(1) Each licensee shall make, or cause to be made, surveys that:

(A) are necessary for the licensee to comply with this section; and

(B) are necessary under the circumstances to evaluate:

(i) the magnitude and extent of radiation levels;

(ii) concentrations or quantities of radioactive material; and

(iii) the potential radiological hazards.

(2) The licensee shall ensure that instruments and equipment used for quantitative radiation measurements, for example, dose rate and effluent monitoring, are operable and calibrated:

(A) by a person licensed or registered by the agency, another agreement state, a licensing state, or the United States Nuclear Regulatory Commission (NRC) to perform such service;

(B) at intervals not to exceed 12 months unless a different time interval is specified in another section of this chapter;

(C) after each instrument or equipment repair;

(D) for the types of radiation used and at energies appropriate for use;
and

(E) at an accuracy within 20% of the true radiation level.

(3) All individual monitoring devices, except for direct and indirect reading pocket dosimeters, electronic personal dosimeters, and those individual monitoring devices used to measure the dose to any extremity, that require processing to determine the radiation dose and that are used by licensees to comply with subsection (f) of this section, with other applicable provisions of this chapter, or with conditions specified in a license, shall be processed and evaluated by a dosimetry processor:

(A) holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology;

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(B) approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored; and

(C) holding a current certificate of registration from the agency authorizing dosimetry processing.

(q) Conditions requiring individual monitoring of external and internal occupational dose. Each licensee shall monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of this section. As a minimum:

(1) each licensee shall monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by:

(A) adults likely to receive, in one year from sources external to the body, a dose in excess of 10% of the limits in subsection (f)(1) of this section;

(B) minors likely to receive, in one year from sources of radiation external to the body, a deep dose equivalent in excess of 0.1 rem (1 mSv), a lens dose equivalent in excess of 0.15 rem (1.5 mSv), or a shallow dose equivalent to the skin or to the extremities in excess of 0.5 rem (5 mSv);

(C) declared pregnant women likely to receive during the entire pregnancy, from sources of radiation external to the body, a deep dose equivalent in excess of 0.1 rem (1 mSv); and

(D) individuals entering a high or very high radiation area;

(2) notwithstanding paragraph (1)(C) of this subsection, a licensee is exempt from supplying individual monitoring devices to healthcare personnel who may enter a high radiation area while providing patient care if:

(A) the personnel are not likely to receive, in one year from sources external to the body, a dose in excess of 10% of the limits in subsection (f)(1) of this section; and

(B) the licensee complies with the requirements of subsection (e)(2) of this section; and

(3) each licensee shall monitor, to determine compliance with subsection (i) of this section, the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

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(A) adults likely to receive, in one year, an intake in excess of 10% of the applicable ALI in Columns 1 and 2 of Table I of subsection (ggg)(2) of this section;

(B) minors likely to receive, in one year, a committed effective dose equivalent in excess of 0.1 rem (1 mSv); and

(C) declared pregnant women likely to receive, during the entire pregnancy, a committed effective dose equivalent in excess of 0.1 rem (1 mSv).

(r) Location and use of individual monitoring devices.

(1) Each licensee shall ensure that individuals who are required to monitor occupational doses in accordance with subsection (q)(l) of this section wear and use individual monitoring devices as follows.

(A) An individual monitoring device used for monitoring the dose to the whole body shall be worn at the unshielded location of the whole body likely to receive the highest exposure. When a protective apron is worn, the location of the individual monitoring device is typically at the neck (collar).

(B) If an additional individual monitoring device is used for monitoring the dose to an embryo/fetus of a declared pregnant woman, in accordance with subsection (m)(1) of this section, it shall be located at the waist under any protective apron being worn by the woman.

(C) An individual monitoring device used for monitoring the lens dose equivalent, to demonstrate compliance with subsection (f)(1)(B)(~~h~~) of this section, shall be located at the neck (collar) or at a location closer to the eye, outside any protective apron being worn by the monitored individual.

(D) An individual monitoring device used for monitoring the dose to the extremities, to demonstrate compliance with subsection (f)(1)(B)(~~h~~) of this section, shall be worn on the extremity likely to receive the highest exposure. Each individual monitoring device, to the extent practicable, shall be oriented to measure the highest dose to the extremity being monitored.

(E) An individual monitoring device shall be assigned to and worn by only one individual.

(F) An individual monitoring device shall be worn for the period of time authorized by the dosimetry processor's certificate of registration or for no longer than three months, whichever is more restrictive.

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(2) Each licensee shall ensure that individual monitoring devices are returned to the dosimetry processor for proper processing.

(3) Each licensee shall ensure that adequate precautions are taken to prevent a deceptive exposure of an individual monitoring device.

(s) Control of access to high radiation areas.

(1) The licensee shall ensure that each entrance or access point to a high radiation area has one or more of the following features:

(A) a control device that, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep dose equivalent of 0.1 rem (1 mSv) in one hour at 30 centimeters (cm) from the source of radiation from any surface that the radiation penetrates;

(B) a control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; or

(C) entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

(2) In place of the controls required by paragraph (1) of this subsection for a high radiation area, the licensee may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

(3) The licensee may apply to the agency for approval of alternative methods for controlling access to high radiation areas.

(4) The licensee shall establish the controls required by paragraphs (1) and (3) of this subsection in a way that does not prevent individuals from leaving a high radiation area.

(5) The licensee is not required to control each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with the regulations of the United States Department of Transportation (DOT) provided that:

(A) the packages do not remain in the area longer than three days; and

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(B) the dose rate at 1 meter from the external surface of any package does not exceed 0.01 rem (0.1 millisievert) per hour.

(6) The licensee is not required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive material, provided that there are personnel in attendance who are taking the necessary precautions to prevent the exposure of individuals to sources of radiation in excess of the established limits in this section and to operate within the ALARA provisions of the licensee's radiation protection program.

(t) Control of access to very high radiation areas. In addition to the requirements in subsection (s) of this section, the licensee shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads (5 grays) or more in one hour at 1 m from a source of radiation or any surface through which the radiation penetrates at this level.

(u) Control of access to very high radiation areas for irradiators.

(1) This subsection applies to licensees with sources of radiation in non-self-shielded irradiators. This subsection does not apply to sources of radiation that are used in teletherapy, in industrial radiography, or in completely self-shielded irradiators in which the source of radiation is both stored and operated within the same shielding radiation barrier and, in the designed configuration of the irradiator, is always physically inaccessible to any individual and cannot create high levels of radiation in an area that is accessible to any individual.

(2) Each area in which there may exist radiation levels in excess of 500 rads (5 grays) in one hour at 1 m from a source of radiation that is used to irradiate materials shall meet the following requirements.

(A) Each entrance or access point shall be equipped with entry control devices that:

(i) function automatically to prevent any individual from inadvertently entering a very high radiation area;

(ii) permit deliberate entry into the area only after a control device is actuated that causes the radiation level within the area, from the source of radiation, to be reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 0.1 rem (1 mSv) in one hour; and

§289.202(u)(2)(A)(iii)

(iii) prevent operation of the source of radiation if it would produce radiation levels in the area that could result in a deep dose equivalent to an individual in excess of 0.1 rem (1 mSv) in one hour.

(B) Additional control devices shall be provided so that, upon failure of the entry control devices to function as required by subparagraph (A) of this paragraph:

(i) the radiation level within the area, from the source of radiation, is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 0.1 rem (1 mSv) in one hour; and

(ii) conspicuous visible and audible alarm signals are generated to make an individual attempting to enter the area aware of the hazard and at least one other authorized individual, who is physically present, familiar with the activity, and prepared to render or summon assistance, aware of the failure of the entry control devices.

(C) The licensee shall provide control devices so that, upon failure or removal of physical radiation barriers other than the sealed source's shielded storage container:

(i) the radiation level from the source of radiation is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 0.1 rem (1 mSv) in one hour; and

(ii) conspicuous visible and audible alarm signals are generated to make potentially affected individuals aware of the hazard and the licensee or at least one other individual, who is familiar with the activity and prepared to render or summon assistance, aware of the failure or removal of the physical barrier.

(D) When the shield for stored sealed sources is a liquid, the licensee shall provide means to monitor the integrity of the shield and to signal, automatically, loss of adequate shielding.

(E) Physical radiation barriers that comprise permanent structural components, such as walls, that have no credible probability of failure or removal in ordinary circumstances, need not meet the requirements of subparagraphs (C) and (D) of this paragraph.

(F) Each area shall be equipped with devices that will automatically generate conspicuous visible and audible alarm signals to alert personnel in the area before the source of radiation can be put into operation and in time for any individual in the area to operate a clearly identified control device, which must be installed in the area and which can prevent the source of radiation from being put into operation.

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(G) Each area shall be controlled by use of such administrative procedures and such devices as are necessary to ensure that the area is cleared of personnel prior to each use of the source of radiation.

(H) Each area shall be checked by a radiation measurement to ensure that, prior to the first individual's entry into the area after any use of the source of radiation, the radiation level from the source of radiation in the area is below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 0.1 rem (1 mSv) in one hour.

(I) The entry control devices required in subparagraph (A) of this paragraph shall be tested for proper functioning. See subsection (uu) of this section for recordkeeping requirements.

(i) Testing shall be conducted prior to initial operation with the source of radiation on any day, unless operations were continued uninterrupted from the previous day.

(ii) Testing shall be conducted prior to resumption of operation of the source of radiation after any unintentional interruption.

(iii) The licensee shall submit and adhere to a schedule for periodic tests of the entry control and warning systems.

(J) The licensee shall not conduct operations, other than those necessary to place the source of radiation in safe condition or to effect repairs on controls, unless control devices are functioning properly.

(K) Entry and exit portals that are used in transporting materials to and from the irradiation area, and that are not intended for use by individuals, shall be controlled by such devices and administrative procedures as are necessary to physically protect and warn against inadvertent entry by any individual through these portals. Exit portals for irradiated materials shall be equipped to detect and signal the presence of any loose radioactive material that is carried toward such an exit and automatically to prevent loose radioactive material from being carried out of the area.

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(3) Licensees or applicants for licenses for sources of radiation within the purview of paragraph (2) of this subsection that will be used in a variety of positions or in locations, such as open fields or forests, which make it impracticable to comply with certain requirements of paragraph (2) of this subsection, such as those for the automatic control of radiation levels, may apply to the Agency for approval of alternative safety measures. Alternative safety measures shall provide personnel protection at least equivalent to those specified in paragraph (2) of this subsection. At least one of the alternative measures shall include an entry-preventing interlock control based on a measurement of the radiation that ensures the absence of high radiation levels before an individual can gain access to the area where such sources of radiation are used.

(4) The entry control devices required by paragraphs (2) and (3) of this subsection shall be established in such a way that no individual will be prevented from leaving the area.

(v) Use of process or other engineering controls. The licensee shall use, to the extent practicable, process or other engineering controls, such as containment or ventilation, to control the concentrations of radioactive material in air.

(w) Use of other controls. When it is not practicable to apply process or other engineering controls to control the concentrations of radioactive material in air to values below those that define an airborne radioactivity area, the licensee shall, consistent with maintaining the total effective dose equivalent ALARA, increase monitoring and limit intakes by one or more of the following means:

- (1) control of access;
- (2) limitation of exposure times;
- (3) use of respiratory protection equipment; or
- (4) other controls.

(x) Use of individual respiratory protection equipment.

(1) If the licensee uses respiratory protection equipment to limit intakes in accordance with subsection (w) of this section.

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(A) Except as provided in subparagraph (B) of this paragraph, the licensee shall use only respiratory protection equipment that is tested and certified or had certification extended by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).

(B) If the licensee wishes to use equipment that has not been tested or certified by the NIOSH and the MSHA, or has not had certification extended by the NIOSH and the MSHA, or for which there is no schedule for testing or certification, the licensee shall submit an application for authorized use of that equipment, including a demonstration by testing, or a demonstration on the basis of test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

(C) The licensee shall implement and maintain a respiratory protection program that includes:

(i) air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;

(ii) surveys and bioassays, as appropriate, to evaluate actual intakes;

(iii) testing of respirators for operability immediately prior to each use;

(iv) written procedures regarding selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and recordkeeping; and

(v) determination by a physician prior to initial fitting of respirators, and either every 12 months thereafter or periodically at a frequency determined by a physician, that the individual user is physically able to use the respiratory protection equipment.

(D) The licensee shall issue a written policy statement on respirator usage covering:

(i) the use of process or other engineering controls, instead of respirators;

§289.202(x)(1)(D)(ii)

- (i) the routine, nonroutine, and emergency use of respirators; and
- (ii) the length of periods of respirator use and relief from respirator use.

(E) The licensee shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require such relief.

(F) The licensee shall use respiratory protection equipment within the equipment manufacturer's expressed limitations for type and mode of use and shall provide proper visual, communication, and other special capabilities, such as adequate skin protection, when needed.

(2) When estimating exposure of individuals to airborne radioactive materials, the licensee may make allowance for respiratory protection equipment used to limit intakes in accordance with subsection (w) of this section, provided that the following conditions, in addition to those in paragraph (1) of this subsection, are satisfied.

(A) The licensee selects respiratory protection equipment that provides a protection factor, specified in subsection (ggg)(1) of this section, greater than the multiple by which peak concentrations of airborne radioactive materials in the working area are expected to exceed the values specified in Column 3 of Table I of subsection (ggg)(2) of this section. However, if the selection of respiratory protection equipment with a protection factor greater than the peak concentration is inconsistent with the goal specified in subsection (w) of this section of keeping the total effective dose equivalent ALARA, the licensee may select respiratory protection equipment with a lower protection factor provided that such a selection would result in a total effective dose equivalent that is ALARA. The concentration of radioactive material in the air that is inhaled when respirators are worn may be initially estimated by dividing the average concentration in air, during each period of uninterrupted use, by the protection factor. If the exposure is later found to be greater than initially estimated, the corrected value shall be used; if the exposure is later found to be less than initially estimated, the corrected value may be used.

(B) The licensee shall obtain authorization from the agency before assigning respiratory protection factors in excess of those specified in subsection (ggg)(1) of this section. The agency may authorize a licensee to use higher protection factors on receipt of an application that:

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(i) describes the situation for which a need exists for higher protection factors; and

(ii) demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

(3) In an emergency, the licensee shall use as emergency equipment only respiratory protection equipment that has been specifically certified or had certification extended for emergency use by the NIOSH and the MSHA.

(4) The licensee shall notify the agency in writing at least 30 days before the date that respiratory protection equipment is first used in accordance with either paragraphs (1) or (2) of this subsection.

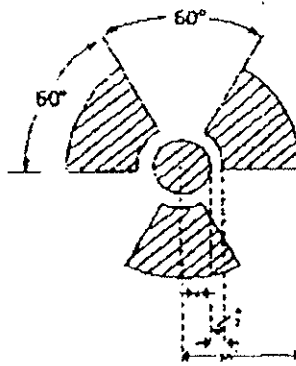
(y) Security and control of licensed sources of radiation.

(1) The licensee shall secure radioactive material from unauthorized removal or access.

(2) The licensee shall maintain constant surveillance, using devices and/or administrative procedures to prevent unauthorized use of radioactive material that is in an unrestricted area and that is not in storage.

(z) Caution signs.

(1) Unless otherwise authorized by the agency, the standard radiation symbol prescribed shall use the colors magenta, or purple, or black on yellow background. The standard radiation symbol prescribed is the three-bladed design as follows:



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(A) the cross-hatched area of the symbol is to be magenta, or purple, or black; and

(B) the background of the symbol is to be yellow.

(2) Notwithstanding the requirements of paragraph (1) of this subsection, licensees are authorized to label sources, source holders, or device components containing sources of radiation that are subjected to high temperatures, with conspicuously etched or stamped radiation caution symbols and without a color requirement.

(aa) Posting requirements.

(1) The licensee shall post each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA."

(2) The licensee shall post each high radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA."

(3) The licensee shall post each very high radiation area with a conspicuous sign or signs bearing the radiation symbol and words "GRAVE DANGER, VERY HIGH RADIATION AREA." If the very high radiation area involves medical treatment of patients, the licensee may omit the word "GRAVE" from the sign or signs.

(4) The licensee shall post each airborne radioactivity area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA."

(5) The licensee shall post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in subsection (ggg)(3) of this section with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)."

(bb) Exceptions to posting requirements.

(1) A licensee is not required to post caution signs in areas or rooms containing sources of radiation for periods of less than 8 hours, if each of the following conditions is met:

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(A) the sources of radiation are constantly attended during these periods by an individual who takes the precautions necessary to prevent the exposure of individuals to sources of radiation in excess of the limits established in this section; and

(B) the area or room is subject to the licensee's control.

(2) Rooms or other areas in hospitals that are occupied by patients are not required to be posted with caution signs in accordance with subsection (aa) of this section provided that the patient could be released from licensee control in accordance with this chapter.

(3) A room or area is not required to be posted with a caution sign because of the presence of a sealed source(s) provided the radiation level at 30 centimeters from the surface of the sealed source container(s) or housing(s) does not exceed 0.005 rem (0.05 mSv) per hour.

(4) Rooms in medical facilities that are used for teletherapy are exempt from the requirement to post caution signs in accordance with subsection (aa) of this section provided the following conditions are met.

(A) Access to the room is controlled in accordance with this chapter; and

(B) Personnel in attendance take necessary precautions to prevent the inadvertent exposure of workers, other patients, and members of the public to radiation in excess of the limits established in this section.

(cc) Labeling containers.

(1) The licensee shall ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL." The label shall also provide information, such as the radionuclides present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, radiation levels, kinds of materials, and mass enrichment, to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures.

(2) Each licensee shall, prior to removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive materials.

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(dd) Exemptions to labeling requirements. A licensee is not required to label:

(1) containers holding licensed material in quantities less than the quantities listed in subsection (ggg)(3) of this section;

(2) containers holding licensed material in concentrations less than those specified in Table III of subsection (ggg)(2) of this section;

(3) containers attended by an individual who takes the precautions necessary to prevent the exposure of individuals in excess of the limits established by this section;

(4) containers when they are in transport and packaged and labeled in accordance with the rules of the DOT (labeling of packages containing radioactive materials is required by the DOT if the amount and type of radioactive material exceeds the limits for an excepted quantity or article as defined and limited by DOT regulations 49 CFR 173.403(m) and (w) and 173.424);

(5) containers that are accessible only to individuals authorized to handle or use them, or to work in the vicinity of the containers, if the contents are identified to these individuals by a readily available written record. Examples of containers of this type are containers in locations such as water-filled canals, storage vaults, or hot cells. The record shall be retained as long as the containers are in use for the purpose indicated on the record; or

(6) installed manufacturing or process equipment, such as piping and tanks.

(ee) Procedures for receiving and opening packages.

(1) Each licensee who expects to receive a package containing quantities of radioactive material in excess of a Type A quantity, as defined in §289.201(b) of this title and specified in §289.257(s)(1) of this title (relating to Packaging and Transportation of Radioactive Material), shall make arrangements to receive:

(A) the package when the carrier offers it for delivery; or

(B) the notification of the arrival of the package at the carrier's terminal and to take possession of the package expeditiously.

(2) Each licensee shall:

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(A) monitor the external surfaces of a labeled package, labeled with a Radioactive White I, Yellow II, or Yellow III label as specified in DOT regulations 49 CFR 172.403 and 172.436-440, for radioactive contamination unless the package contains only radioactive material in the form of gas or in special form as defined in §289.201(b) of this title; and

(B) monitor the external surfaces of a labeled package, labeled with a Radioactive White I, Yellow II, or Yellow III label as specified in DOT regulations 49 CFR 172.403 and 172.436-440, for radiation levels unless the package contains quantities of radioactive material that are less than or equal to the Type A quantity, as defined in §289.201(b) of this title and specified in §289.257(s)(1) of this title; and

(C) monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as packages that are crushed, wet, or damaged.

(3) The licensee shall perform the monitoring required by paragraph (2) of this subsection as soon as practicable after receipt of the package, but not later than three hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours. If a package is received after working hours, the package shall be monitored no later than three hours from the beginning of the next working day. If the licensee discovers there is evidence of degradation of package integrity, such as a package that is crushed, wet, or damaged, the package shall be surveyed immediately.

(4) The licensee shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the agency when removable radioactive surface contamination or external radiation levels exceed the limits established in subparagraphs (A) and (B) of this paragraph.

(A) Limits for removable radioactive surface contamination levels.

(i) The level of removable radioactive contamination on the external surfaces of each package offered for shipment shall be ALARA. The level of removable radioactive contamination may be determined by wiping an area of 300 square centimeters (cm²) of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the removable contamination levels. Except as provided in clause (iii) of this subparagraph, the amount of radioactivity measured on any single wiping material, when averaged over the surface wiped, must not exceed the limits given in clause (i) of this subparagraph at any time during transport. If other methods are used, the detection efficiency of the method used must be taken into account and in no case may the removable contamination on the external surfaces of the package exceed 10 times the limits listed in clause (i) of this subparagraph.

§289.202(ee)(4)(A)(i)

(ii) Removable external radioactive contamination wipe limits are as follows.

Contaminant	Maximum Permissible Limits	
	$\mu\text{Ci}/\text{cm}^2$ *	dpm/cm ²
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than 10 days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228; and thorium-230 when contained in ores or physical concentrates.....	10^{-5}	22
All other alpha emitting radionuclides.....	10^{-6}	2.2

(iii) In the case of packages transported as exclusive use shipments by rail or highway only, the removable radioactive contamination at any time during transport must not exceed 10 times the levels prescribed in clause (ii) of this subparagraph. The levels at the beginning of transport must not exceed the levels in clause (i) of this subparagraph.

(B) Limits for external radiation levels.

(i) External radiation levels around the package and around the vehicle, if applicable, will not exceed 200 millirems per hour (mrem/hr) (2 millisieverts per hour (mSv/hr)) at any point on the external surface of the package at any time during transportation. The transport index shall not exceed 10.

(ii) For a package transported in exclusive use by rail, highway or water, radiation levels external to the package may exceed the limits specified in clause (i) of this subparagraph but shall not exceed any of the following:

* To convert microcuries (μCi) to SI units of kilobecquerels, multiply the values by 37.

§289.202(cc)(4)(B)(i)(I)

(I) 200 mrem/hr (2 mSv/hr) on the accessible external surface of the package unless the following conditions are met, in which case the limit is 1,000 mrem/hr (10 mSv/hr):

(-a-) the shipment is made in a closed transport vehicle;

(-b-) provisions are made to secure the package so that its position within the vehicle remains fixed during transportation; and

(-c-) there are no loading or unloading operations between the beginning and end of the transportation;

(II) 200 mrem/hr (2 mSv/hr) at any point on the outer surface of the vehicle, including the upper and lower surfaces, or, in the case of a flat-bed style vehicle, with a personnel barrier, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load (or enclosure, if used), and on the lower external surface of the vehicle (a flat-bed style vehicle with a personnel barrier shall have radiation levels determined at vertical planes. If no personnel barrier, the package cannot exceed 200 mrem/hr (2 mSv/hr) at the surface.);

(III) 10 mrem/hr (0.1 mSv/hr) at any point 2 m from the vertical planes represented by the outer lateral surfaces of the vehicle, or, in the case of a flat-bed style vehicle, at any point 2 m from the vertical planes projected from the outer edges of the vehicle; and

(IV) 2 mrem/hr (0.02 mSv/hr) in any normally occupied positions of the vehicle, except that this provision does not apply to private motor carriers when persons occupying these positions are provided with special health supervision, personnel radiation exposure monitoring devices, and training in accordance with §289.203(c) of this title (relating to Notices, Instructions, and Reports to Workers; Inspections).

(5) Each licensee shall:

(A) establish, maintain, and retain written procedures for safely opening packages in which radioactive material is received; and

(B) ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

§289.202(ee)(6)

(6) Licensees transferring special form sources in vehicles owned or operated by the licensee to and from a work site are exempt from the contamination monitoring requirements of paragraph (2) of this subsection, but are not exempt from the monitoring requirement in paragraph (2) of this subsection for measuring radiation levels that ensures that the source is still properly lodged in its shield.

(ff) General requirements for waste management.

(1) Unless otherwise exempted, a licensee shall discharge, treat, or decay licensed material or transfer waste for disposal only:

(A) by transfer to an authorized recipient as provided in subsection (jj) of this section, §289.252 of this title, §289.254 of this title (relating to Licensing of Radioactive Waste Processing and Storage Facilities), §289.257 of this title, §289.259 of this title (relating to Licensing of Naturally Occurring Radioactive Material (NORM)), or to the United States Department of Energy (DOE);

(B) by decay in storage with prior approval from the agency;

(C) by release in effluents within the limits in subsection (n) of this section; or

(D) as authorized in accordance with paragraph (2) of this subsection, and subsections (gg) and (hh) of this section.

(2) Upon agency approval, emission control dust and other material from electric arc furnaces or foundries, such as K061 listed hazardous waste or other listed hazardous waste, contaminated as a result of inadvertent melting of a cesium-137 source may be transferred for disposal to a hazardous waste disposal facility authorized by the Texas Natural Resource Conservation Commission (Commission) or its successor, another state's regulatory agency with jurisdiction to regulate hazardous waste as classified under Subtitle C of the Resource Conservation and Recovery Act (RCRA), or the EPA. The material may be transferred for disposal without regard to its radioactivity if the following conditions are met.

(A) Contaminated material described in paragraph (2) of this subsection, whether packaged or unpackaged (i.e., bulk), must be treated through stabilization to comply with all waste treatment requirements of the appropriate state or federal regulatory agency as listed in this paragraph. The treatment operations must be undertaken by either of the following:

§289.202(ff)(2)(A)(i)

(i) the owner/operator of the electric arc furnace or foundry licensed to possess, treat or transfer cesium-137 contaminated incident-related material; or

(ii) a service contractor licensed by the agency, NRC, or an agreement state.

(B) The emission control dust and other incident-related materials have been stored (if applicable) and transferred in accordance with operating and emergency procedures approved by the agency.

(C) The total cesium-137 activity contained in emission control dust and other incident-related materials to be transferred to a hazardous waste disposal facility has been specifically approved by NRC or the appropriate agreement state(s) and does not exceed the total activity associated with the inadvertent melting incident.

(D) The hazardous waste disposal facility operator has been notified in writing of the impending transfer of the incident-related materials and has agreed in writing to receive and dispose of the packaged or unpackaged materials. Copies of the notification and agreement shall be submitted to the agency.

(E) The licensee, as listed in subparagraph (A)(i) or (ii) of this paragraph, notifies the NRC or agreement state(s) in which the transferor and transferee are located, in writing, of the impending transfer, at least 30 days before the transfer.

(F) The packaged stabilized material has been packaged for transportation and disposal in non-bulk steel packaging as defined in DOT regulations at 49 CFR 173.213.

(G) The emission control dust and other incident-related materials that have been stabilized and packaged as described in subparagraph (F) of this paragraph shall contain pretreatment average concentrations of cesium-137 that do not exceed 130 pCi/g of material, above background.

(H) The dose rate at 3.28 feet (1 m) from the surface of any package containing stabilized waste shall not exceed 20 μ rem per hour or 0.20 μ Sv per hour, above background.

(I) The unpackaged stabilized material shall contain pretreatment average concentrations of cesium-137 that do not exceed 100 pCi/g of material, above background.

§289.202(f)(3)

(3) The licensee transferring the cesium-137 contaminated incident-related material must consult with the agency, the Commission or its successor, another state's regulatory agency with jurisdiction to regulate hazardous waste as classified under RCRA, or the EPA and other authorized parties, including state and local governments, and obtain all necessary approvals, in addition to those of NRC and/or appropriate agreement states, for the transfers described in paragraph (2) of this subsection.

(4) Nothing in this subsection shall be or is intended to be construed as a waiver of any RCRA permit condition or term, of any state or local statute or regulation, or of any federal RCRA regulation.

(5) The total incident-related cesium-137 activity received by a facility over its operating life shall not exceed 1 Ci (37 GBq). The agency will maintain a record of the total incident-related cesium-137 activity shipped by a person licensed by the agency. Upon consultation with the Commission, the agency will determine if the total incident-related cesium-137 activity received by a hazardous waste disposal facility over its operating life has reached 1 Ci (37 GBq). The agency will not approve shipments of cesium-137 contaminated incident-related material that will cause this limit to be exceeded.

(6) A person shall be specifically licensed to receive waste containing licensed material from other persons for:

- (A) treatment prior to disposal;
- (B) treatment by incineration;
- (C) decay in storage;
- (D) disposal at an authorized land disposal facility; or
- (E) storage until transferred to a storage or disposal facility authorized to receive the waste.

§289.202(gg)

(gg) Discharge by release into sanitary sewerage.

(1) A licensee may discharge licensed material into sanitary sewerage if each of the following conditions is satisfied:

(A) the material is readily soluble, or is readily dispersible biological material, in water;

(B) the quantity of licensed radioactive material that the licensee releases into the sewer in one month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table III of subsection (ggg)(2) of this section; and

(C) if more than one radionuclide is released, the following additional conditions must also be satisfied:

(i) the fraction of the limit in Table III of subsection (ggg)(2) of this section represented by discharges into sanitary sewerage determined by dividing the actual monthly average concentration of each radionuclide released by the licensee into the sewer by the concentration of that radionuclide listed in Table III of subsection (ggg)(2) of this section; and

(ii) the sum of the fractions for each radionuclide required by clause (i) of this subparagraph does not exceed unity; and

(D) the total quantity of licensed radioactive material that the licensee releases into the sanitary sewerage in a year does not exceed 5 curies (Ci) (185 gigabecquerels (GBq)) of hydrogen-3, 1 Ci (37 GBq) of carbon-14, and 1 Ci (37 GBq) of all other radioactive materials combined.

(2) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material are not subject to the limitations contained in paragraph (1) of this subsection.

(hh) Treatment by incineration. A licensee may treat licensed material by incineration only in the form and concentration specified in subsection (fff)(1) of this section or as authorized by the agency.

(ii) Discharge by release into septic tanks. No licensee shall discharge radioactive material into a septic tank system except as specifically approved by the agency.

§289.202(jj)

(jj) Transfer for disposal and manifests.

(1) The control of transfers of LLRW intended for disposal at a licensed low-level radioactive waste disposal facility, the establishment of a manifest tracking system, and additional requirements concerning transfers and recordkeeping for those wastes are found in §289.257(s)(5) of this title.

(2) Each person involved in the transfer of waste for disposal including the waste generator, waste collector, and waste processor, shall comply with the requirements specified in §289.257(s)(5) of this title.

(kk) Compliance with environmental and health protection regulations. Nothing in subsections (ff), (gg), (hh), or (jj) of this section relieves the licensee from complying with other applicable federal, state, and local regulations governing any other toxic or hazardous properties of materials that may be disposed of in accordance with subsections (ff), (gg), (hh), or (jj) of this section.

(ll) General provisions for records.

(1) Each licensee shall use the SI units becquerel, gray, sievert, and coulomb per kilogram, or the special units curie, rad, rem, and roentgen, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by this section. Disintegrations per minute may be indicated on records of surveys performed to determine compliance with subsection (ggg)(6) of this section. To ensure compatibility with international transportation standards, all limits in this section are given in terms of dual units: The International System of Units (SI) followed or preceded by United States (U.S.) standard or customary units. The U.S. customary units are not exact equivalents, but are rounded to a convenient value, providing a functionally equivalent unit. For the purpose of this section, either unit may be used.

(2) Notwithstanding the requirements of paragraph (1) of this subsection, when recording information on shipment manifests, as required in §289.257 of this title, information must be recorded in SI units or in SI and units as specified in paragraph (1) of this subsection.

(3) The licensee shall make a clear distinction among the quantities entered on the records required by this section, such as, total effective dose equivalent, total organ dose equivalent, shallow dose equivalent, lens dose equivalent, deep dose equivalent, or committed effective dose equivalent.

§289.202(l)(4)

(4) Records required in accordance with §289.201(d) of this title, and subsections (mm)-(oo), (tt), and (uu) of this section shall include the date and the identification of individual(s) making the record, and, as applicable, a unique identification of survey instrument(s) used, and an exact description of the location of the survey. Records of receipt, transfer, and disposal of sources of radiation shall uniquely identify the source of radiation.

(5) Copies of records required in accordance with §289.201(d) of this title, and subsections (mm)-(uu) of this section, and by license condition that are relevant to operations at an additional authorized use/storage site shall be maintained at that site in addition to the main site specified on a license.

(mm) Records of radiation protection programs.

(1) Each licensee shall maintain records of the radiation protection program, including:

(A) the provisions of the program; and

(B) audits and other reviews of program content and implementation.

(2) The licensee shall retain the records required by paragraph (1)(A) of this subsection until the agency terminates each pertinent license requiring the record. The licensee shall retain the records required by paragraph (1)(B) of this subsection for three years after the record is made.

(nn) Records of surveys.

(1) Each licensee shall maintain records showing the results of surveys and calibrations required by subsections (p) and (ee)(2) of this section. The licensee shall retain these records for three years after the record is made.

(2) The licensee shall retain each of the following records until the agency terminates each pertinent license requiring the record:

(A) the results of surveys to determine the dose from external sources of radiation used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents; and

(B) results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose; and

§289.202(nn)(2)(C)

(C) results of air sampling, surveys, and bioassays required in accordance with subsection (x)(1)(C)(i) and (ii) of this section; and

(D) results of measurements and calculations used to evaluate the release of radioactive effluents to the environment.

(oo) Records of tests for leakage or contamination of sealed sources. Records of tests for leakage or contamination of sealed sources required by §289.201(g) of this title shall be kept in units of becquerel or microcurie and retained for inspection by the agency for five years after the records are made.

(pp) Records of lifetime cumulative occupational radiation dose. The licensee shall retain the records of lifetime cumulative occupational radiation dose as specified in subsection (k) of this section on BRC Form 202-2 or equivalent until the agency terminates each pertinent license requiring this record. The licensee shall retain records used in preparing BRC Form 202-2 or equivalent for three years after the record is made.

(qq) Records of planned special exposures.

(1) For each use of the provisions of subsection (k) of this section for planned special exposures, the licensee shall maintain records that describe:

(A) the exceptional circumstances requiring the use of a planned special exposure;

(B) the name of the management official who authorized the planned special exposure and a copy of the signed authorization;

(C) what actions were necessary;

(D) why the actions were necessary;

(E) what precautions were taken to assure that doses were maintained ALARA;

(F) what individual and collective doses were expected to result; and

(G) the doses actually received in the planned special exposure.

(2) The licensee shall retain the records until the agency terminates each pertinent license requiring these records.

§289.202(rr)

(rr) Records of individual monitoring results.

(1) Each licensee shall maintain records of doses received by all individuals for whom monitoring was required in accordance with subsection (q) of this section, and records of doses received during planned special exposures, accidents, and emergency conditions. Assessments of dose equivalent and records made using units in effect before January 1, 1994, need not be changed. These records shall include, when applicable:

(A) the deep dose equivalent to the whole body, lens dose equivalent, shallow dose equivalent to the skin, and shallow dose equivalent to the extremities;

(B) the estimated intake of radionuclides, see subsection (g) of this section;

(C) the committed effective dose equivalent assigned to the intake of radionuclides;

(D) the specific information used to calculate the committed effective dose equivalent in accordance with subsection (i)(1) and (3) of this section and when required by subsection (q)(1) of this section;

(E) the total effective dose equivalent when required by subsection (g) of this section;

(F) the total of the deep dose equivalent and the committed dose to the organ receiving the highest total dose; and

(G) the data used to make occupational dose assessments in accordance with subsection (j)(5) of this section.

(2) The licensee shall make entries of the records specified in paragraph (1) of this subsection at intervals not to exceed 1 year and within 60 days of the end of the year.

(3) The licensee shall maintain the records specified in paragraph (1) of this subsection on BRC Form 202-3, in accordance with the instructions for BRC Form 202-3, or in clear and legible records containing all the information required by BRC Form 202-3.

(4) The licensee shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. The declaration of pregnancy, including the estimated date of conception, shall also be kept on file, but may be maintained separately from the dose records.

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(5) The licensee shall retain each required form or record until the agency terminates each pertinent license requiring the record. The licensee shall retain records used in preparing BRC Form 202-3 or equivalent for three years after the record is made.

(ss) Records of dose to individual members of the public.

(1) Each licensee shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public. See subsection (n) of this section.

(2) The licensee shall retain the records required by paragraph (1) of this subsection until the agency terminates each pertinent license requiring the record.

(tt) Records of discharge, treatment, or transfer for disposal.

(1) Each licensee shall maintain records of the discharge or treatment of licensed materials made in accordance with subsection (gg) and (hh) of this section and of transfers for disposal made in accordance with subsection (jj) of this section and §289.257 of this title.

(2) The licensee shall retain the records required by paragraph (1) of this subsection until the agency terminates each pertinent license requiring the record.

(uu) Records of testing entry control devices for very high radiation areas.

(1) Each licensee shall maintain records of tests made in accordance with subsection (u)(2)(f) of this section on entry control devices for very high radiation areas. These records must include the date, time, and results of each such test of function.

(2) The licensee shall retain the records required by paragraph (1) of this subsection for three years after the record is made.

(vv) Form of records. Each record required by this chapter shall be legible throughout the specified retention period. The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period or the record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

§289.202(ww)

(ww) Reports of stolen, lost, or missing licensed sources of radiation.

(1) Each licensee shall report to the agency by telephone as follows:

(A) immediately after its occurrence becomes known to the licensee, stolen, lost, or missing licensed radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in subsection (ggg)(3) of this section, under such circumstances that it appears to the licensee that an exposure could result to individuals in unrestricted areas; or

(B) within 30 days after its occurrence becomes known to the licensee, lost, stolen, or missing licensed radioactive material in an aggregate quantity greater than 10 times the quantity specified in subsection (ggg)(3) of this section that is still missing.

(2) Each licensee required to make a report in accordance with paragraph (1) of this subsection shall, within 30 days after making the telephone report, make a written report to the agency setting forth the following information:

(A) a description of the licensed source of radiation involved, including, for radioactive material, the kind, quantity, and chemical and physical form;

(B) a description of the circumstances under which the loss or theft occurred;

(C) a statement of disposition, or probable disposition, of the licensed source of radiation involved;

(D) exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible total effective dose equivalent to persons in unrestricted areas;

(E) actions that have been taken, or will be taken, to recover the source of radiation; and

(F) procedures or measures that have been, or will be, adopted to ensure against a recurrence of the loss or theft of licensed sources of radiation.

(3) Subsequent to filing the written report, the licensee shall also report additional substantive information on the loss or theft within 30 days after the licensee learns of such information.

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(4) The licensee shall prepare any report filed with the agency in accordance with this subsection so that names of individuals who may have received exposure to radiation are stated in a separate and detachable portion of the report.

(xx) Notification of Incidents.

(1) Notwithstanding other requirements for notification, each licensee shall immediately report each event involving a source of radiation possessed by the licensee that may have caused or threatens to cause:

(A) an individual to receive:

- (i) a total effective dose equivalent of 25 rems (0.25 Sv) or more;
- (ii) a lens dose equivalent of 75 rems (0.75 Sv) or more; or
- (iii) a shallow dose equivalent to the skin or extremities or a total organ dose equivalent of 250 rads (2.5 grays) or more; or

(B) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(2) Each licensee shall, within 24 hours of discovery of the event, report to the agency each event involving loss of control of a licensed source of radiation possessed by the licensee that may have caused, or threatens to cause:

(A) an individual to receive, in a period of 24 hours:

- (i) a total effective dose equivalent exceeding 5 rems (0.05 Sv);
- (ii) a lens dose equivalent exceeding 15 rems (0.15 Sv); or
- (iii) a shallow dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 50 rems (0.5 Sv); or

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(B) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(3) Licensees shall make the initial notification reports required by paragraphs (1) and (2) of this subsection by telephone to the agency and shall confirm the initial notification report within 24 hours by telegram, mailgram, or facsimile to the agency.

(4) The licensee shall prepare each report filed with the agency in accordance with this section so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.

(5) The provisions of this section do not apply to doses that result from planned special exposures, provided such doses are within the limits for planned special exposures and are reported in accordance with section (zz) of this section.

(6) Each licensee shall notify the agency as soon as possible but not later than four hours after the discovery of an event that prevents immediate protective actions necessary to avoid exposures to radioactive materials that could exceed regulatory limits or releases of radioactive materials that could exceed regulatory limits (events may include fires, explosions, toxic gas releases, etc.).

(7) Each licensee shall notify the agency within 24 hours after the discovery of any of the following events involving radioactive material:

(A) an unplanned contamination event that:

(i) requires access to the contaminated area, by workers or the public, to be restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area;

(ii) involves a quantity of material greater than five times the lowest annual limit on intake specified in subsection (ggg)(2) of this section for the material; and

(iii) has access to the area restricted for a reason other than to allow isotopes with a half-life of less than 24 hours to decay prior to decontamination.

(B) an event in which equipment is disabled or fails to function as designed when:

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(i) the equipment is required by rule or license condition to prevent releases exceeding regulatory limits, to prevent exposures to radioactive materials exceeding regulatory limits, or to mitigate the consequences of an accident;

(ii) the equipment is required to be available and operable when it is disabled or fails to function; and

(iii) no redundant equipment is available and operable to perform the required safety function;

(C) an event that requires unplanned medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual's clothing or body; or

(D) an unplanned fire or explosion damaging any radioactive material or any device, container, or equipment containing radioactive material when:

(i) the quantity of material involved is greater than five times the lowest annual limit on intake specified in subsection (ggg)(2) of this section for the material; and

(ii) the damage affects the integrity of the radioactive material or its container.

(8) Preparation and submission of reports. Reports made by licensees in response to the requirements of paragraphs (6) and (7) of this subsection shall be made as follows.

(A) Licensees shall make reports required by paragraphs (6) and (7) of this subsection by telephone to the agency. To the extent that the information is available at the time of notification, the information provided in these reports shall include:

(i) the caller's name and call back telephone number;

(ii) a description of the event, including date and time;

(iii) the exact location of the event;

(iv) the isotopes, quantities, and chemical and physical form of the radioactive material involved; and

(v) any personnel radiation exposure data available.

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(B) Each licensee who makes a report required by paragraphs (6) and (7) of this subsection shall submit to the agency a written follow-up report within 30 days of the initial report. Written reports prepared in accordance with other requirements of this chapter may be submitted to fulfill this requirement if the reports contain all of the necessary information and the appropriate distribution is made. The reports must include the following:

(i) a description of the event, including the probable cause and the manufacturer and model number (if applicable) of any equipment that failed or malfunctioned;

(ii) the exact location of the event;

(iii) the isotopes, quantities, and chemical and physical form of the radioactive material involved;

(iv) date and time of the event;

(v) corrective actions taken or planned and the results of any evaluations or assessments; and

(vi) the extent of exposure of individuals to radioactive materials without identification of individuals by name.

(yy) Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits.

(1) In addition to the notification required by subsection (xx) of this section, each licensee shall submit a written report within 30 days after learning of any of the following occurrences:

(A) incidents for which notification is required by subsection (xx) of this section;

(B) doses in excess of any of the following:

(i) the occupational dose limits for adults in subsection (f) of this section;

(ii) the occupational dose limits for a minor in subsection (l) of this section;

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(iii) the limits for an embryo/fetus of a declared pregnant woman in subsection (m) of this section;

(iv) the limits for an individual member of the public in subsection (n) of this section;

(v) any applicable limit in the license; or

(vi) the ALARA constraints for air emissions as required by subsection (e)(4) of this section;

(C) levels of radiation or concentrations of radioactive material in:

(i) a restricted area in excess of applicable limits in the license; or

(ii) an unrestricted area in excess of 10 times the applicable limit set forth in this section or in the license, whether or not involving exposure of any individual in excess of the limits in subsection (n) of this section; or

(D) for licensees subject to the provisions of the EPA's generally applicable environmental radiation standards in 40 CFR 190, levels of radiation or releases of radioactive material in excess of those standards, or of license conditions related to those requirements.

(2) Each report required by paragraph (1) of this subsection shall describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

(A) estimates of each individual's dose;

(B) the levels of radiation and concentrations of radioactive material involved;

(C) the cause of the elevated exposures, dose rates, or concentrations; and

(D) corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, ALARA constraints, generally applicable environmental standards, and associated license conditions.

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(3) Each report filed in accordance with paragraph (1) of this subsection shall include for each individual exposed: the name, identification number, and date of birth. With respect to the limit for the embryo/fetus in subsection (m) of this section, the identifiers should be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable portion of the report.

(4) All licensees who make reports in accordance with paragraph (1) of this subsection shall submit the report in writing to the agency.

(zz) Reports of planned special exposures. The licensee shall submit a written report to the agency within 30 days following any planned special exposure conducted in accordance with subsection (k) of this section, informing the Agency that a planned special exposure was conducted and indicating the date the planned special exposure occurred and the information required by subsection (qq) of this section.

(aaa) Notifications and reports to individuals.

(1) Requirements for notification and reports to individuals of exposure to sources of radiation are specified in §289.203 of this title.

(2) When a licensee is required in accordance with subsection (yy) or (zz) of this section to report to the agency any exposure of an identified occupationally exposed individual, or an identified member of the public, to sources of radiation, the licensee shall also notify the individual and provide a copy of the report submitted to the agency, to the individual. Such notice shall be transmitted at a time not later than the transmittal to the agency, and shall comply with the provisions of §289.203(d)(1) of this title.

(bbb) Reports of leaking or contaminated sealed sources. The licensee shall immediately notify the agency if the test for leakage or contamination required in accordance with §289.201(g) of this title indicates a sealed source is leaking or contaminated. A written report of a leaking or contaminated source shall be submitted to the agency within five days. The report shall include the equipment involved, the test results and the corrective action taken.

(ccc) Vacating premises.

(1) Each licensee or person possessing non-exempt sources of radiation shall, no less than 30 days before vacating and relinquishing possession or control of premises, notify the agency, in writing, of the intent to vacate.

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(2) The licensee or person possessing non-exempt radioactive material shall decommission the premises to a degree consistent with subsequent use as an unrestricted area and in accordance with the requirements of subsection (ddd) of this section or, for uranium recovery and byproduct material disposal facilities licensed in accordance with §289.260 of this title, subsection (eee) of this section.

(ddd) Radiological requirements for license termination.

(1) General provisions and scope.

(A) The requirements in this section apply to the decommissioning of facilities licensed in accordance with §289.252 of this title (relating to Licensing of Radioactive Material), §289.254 of this title (relating to Licensing of Radioactive Waste Processing and Storage Facilities), §289.255 of this title (relating to Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography), and §289.258 of this title (relating to Licensing and Radiation Safety Requirements for Irradiators). The requirements do not apply to uranium recovery and byproduct material disposal facilities already subject to the requirements of §289.260 of this title (relating to Licensing of Uranium Recovery and Byproduct Material Disposal Facilities).

(B) The requirements in this section do not apply to the following:

(i) sites that have been decommissioned prior to October 1, 2000, in accordance with requirements identified in this section and in §289.252 of this title; or

(ii) sites that have previously submitted and received approval on a decommissioning plan by October 1, 2000.

(C) After a site has been decommissioned and the license terminated in accordance with the requirements in the subsection, the agency will require additional cleanup if it determines that the requirements of the subsection were not met and residual radioactivity remaining at the site could result in significant threat to public health and safety.

(D) When calculating TEDE to the average member of the critical group, the licensee shall determine the peak annual TEDE dose expected within the first 1,000 years after decommissioning.

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(2) Radiological requirements for unrestricted use. A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are ALARA. Determination of the levels that are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.

(3) Alternate requirements for license termination.

(A) The agency may terminate a license using alternate requirements greater than the dose requirements specified in paragraph (2) of this subsection if the licensee does the following:

(i) provides assurance that public health and safety would continue to be protected, and that it is unlikely that the dose from all man-made sources combined, other than medical, would be more than the 1 mSv per year (100 mrem per year) limit specified in subsection (c) of this section, by submitting an analysis of possible sources of exposure;

(ii) reduces doses to ALARA levels, taking into consideration any detriments such as traffic accidents expected to potentially result from decontamination and waste disposal; and

(iii) has submitted a decommissioning plan to the agency indicating the licensee's intent to decommission in accordance with the requirements in §289.252(l)(7) of this title, and specifying that the licensee proposes to decommission by use of alternate requirements. The licensee shall document in the decommissioning plan how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and addressed, as appropriate, following analysis of that advice. In seeking such advice, the licensee shall provide for the following:

(I) participation by representatives of a broad cross section of community interests who may be affected by the decommissioning;

(II) an opportunity for a comprehensive, collective discussion on the issues by the participants represented; and

(III) a publicly available summary of the results of all such discussions, including a description of the individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants on the issues.

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(B) The use of alternate requirements to terminate a license requires the approval of the agency after consideration of the agency's recommendations that will address any comments provided by the EPA and any public comments submitted in accordance with paragraph (4) of this subsection.

(4) Public notification and public participation. Upon receipt of a decommissioning plan from the licensee, or a proposal from the licensee for release of a site in accordance with paragraph (3) of this subsection, or whenever the agency deems such notice to be in the public interest, the agency will do the following:

(A) notify and solicit comments from the following:

(i) local and state governments in the vicinity of the site and any Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning; and

(ii) the EPA for cases where the licensee proposes to release a site in accordance with paragraph (3) of this subsection; and

(B) publish a notice in the *Texas Register* and a forum, such as local newspapers, letters to state of local organizations, or other appropriate forum, that is readily accessible to individuals in the vicinity of the site, and solicit comments from affected parties.

(5) Minimization of contamination. Applicants for licenses, other than renewals, after October 1, 2000, shall describe in the application how facility design and procedures for operation will minimize, to the extent practical, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practical, the generation of LLRW.

(eee) Limits for contamination of soil, surfaces of facilities and equipment, and vegetation.

(1) No licensee shall possess, receive, use, or transfer radioactive material in such a manner as to cause contamination of surfaces of facilities or equipment in unrestricted areas to the extent that the contamination exceeds the limits specified in subsection (ggg)(6) of this section.

(2) No licensee shall possess, receive, use, or transfer radioactive material in such a manner as to cause contamination of soil in unrestricted areas, to the extent that the contamination exceeds, on a dry weight basis, the concentration limits specified in:

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(A) subsection (ggg)(8) of this section; or

(B) the effluent concentrations in Table II, Column 2 of subsection (ggg)(2)(F) of this section, with the units changed from microcuries per milliliter to microcuries per gram, for radionuclides not specified in subsection (ggg)(8) of this section or paragraph (4) of this subsection.

(3) Where combinations of radionuclides are involved, the sum of the ratios between the concentrations present and the limits specified in paragraph (2) of this subsection shall not exceed one.

(4) Notwithstanding the limits specified in paragraph (2) of this subsection, no licensee shall cause the concentration of radium-226 or radium-228 in soil in unrestricted areas, averaged over any 100 square meters (m^2), to exceed the background level by more than:

(A) 5 picocuries per gram (pCi/g) (0.185 becquerel per gram (Bq/g)), averaged over the first 15 cm of soil below the surface; and

(B) 15 pCi/g (0.555 Bq/g), averaged over 15 cm thick layers of soil more than 15 cm below the surface.

(5) No licensee shall possess, receive, use, or transfer radioactive material in such a manner as to cause contamination of vegetation in unrestricted areas to exceed 5 pCi/g (0.185 Bq/g), based on dry weight, for radium-226 or radium-228.

(6) Notwithstanding the limits specified in paragraph (2) of this subsection, no licensee shall cause the concentration of natural uranium with no daughters present, based on dry weight and averaged over any 100 m^2 of area, to exceed the following limits:

(A) 30 pCi/g (1.11 Bq/g), averaged over the top 15 cm of soil below the surface; and

(B) 150 pCi/g (5.55 Bq/g), average concentration at depths greater than 15 centimeters below the surface so that no individual member of the public will receive an effective dose equivalent in excess of 100 mrem (1 mSv) per year.

(fff) Exemption of specific wastes.

(1) A licensee may discard the following licensed material without regard to its radioactivity:

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(A) 0.05 microcurie (μCi) (1.85 kilobecquerels (kBq)), or less, of hydrogen-3, carbon-14, or iodine-125 per gram of medium used for liquid scintillation counting or *in vitro* clinical or *in vitro* laboratory testing; and

(B) 0.05 μCi (1.85 kBq), or less, of hydrogen-3, carbon-14, or iodine-125, per gram of animal tissue, averaged over the weight of the entire animal.

(2) A licensee shall not discard tissue in accordance with paragraph (1)(B) of this subsection in a manner that would permit its use either as food for humans or as animal feed.

(3) The licensee shall maintain records in accordance with subsection (tt) of this section.

(4) Any licensee may, upon agency approval of procedures required in paragraph (6) of this subsection, discard licensed material included in subsection (ggg)(7) of this section, provided that it does not exceed the concentration and total curie limits contained therein, in a Type I municipal solid waste site as defined in the Municipal Solid Waste Regulations of the authorized regulatory agency (31 Texas Administrative Code Chapter 330), unless such licensed material also contains hazardous waste, as defined in Section 3(15) of the Solid Waste Disposal Act, Health and Safety Code, Chapter 361. Any licensed material included in subsection (ggg)(7) of this section and which is a hazardous waste as defined in the Solid Waste Disposal Act may be discarded at a facility authorized to manage hazardous waste by the authorized regulatory agency.

(5) Each licensee who discards material described in paragraphs (1) or (4) of this subsection shall:

(A) make surveys adequate to assure that the limits of paragraphs (1) or (4) of this subsection are not exceeded; and

(B) remove or otherwise obliterate or obscure all labels, tags, or other markings that would indicate that the material or its contents is radioactive.

(6) Prior to authorizations in accordance with paragraph (4) of this subsection, a licensee shall submit procedures to the agency for:

(A) the physical delivery of the material to the disposal site;

(B) surveys to be performed for compliance with paragraph (5)(A) of this subsection;

(C) maintaining secure packaging during transportation to the site; and

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(D) maintaining records of any discards made under paragraph (4) of this subsection.

(7) Nothing in this section relieves the licensee of maintaining records showing the receipt, transfer, and discard of such radioactive material as specified in §289.201(d) of this title.

(8) Nothing in this section relieves the licensee from complying with other applicable federal, state, and local regulations governing any other toxic or hazardous property of these materials.

(9) Licensed material discarded under this section is exempt from the requirements of §289.252(t) of this title.

(ggg) Appendices.

(1) Protection factors for respirators. The following table contains protection factors for respirators^a:

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\$289.202(ggg)(1)

Description ^b	Protection Factors ^d			Tested & Certified Equipment
	Modes ^c	Particu- lates only	Particu- lates, gases, vapors ^e	
				National Institute for Occupational Safety and Health & Mine Safety and Health Administration tests for permissibility

1. AIR-PURIFYING RESPIRATORS^f

Facepiece, half-mask ^g	NP	10		30 CFR 11, Subpart K.
Facepiece, full	NP	50		
Facepiece, half-mask, full, or hood	PP	1,000		

2. ATMOSPHERE-SUPPLYING
RESPIRATORS

A. Air-line respirator

Facepiece, half-mask	CF		1,000	30 CFR 11, Subpart J.
Facepiece, half-mask	D		5	
Facepiece, full	CF		2,000	
Facepiece, full	D		5	
Facepiece, full	PD		2,000 ^h	
Hood	CF		1	
Suit	CF			

B. Self-contained
breathing apparatus
(SCBA)

Facepiece, full	D		50	30 CFR 11, Subpart H.
Facepiece, full	PD		10,000 ^k	
Facepiece, full	RD		50	
Facepiece, full	RP		5,000 ^l	

See footnotes at end of this paragraph.

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Description ^b	Modes ^c	Protection Factors ^d		Tested & Certified Equipment
		Particu- lates only	Particu- lates, gases, vapors ^e	National Institute for Occupational Safety and Health & Mine Safety and Health Administration tests for permissibility

3. COMBINATION RESPIRATORS

Any combination of
air-purifying and
atmosphere-supplying
respirators

Protection factor
for type and mode
of operation as
listed above

30 CFR 11,
11.63(b).

See footnotes at end of this paragraph.

FOOTNOTES

- (a) For use in the selection of respiratory protective equipment to be used only where the contaminants have been identified and the concentrations, or possible concentrations, are known.
- (b) Only for shaven faces and where nothing interferes with the seal of tight-fitting facepieces against the skin. Hoods and suits are excepted.
- (c) The mode symbols are defined as follows:
 - CF = continuous flow
 - D = demand
 - NP = negative pressure, that is, negative phase during inhalation
 - PD = pressure demand, that is, always positive pressure
 - PP = positive pressure
 - RD = demand, recirculating or closed circuit
 - RP = pressure demand, recirculating or closed circuit
- (d) (1) The protection factor is a measure of the degree of protection afforded by a respirator, defined as the ratio of the concentration of airborne radioactive material outside the respiratory protective equipment to that inside the equipment, usually inside the facepiece, under conditions of use. It is applied to the ambient airborne concentration to estimate the concentrations inhaled by the wearer according to the following formula:

$$\text{Concentration inhaled} = \frac{\text{Ambient airborne concentration}}{\text{Protection factor}}$$

- (2) The protection factors apply:
 - (i) only for individuals trained in using respirators and wearing properly fitted respirators that are used and maintained under supervision in a well-planned respiratory protective program;
 - (ii) for air-purifying respirators only when high efficiency particulate filters, above 99.97% removal efficiency by thermally generated 0.3 micrometer dioctyl phthalate (DOP) test or equivalent, are used in atmospheres not deficient in oxygen and not containing radioactive gas or vapor respiratory hazards;

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- (iii) no adjustment is to be made for the use of sorbents against radioactive material in the form of gases or vapors;
 - (iv) for atmosphere-supplying respirators only when supplied with adequate respirable air. Respirable air shall be provided of the quality and quantity required in accordance with the NIOSH and the MSHA certification described in 30 CFR 11. Oxygen and air shall not be used in the same apparatus.
- (e) Excluding radioactive contaminants that present an absorption or submersion hazard. For tritium oxide, approximately one-third of the intake occurs by absorption through the skin so that an overall protection factor of less than 2 is appropriate when atmosphere-supplying respirators are used to protect against tritium oxide. If the protection factor for respiratory protective equipment is 5, the effective protection factor for tritium is about 1.4; with protection factors of 10, the effective factor for tritium oxide is about 1.7; and with protection factors of 100 or more, the effective factor for tritium oxide is about 1.9. Air-purifying respirators are not suitable for protection against tritium oxide. See also footnote (i) concerning supplied-air suits.
- (f) Canisters and cartridges shall not be used beyond service-life limitations.
- (g) Under-chin type only. This type of respirator is not satisfactory for use where it might be possible, such as, if an accident or emergency were to occur, for the ambient airborne concentrations to reach instantaneous values greater than 10 times the pertinent values in Column 3 of Table I of subsection (ggg)(2) of this section. This type of respirator is not suitable for protection against plutonium or other high-toxicity materials. The mask is to be tested for fit prior to use, each time it is donned.
- (h) (1) Equipment shall be operated in a manner that ensures that proper air flow-rates are maintained. A protection factor of no more than 1000 may be utilized for tested-and-certified supplied-air hoods when a minimum air flow of 6 ft³/min (0.17 m³/min) is maintained and calibrated air line pressure gauges or flow measuring devices are used. A protection factor of up to 2000 may be used for tested and certified hoods only when the air flow is maintained at the manufacturer's recommended maximum rate for the equipment, this rate is greater than 6 ft³/min (0.17 m³/min) and calibrated air line pressure gauges or flow measuring devices are used.

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- (2) The design of the supplied-air hood or helmet, with a minimum flow of 6 ft³/min (0.17 m³/min) of air, may determine its overall efficiency and the protection it provides. For example, some hoods aspirate contaminated air into the breathing zone when the wearer works with hands-over-head. This aspiration may be overcome if a short cape-like extension to the hood is worn under a coat or overalls. Other limitations specified by the approval agency shall be considered before using a hood in certain types of atmospheres. See footnote (i).
- (i) Appropriate protection factors shall be determined, taking into account the design of the suit and its permeability to the contaminant under conditions of use. There shall be a standby rescue person equipped with a respirator or other apparatus appropriate for the potential hazards and communications equipment whenever supplied-air suits are used.
- (j) No approval schedules are currently available for this equipment. Equipment is to be evaluated by testing or on the basis of reliable test information.
- (k) This type of respirator may provide greater protection and be used as an emergency device in unknown concentrations for protection against inhalation hazards. External radiation hazards and other limitations to permitted exposure, such as skin absorption, must be taken into account in such circumstances.
- (l) Quantitative fit testing shall be performed on each individual, and no more than 0.02% leakage is allowed with this type of apparatus. Perceptible outward leakage of gas from this or any positive pressure self-contained breathing apparatus is unacceptable because service life will be reduced substantially. Special training in the use of this type of apparatus shall be provided to the wearer.

Note 1: Protection factors for respirators approved by the United States Bureau of Mines and the NIOSH, according to applicable approvals for respirators for type and mode of use to protect against airborne radionuclides, may be used to the extent that they do not exceed the protection factors listed in this table. The protection factors listed in this table may not be appropriate to circumstances where chemical or other respiratory hazards exist in addition to radioactive hazards. The selection and use of respirators for such circumstances should take into account applicable approvals of the United States Bureau of Mines and the NIOSH.

Note 2: Radioactive contaminants, for which the concentration values in Column 3 of Table I of subsection (ggg)(2) of this section are based on internal dose due to inhalation, may present external exposure hazards at higher concentrations. Under these circumstances, limitations on occupancy may have to be governed by external dose limits.

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(2) Annual limits on intake (ALI) and derived air concentrations (DAC) of radionuclides for occupational exposure; effluent concentrations; concentrations for release to sanitary sewerage.

(A) Introduction.

(i) For each radionuclide, Table I of subparagraph (F) of this paragraph indicates the chemical form that is to be used for selecting the appropriate ALI or DAC value. The ALIs and DACs for inhalation are given for an aerosol with an activity median aerodynamic diameter (AMAD) of 1 micron, and for three classes (D,W,Y) of radioactive material, which refer to their retention (approximately days, weeks, or years) in the pulmonary region of the lung. This classification applies to a range of clearance half-times for D if less than 10 days, for W from 10 to 100 days, and for Y greater than 100 days. Table II of subparagraph (F) of this paragraph provides concentration limits for airborne and liquid effluents released to the general environment. Table III of subparagraph (F) of this paragraph provides concentration limits for discharges to sanitary sewerage.

(ii) The values in Tables I, II, and III of subparagraph (F) of this paragraph are presented in the computer "E" notation. In this notation a value of 6E-02 represents a value of 6×10^{-2} or 0.06, 6E+2 represents 6×10^2 or 600, and 6E+0 represents 6×10^0 or 6.

(B) Occupational values.

(i) Note that the columns in Table I of subparagraph (F) of this paragraph captioned "Oral Ingestion ALI," "Inhalation ALI," and "DAC," are applicable to occupational exposure to radioactive material.

(ii) The ALIs in subparagraph (F) of this paragraph are the annual intakes of given radionuclide by "Reference Man" that would result in either a committed effective dose equivalent of 5 rems (0.05 Sv), stochastic ALI, or a committed dose equivalent of 50 rems (0.5 Sv) to an organ or tissue, non-stochastic ALI. The stochastic ALIs were derived to result in a risk, due to irradiation of organs and tissues, comparable to the risk associated with deep dose equivalent to the whole body of 5 rems (0.05 Sv). The derivation includes multiplying the committed dose equivalent to an organ or tissue by a weighting factor, w_T . This weighting factor is the proportion of the risk of stochastic effects resulting from irradiation of the organ or tissue, T, to the total risk of stochastic effects when the whole body is irradiated uniformly. The values of w_T are listed under the definition of "weighting factor" in subsection (c) of this section. The non-stochastic ALIs were derived to avoid non-stochastic effects, such as prompt damage to tissue or reduction in organ function.

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(iii) A value of $w_T = 0.06$ is applicable to each of the five organs or tissues in the "remainder" category receiving the highest dose equivalents, and the dose equivalents of all other remaining tissues may be disregarded. The following portions of the GI tract: stomach, small intestine, upper large intestine, and lower large intestine, are to be treated as four separate organs.

(iv) The dose equivalents for an extremity, skin, and lens of the eye are not considered in computing the committed effective dose equivalent, but are subject to limits that must be met separately.

(v) When an ALI is defined by the stochastic dose limit, this value alone is given. When an ALI is determined by the non-stochastic dose limit to an organ, the organ or tissue to which the limit applies is shown, and the ALI for the stochastic limit is shown in parentheses. Abbreviated organ or tissue designations are used as follows:

(I) LLI wall = lower large intestine wall;

(II) St. wall = stomach wall;

(III) Blad wall = bladder wall; and

(IV) Bone surf = bone surface.

(vi) The use of the ALIs listed first, the more limiting of the stochastic and non-stochastic ALIs, will ensure that non-stochastic effects are avoided and that the risk of stochastic effects is limited to an acceptably low value. If, in a particular situation involving a radionuclide for which the non-stochastic ALI is limiting, use of that non-stochastic ALI is considered unduly conservative, the licensee may use the stochastic ALI to determine the committed effective dose equivalent. However, the licensee shall also ensure that the 50 rems (0.5 sievert) dose equivalent limit for any organ or tissue is not exceeded by the sum of the external deep dose equivalent plus the internal committed dose equivalent to that organ, not the effective dose. For the case where there is no external dose contribution, this would be demonstrated if the sum of the fractions of the nonstochastic ALIs (ALI_{ns}) that contribute to the committed dose equivalent to the organ receiving the highest dose does not exceed unity, that is, $\sum (\text{intake (in } \mu\text{Ci)}) / ALI_{ns} \leq 1.0$. If there is an external deep dose equivalent contribution of H_d , then this sum must be less than $1 - (H_d/50)$, instead of ≤ 1.0 .

(vii) The dose equivalents for an extremity, skin, and lens of the eye are not considered in computing the committed effective dose equivalent, but are subject to limits that must be met separately.

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(viii) The DAC values are derived limits intended to control chronic occupational exposures. The relationship between the DAC and the ALI is given by:

$$\text{DAC} = \text{ALI}(\text{in } \mu\text{Ci}) / (2000 \text{ hours per working year} \times 60 \text{ minutes/hour} \times 2 \times 10^4 \text{ ml per minute}) = [\text{ALI}/2.4 \times 10^9] \mu\text{Ci/ml},$$

where 2×10^4 milliliter is the volume of air breathed per minute at work by Reference Man under working conditions of light work.

(ix) The DAC values relate to one of two modes of exposure: either external submersion or the internal committed dose equivalents resulting from inhalation of radioactive materials. DACs based upon submersion are for immersion in a semi-infinite cloud of uniform concentration and apply to each radionuclide separately.

(x) The ALI and DAC values include contributions to exposure by the single radionuclide named and any in-growth of daughter radionuclides produced in the body by decay of the parent. However, intakes that include both the parent and daughter radionuclides should be treated by the general method appropriate for mixtures.

(xi) The values of ALI and DAC do not apply directly when the individual both ingests and inhales a radionuclide, when the individual is exposed to a mixture of radionuclides by either inhalation or ingestion or both, or when the individual is exposed to both internal and external irradiation. See subsection (g) of this section. When an individual is exposed to radioactive materials which fall under several of the translocation classifications of the same radionuclide, such as, Class D, Class W, or Class Y, the exposure may be evaluated as if it were a mixture of different radionuclides.

(xii) It should be noted that the classification of a compound as Class D, W, or Y is based on the chemical form of the compound and does not take into account the radiological half-life of different radionuclides. For this reason, values are given for Class D, W, and Y compounds, even for very short-lived radionuclides.

(C) Effluent concentrations.

(i) The columns in Table II of subparagraph (F) of this paragraph captioned "Effluents," "Air," and "Water" are applicable to the assessment and control of dose to the public, particularly in the implementation of the provisions of subsection (o) of this section. The concentration values given in Columns 1 and 2 of Table II of subparagraph (F) of this paragraph are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (0.5 mSv).

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(ii) Consideration of non-stochastic limits has not been included in deriving the air and water effluent concentration limits because non-stochastic effects are presumed not to occur at or below the dose levels established for individual members of the public. For radionuclides, where the non-stochastic limit was governing in deriving the occupational DAC, the stochastic ALI was used in deriving the corresponding airborne effluent limit in Table II of subparagraph (F) of this paragraph. For this reason, the DAC and airborne effluent limits are not always proportional as they were in the previous radiation protection standards.

(iii) The air concentration values listed in Column I of Table II of subparagraph (F) of this paragraph were derived by one of two methods. For those radionuclides for which the stochastic limit is governing, the occupational stochastic inhalation ALI was divided by 2.4×10^9 , relating the inhalation ALI to the DAC, as explained in subparagraph (B)(viii) of this paragraph, and then divided by a factor of 300. The factor of 300 includes the following components:

(I) a factor of 50 to relate the 5 rems (0.05 Sv) annual occupational dose limit to the 0.1 rem limit for members of the public;

(II) a factor of 3 to adjust for the difference in exposure time and the inhalation rate for a worker and that for members of the public; and

(III) a factor of 2 to adjust the occupational values, derived for adults, so that they are applicable to other age groups.

(iv) For those radionuclides for which submersion, that is external dose, is limiting, the occupational DAC in Column 3 of Table I of subparagraph (F) of this paragraph was divided by 219. The factor of 219 is composed of a factor of 50, as described in clause (iii) of this subparagraph, and a factor of 4.38 relating occupational exposure for 2,000 hours per year to full-time exposure (8,760 hours per year). Note that an additional factor of 2 for age considerations is not warranted in the submersion case.

(v) The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^7 . The factor of 7.3×10^7 milliliters (ml) includes the following components:

(I) the factors of 50 and 2 described in clause (iii) of this subparagraph; and

(II) a factor of 7.3×10^5 (ml) which is the annual water intake of "Reference Man."

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(vi) Note 2 of subparagraph (F) of this paragraph provides groupings of radionuclides that are applicable to unknown mixtures of radionuclides. These groupings, including occupational inhalation ALIs and DACs, air and water effluent concentrations, and releases to sewer, require demonstrating that the most limiting radionuclides in successive classes are absent. The limit for the unknown mixture is defined when the presence of one of the listed radionuclides cannot be definitely excluded as being present either from knowledge of the radionuclide composition of the source or from actual measurements.

(D) Releases to sewers. The monthly average concentrations for release to sanitary sewerage are applicable to the provisions in subsection (gg) of this section. The concentration values were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^6 (ml). The factor of 7.3×10^6 (ml) is composed of a factor of 7.3×10^5 (ml), the annual water intake by "Reference Man," and a factor of 10, such that the concentrations, if the sewage released by the licensee were the only source of water ingested by a "Reference Man" during a year, would result in a committed effective dose equivalent of 0.5 rem.

(E) List of elements.

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Actinium	Ac	89	Chlorine	Cl	17
Aluminum	Al	13	Chromium	Cr	24
Americium	Am	95	Cobalt	Co	27
Antimony	Sb	51	Copper	Cu	29
Argon	Ar	18	Curium	Cm	96
Arsenic	As	33	Dysprosium	Dy	66
Astatine	At	85	Einsteinium	Es	99
Barium	Ba	56	Erbium	Er	68
Berkelium	Bk	97	Europium	Eu	63
Beryllium	Be	4	Fermium	Fm	100
Bismuth	Bi	83	Fluorine	F	9
Bromine	Br	35	Francium	Fr	87
Cadmium	Cd	48	Gadolinium	Gd	64
Calcium	Ca	20	Gallium	Ga	31
Californium	Cf	98	Germanium	Ge	32
Carbon	C	6	Gold	Au	79
Cerium	Ce	58	Hafnium	Hf	72
Cesium	Cs	55	Holmium	Ho	67

§289.202(ggg)(2)(E)

Hydrogen H1
Indium In49

Name	Symbol	Atomic Number	Name	Symbol	Atomic Number
Iodine	I	53	Silicon	Si	14
Iridium	Ir	77	Silver	Ag	47
Iron	Fe	26	Sodium	Na	11
Krypton	Kr	36	Strontium	Sr	38
Lanthanum	La	57	Sulfur	S	16
Lead	Pb	82	Tantalum	Ta	73
Lutetium	Lu	71	Technetium	Tc	43
Magnesium	Mg	12	Tellurium	Te	52
Manganese	Mn	25	Terbium	Tb	65
Mendelevium	Md	101	Thallium	Tl	81
Mercury	Hg	80	Thorium	Th	90
Molybdenum	Mo	42	Thulium	Tm	69
Neodymium	Nd	60	Tin	Sn	50
Neptunium	Np	93	Titanium	Ti	22
Nickel	Ni	28	Tungsten	W	74
Niobium	Nb	41	Uranium	U	92
Osmium	Os	76	Vanadium	V	23
Palladium	Pd	46	Xenon	Xe	54
Phosphorus	P	15	Ytterbium	Yb	70
Platinum	Pt	78	Yttrium	Y	39
Plutonium	Pu	94	Zinc	Zn	30
Polonium	Po	84	Zirconium	Zr	40
Potassium	K	19			
Praseodymium	Pr	59			
Promethium	Pm	61			
Protactinium	Pa	91			
Radium	Ra	88			
Radon	Rn	86			
Rhodium	Rh	45			
Rubidium	Rb	37			
Ruthenium	Ru	44			
Samarium	Sm	62			
Scandium	Sc	21			
Selenium	Se	34			

§289.202(ggg)(2)(F)

(F) Tables - Values for annual limits. The following tables contain values for annual limits on intake (ALI) and derived air concentrations (DAC) of radionuclides for occupational exposure; effluent concentrations; concentrations for release to sanitary sewerage:

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Attachment D

Instrument Calibration Certifications



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

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

CUSTOMER US ECOLOGY OAK RIDGE

ORDER NO. 263764/255718

1. Ludlum Measurements, Inc. Model 19 Serial No. 160093

2. Model Serial No. Model

Cal. Date 25-May-01 Cal Due Date 25-May-02 Cal. Interval 1 Year Meterface 202-016

Check mark ☒ applies to applicable Instr. and/or detector IAW mfg. spec. T. 74 °F RH 25 % Alt 704.8 mm Hg

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

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

☒ F/S Resp. ck. ☒ Resel 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 550 V Input Sens. 33 mV Det. Oper. 550 V at 33 mV Threshold 550 mV

☐ HV Readout (2 points) Ref./Inst. 550 / 33 V Ref./Inst. 550 / 33 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*
5000	4000 μ R/hr	4400	4000
5000	1000 μ R/hr	1000	1000
500	400 μ R/hr = 69.4Kcpm	400	400
500	100 μ R/hr	100	100
250	200 μ R/hr = 52.8Kcpm	180	200
250	100 μ R/hr	100	110
50	6.94K cpm	40	40
50	1.74K cpm	10	10
25	3.28K cpm	19	20
25	820 cpm	4.5	5

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

50, 25 Range(s) Calibrated Electronically

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSS 2540-1-1994 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 121025 ☐ Oscilloscope S/N ☒ Multimeter S/N 73760305

Calibrated By: Russell Harris Date 25-May-01

Reviewed By: Russell Harris Date 29 May 01

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 12/28/2000

☐ Passed Dielectric (Hi-Pot) and Continuity Test



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

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

CUSTOMER US ECOLOGY OAK RIDGE ORDER NO. 263764/255718
Mfg. Ludlum Measurements, Inc. Model 125 Serial No. 11818
ig. _____ Model _____ Serial No. _____
Cal. Date 29-May-01 Cal Due Date 29-May-02 Cal. Interval 1 Year Meterface 202-004
Check mark ☒ Applies to applicable Instr. and/or detector IAW mfg. spec. T. 72 °F RH 40 % Alt 696.8 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 800 V Input Sens. 35 mV Def. Oper. _____ V at _____ mV Threshold _____ mV
Dial Ratio _____ = _____
☐ 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	2000 μ R/hr	<u>NA</u>	<u>2</u>
X 1000	1000 μ R/hr		<u>1</u>
X 100	200 μ R/hr = <u>35.6 Rcpm</u>		<u>2</u>
X 100	100 μ R/hr		<u>1.1</u>
X 10	<u>3.56 Rcpm</u>		<u>2</u>
X 10	<u>177 Rcpm</u>		<u>1</u>
X1	<u>356 cpm</u>		<u>2</u>
X1	<u>177 cpm</u>		<u>1</u>

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

X10, X1 Range(s) Calibrated Electronically

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCST 1340-1-1994 and ANSI N323-1978. State of Texas Calibration License No. 10-1963

Reference Instruments and/or Sources:

CS-137 Gamma S/N ☐ 1162 ☐ G112 ☒ M565 ☐ S105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☒ m 500 S/N 121025 ☐ Oscilloscope S/N _____ ☒ Multimeter S/N 73760305

Calibrated By: Ronald H. Harris Date 29-May-01

Reviewed By: Rhonda Harris Date 29 May 01

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 12/28/2000

☐ Passed Dielectric (Hi-Pot) and Continuity Test



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-487
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER US ECOLOGY OAK RIDGE

ORDER NO. 263764/255

Mfg. Ludlum Measurements, Inc. Model 177 Serial No. 120411

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. RN-013602

Cal. Date 29-May-01 Cal Due Date 29-May-02 Cal. Interval 1 Year Meterface 202-096

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 40 % All 696.8 mm±

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

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

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

☒ Audio ck. ☒ Alarm Setting ck. ☐ Batt. ck. (Min. Volt) 5.97 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 900 V Input Sens. 80 mV Del. Oper. 900 V at 80 mV Threshold Dial Ratio =

☒ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1000 / 1000 V

COMMENTS:

Instrument calibrated with 5' cable
Alarm checked but not set.

Gamma Calibration: GM detectors positioned perpendicular to source except for M44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X1000	400 K cpm	400	400
X1000	100 K cpm	100	100
X100	40 K cpm	400	400
X100	10 K cpm	100	100
X10	4 K cpm	400	400
X10	1 K cpm	100	100
X1	400 cpm	400	400
X1	100 cpm	100	100

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

ALL Range(s) Calibrated Electronically

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration technique. The calibration system conforms to the requirements of ANSI/NCST 1540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-196

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☒ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☒ E551

☐ Neutron Am-241 Be S/N 1-3

☐ Alpha S/N ☐ Beta S/N ☐ Other

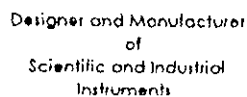
☒ m 500 S/N 121025 ☐ Oscilloscope S/N ☒ Multimeter S/N 73760305

Calibrated By: Ronald Ham Date 29-May-01

Reviewed By: Ronald Ham Date 29-May-01

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 12/28/2000

☒ Passed Dielectric (Hi-Pot) and Continuity Test



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

Customer US ECOLOGY OAK RIDGE Date 29-May-01 Order #. 263764/255718

Model 177 Serial No. 120411 Detector Model 44-9 Serial No. RN-013602

Source Cs-137 194.6 mCi Cs-137 20 mCi High Voltage 900 v

Input Sensitivity 80 mV

Signature: Frank N Date: 29-May-01



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

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

CUSTOMER US ECOLOGY OAK RIDGE

ORDER NO. 263764255718

1. Ludlum Measurements, Inc. Model 2221

Serial No. 126533

2. Ludlum Measurements, Inc. Model 44-62

Serial No. PR113401

Cal. Date 23-May-01 Cal Due Date 23-May-02 Cal. Interval 1 Year Meterface 202-159

Check mark ☒ Applies to applicable Instr. and/or detector IAW mfg. spec. T. 74 °F RH 20 % Alt 203.8 mm Hg

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

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

☒ F/S Resp. ck. ☒ Reset ck. ☒ Window Operation ☒ Geotrolism

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 5.0 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 1050 V Input Sens. 10 mV Det. Oper. 1050 V at 10 mV Threshold 100 = 10 mV

☒ HV Readout (2 points) Ref./Inst. 498 / 500 V Ref./Inst. 1993 / 2000 V

COMMENTS:

Instrument calibrated with 100' cable

HV set with detector connected.

Firmware: 261010

Gamma Calibration: GM detectors positioned perpendicular to source except for M44-9 in which the front of probe faces source.

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

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

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400 K cpm	399744	399744	500 K cpm	500K	500K
40 K cpm	39978	39978	50 K cpm	50K	50K
4 K cpm	3998	3998	5 K cpm	5K	5K
400 cpm	400	400	500 cpm	500	500
40 cpm	40	40			

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 their 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. This 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 ☐ S105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551

☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☒ Other Am-241 -0.77uCi

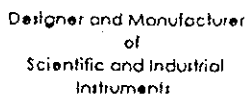
☒ m 500 S/N 121025 ☐ Oscilloscope S/N ☒ Multimeter S/N 73760305

Calibrated By: Ronald Harris Date 23-May-01

Reviewed By: Rhonda Harris Date 24 May 01

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FORM C22A 12/28/2000

☐ Passed Dielectric (Hi-Pot) and Continuity Test



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

Detector 44-62 Serial No. PR113401
 Customer US ECOLOGY OAK RIDGE Order #. 263764255718
 Counter 2221 Serial No. 126533 Counter Input Sensitivity 10 mV
 Count Time 0.1min Distance Source to Detector Surface
 Other _____

[illegible]

Signature

Date 23-May-01



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4671
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER US ECOLOGY OAK RIDGE

ORDER NO. 263764/255

Co. Ludlum Measurements, Inc.

Model 2221

Serial No. 126523

Co. Ludlum Measurements, Inc.

Model 43-5

Serial No. PR092793

Cal. Date 24-May-01

Cal Due Date 24-May-02

Cal. Interval 1 Year Meterface 202-159

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 28 % Alt 700.8 mm Hg

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

☒ Mechanical ck.

☒ Meter Zeroed

☐ Background Subtract

☒ Input Sens. Linearity

☒ F/S Resp. ck.

☒ Reset ck.

☒ Window Operation

☒ Geotrapism

☒ Audio ck.

☐ Alarm Settling ck.

☒ Batt. ck. (Min. Volt) 5.0 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 800 V Input Sens. 10 mV Det. Oper. 800 V at 10 mV Threshold 100 = 10 mV

☒ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2003 / 2000 V

COMMENTS:

Instrument calibrated with 5' cable
Firmware: 261010

OL checked but not ret.

Gamma Calibration: GM detectors positioned perpendicular to source except for M44-9 in which the front of probe faces source

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

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

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K cpm	399522	Log Scale	500 K cpm	500K
	40 K cpm	39961		50 K cpm	50K
	4 K cpm	3996		5 K cpm	5K
	400 cpm	400		500 cpm	500
	40 cpm	40			

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/NCISL 2540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-194

Reference Instruments and/or Sources:

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

☐ Neutron Am-241 Be S/N T-33

☒ Alpha S/N Pu-239 4337 15.7Kcpm

☐ Beta S/N

☐ Other

☒ m 500 S/N 121025

☐ Oscilloscope S/N

☒ Multimeter S/N 73760305

Calibrated By: Russell

Date 24-May-01

Reviewed By: Rhonda Horn

Date 29 May 01

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 12/28/2000

☐ Passed Dielectric (Hi-Pot) and Continuity Test



Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PRO92793
Customer US ECOLOGY OAK RIDGE Order # 263764/255718
Counter 2221 Serial No. 126523 Counter Input Sensitivity 10 mV
Count Time 1 min Distance Source to Detector Surface
Isotope Pu-239 4337.15.7Kcpm Other _____

Alpha Scintillation Detector

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

HV Plateau	Background	Source Count
650	0	2949
700	0	3705
750	0	3956
800	0	4107
850	2	4216
900	2	4098
950	5	4370

Operating Voltage Set at 800 V

Air Proportional	43-5	43-65	43-90	Background	Meter Reading	Range/Scale
Toe	Toe	L/S*	Toe	0	3995	—
Center	Center	Center	Center	0	4107	—
Heel	Heel	Other**	Heel	0	3918	—

☒ Uniformity ($\pm 10\%$)

Average Efficiency 26 %

- * Least Sensitive Position (Heel of Detector)
- ** Opposite Least Sensitive Position (Top of Detector)

Signature _____

Date 24-May-01



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

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

CUSTOMER US ECOLOGY OAK RIDGE

ORDER NO. 263764/255718

To Ludlum Measurements, Inc. Model 2221 Serial No. 125469

To Ludlum Measurements, Inc. Model 43-90 Serial No. PR124875

Cal. Date 24-May-01 Cal Due Date 24-May-02 Cal. Interval 1 Year Meterface 202-159

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 28 % Alt 700.8 mm Hg

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

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

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

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck. (Min. Volt) 5.0 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 650 V Input Sens. 10 mV Det. Oper. 650 V at 10 mV Threshold 100 = 10 mV

☒ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1995 / 2000 V

COMMENTS:

OL set to simulate light leak.

Firmware: 261010

Calibrated with 5' cable.

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	400K cpm	400	400
X 1000	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	100
X 10	4 K cpm	400	400
X 10	1 K cpm	100	100
X 1	400 cpm	400	400
X 1	100 cpm	100	100

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

All Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K cpm	400003	Log Scale	500 K cpm	500K
	40 K cpm	40003		50 K cpm	50K
	4 K cpm	4000		5 K cpm	5K
	400 cpm	400		500 cpm	500
	40 cpm	40			

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/NCCL 2540-1-1994 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 B & S/N T-304

☒ Alpha S/N Pu-239 4339 15.7Kcpm ☐ Beta S/N ☐ Other

☒ m 500 S/N 121025 ☐ Oscilloscope S/N ☒ Multimeter S/N 73760305

Calibrated By: Ronald Harris Date 24-May-01

Reviewed By: Ronald Harris Date 29-May-01

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FORM C22A 12/28/2000

☐ Passed Dielectric (Hi-Pot) and Continuity Test



Designer and Manufacturer
of
Scientific and Industrial
Instruments

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

Bench Test Data For Alpha Detector

Detector 43-90 Serial No. PR124875
Customer US ECOLOGY OAK RIDGE Order # 263764/255718
Counter 2221 Serial No. 125469 Counter Input Sensitivity 10 mV
Count Time 1 min Distance Source to Detector Surface
Isotope Pu-239 4339 15.7Kcpm Other _____

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
<u>550</u>	<u>2</u>	<u>5010</u>
<u>600</u>	<u>1</u>	<u>6283</u>
<u>650</u>	<u>1</u>	<u>6662</u>
<u>700</u>	<u>2</u>	<u>6520</u>
<u>750</u>	<u>6</u>	<u>6939</u>

Operating Voltage Set at 650 V

Air Proportional	43-5	43-65	<u>43-90</u>	Background	Meter Reading	Range/Scale
Toe	Toe	L/S*	Toe	<u>1</u>	<u>6403</u>	<u>-</u>
Center	Center	Center	Center	<u>1</u>	<u>6662</u>	<u>-</u>
Heel	Heel	Other**	Heel	<u>1</u>	<u>6939</u>	<u>-</u>

☒ Uniformity (± 10%)

Average Efficiency 42 %

- * Least Sensitive Position (Heel of Detector)
- ** Opposite Least Sensitive Position (Top of Detector)

Signature _____

Date 24-May-01



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

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

CUSTOMER US ECOLOGY OAK RIDGE

ORDER NO. 263768/255722

Mfg. Ludlum Measurements, Inc. Model 9 Serial No. 161689

Mfg. _____ Model _____ Serial No. _____

Cal. Date 22-May-01 Cal Due Date 22-May-02 Cal. Interval 1 Year Meterface 200

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 20 % Alt 702.8 mm Hg

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

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

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

☒ 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	4.2	4
X 1000	1 R/hr	1	1
X 100	400 mR/hr	4.2	4
X 100	100 mR/hr	1.1	1
X 10	40 mR/hr	4.2	4
X 10	10 mR/hr	1.1	1
X 1	4 mR/hr	4.1	4
X 1	1 mR/hr	0.8	1

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

NONE Range(s) Calibrated Electronically

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration technique. The calibration system conforms to the requirements of ANSI/NCSL I540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-191

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☒ G112 ☐ M565 ☐ 5105 ☒ T1008 ☐ 1879 ☐ E552 ☒ E551

☐ Neutron Am-241 Be S/N 1-1

☐ Alpha S/N _____ ☐ Beta S/N _____ ☐ Other _____

☐ m 500 S/N _____ ☐ Oscilloscope S/N _____ ☐ Multimeter S/N _____

Calibrated By: [Signature] Date 22 May 01

Reviewed By: [Signature] Date 23 May 01

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FORM C22A 12/28/2000

☐ Passed Dielectric (Hi-Pot) and Continuity Test

Attachment E

Survey Data

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFICIENCIES: α .34 $\beta\gamma$.43

MDA: α 13 $\beta\gamma$ 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: ☒ dpm ☐ μ Ci

α Background: .1 cpm

$\beta\gamma$ Background: 73 cpm

SAMPLE I.D. OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	$\beta\gamma$	α	$\beta\gamma$	α	$\beta\gamma$
Room 1-1	4	94	3.9	21	11	49
1-2	10	80	9.9	7	29	16
1-3	0	78	0	5	0	12
1-4	0	74	0	1	0	2
1-5	2	78	1.9	5	6	12
2-1	10	102	9.9	29	29	67
2-2	4	82	3.9	9	11	21
2-3	0	86	0	13	0	30
2-4	2	64	1.9	0	6	0
2-5	4	74	3.9	1	11	2
3-1	10	92	9.9	19	29	44
3-2	0	66	0	0	0	0
3-3	2	90	1.9	17	6	40
3-4	2	88	1.9	15	6	35
3-5	4	74	3.9	1	11	2
4-1	4	76	3.9	3	11	7

Remarks:

Reviewed by: NW

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES: α .34 β .43

MDA: α 13 β 484

PERFORMED BY J. Sitzler

Sample Count Time: 1 min.

Activity Report In: ☒ dpm ☐ μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 4-2	4	72	3.9	0	11	0
4-3	0	78	0	5	0	12
4-4	0	80	0	7	0	16
4-5	2	96	1.9	23	6	53
5-1	2	92	1.9	19	6	44
5-2	2	76	1.9	3	6	7
5-3	2	594	1.9	521	6	1212
5-4	2	88	1.9	15	6	35
5-5	2	126	1.9	53	6	123
6-1	0	74	0	1	0	2
6-2	2	76	1.9	3	6	7
6-3	0	62	0	0	0	0
6-4	4	86	3.9	13	11	30
6-5	6	84	5.9	11	17	26
7-1	2	82	1.9	9	6	21
7-2	0	72	0	0	0	0

Remarks:

Reviewed by: Neil White

Date: 10/17/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/17/600
 EFFICIENCIES: α .34 β .43
 MDA: α 13 β 484
 PERFORMED BY: J. Sitzler

DETECTOR ID: 43-10-1/179311

Sample Count time: 1 min.

Activity Report in μ cpm: 2

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 7-3	0	84	0	11	0	26
7-4	0	80	0	7	0	16
7-5	0	68	0	0	0	0
8-1	2	88	1.9	15	6	35
8-2	2	84	1.9	11	6	26
8-3	0	78	0	5	0	12
8-4	0	74	0	1	0	2
8-5	12	70	11.9	0	35	0
9-1	14	80	13.9	7	41	16
9-2	2	80	1.9	7	6	16
9-3	2	74	1.9	1	6	2
9-4	2	78	1.9	5	6	12
9-5	0	88	0	15	0	35
10-1	4	86	3.9	13	11	30
10-2	2	76	1.9	3	6	7
✓ 10-3	0	80	0	7	0	16

Remarks:

Reviewed by: Ned White

Date: 10/17/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 4310-1/179311

EFFICIENCIES α .34 β .43

MDA: α 13 β 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In μ cpm \pm μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 10-4	0	82	0	9	0	21
10-5	2	74	1.9	1	6	2
11-1	0	76	0	3	0	7
11-2	2	140	1.9	67	6	156
11-3	6	88	5.9	15	17	35
11-4	2	94	1.9	21	6	49
11-5	0	82	0	9	0	21
12-1	0	90	0	17	0	40
12-2	2	86	1.9	13	6	30
12-3	0	82	0	9	0	21
12-4	0	84	0	11	0	26
12-5	4	58	3.9	0	11	0
13-1	2	130	1.9	57	6	133
13-2	0	86	0	13	0	30
13-3	0	124	0	51	0	119
✓ 13-4	0	88	0	15	0	35

Remarks:

Reviewed by:

Neil White

Date: 10/17/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES α .34 β .43

MDA: α 13 β 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In α cpm β cpm μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 13-5	0	112	0	39	0	91
16-1	0	52	0	0	0	0
16-2	2	102	1.9	29	6	67
16-3	0	78	0	5	0	12
16-4	0	72	0	0	0	0
16-5	10	84	9.9	11	29	26
17-1	4	80	3.9	7	11	16
17-2	2	80	1.9	7	6	16
17-3	0	88	0	15	0	35
17-4	0	80	0	7	0	16
17-5	0	108	0	35	0	81
18-1	0	68	0	0	0	0
18-2	0	72	0	0	0	0
18-3	0	102	0	29	0	67
18-4	2	68	1.9	0	6	0
18-5	4	80	3.9	7	11	16

Remarks:

Reviewed by: Ned Wherry

Date: 10/17/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01Analysis Performed by Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600DETECTOR ID: 43-10-1/179311EFFICIENCIES α .34 β .43MDA: α 13 β 484PERFORMED BY J. SitzlerSample Count Time: 1 min.Activity Report to ☒ dpm ☐ μ Ci α Background .1 cpm β Background 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 1-6	4	96	3.9	23	11	53
2-6	2	134	1.9	61	6	142
3-6	0	90	0	73	0	40
4-6	4	116	3.9	43	11	100
5-6	2	146	1.9	73	6	170
8-6	0	70	0	0	0	0
10-6	0	86	0	13	0	30
11-6	0	68	0	0	0	0
15-6	2	90	1.9	17	6	40
17-6	0	82	0	9	0	21
19-6	0	88	0	15	0	35
14-1	2	120	1.9	47	6	109
14-2	2	70	1.9	0	6	0
14-3	0	68	0	0	0	0
14-4	2	86	1.9	13	6	30
✓ 14-5	0	72	0	0	0	0

Remarks:

Reviewed by

Nat White

Date

12/19/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2939/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES: α .34 β .43

MDA: α 13 β 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: α cpm β cpm

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 15-1	2	82	1.9	9	6	21
15-2	8	82	7.9	9	23	21
15-3	0	82	0	9	0	21
15-4	0	74	0	1	0	2
15-5	0	70	0	0	0	0
19-1	2	78	1.9	5	6	12
19-2	0	64	0	0	0	0
19-3	4	50	3.9	0	11	0
19-4	2	64	1.9	0	6	0
19-5	0	80	0	7	0	16
20-1	2	72	1.9	0	6	0
20-2	0	84	0	11	0	26
20-3	0	68	0	0	0	0
20-4	0	70	0	0	0	0
20-5	2	88	1.9	15	6	35
✓ 21-1	2	90	1.9	17	6	40

Remarks:

Reviewed by: N. White

Date: 10/19/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/12/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID 2929/171600

DETECTOR ID 43-10-1/179311

EFFICIENCIES: α .34 β .43

MDA: α 13 β 484

PERFORMED BY J. Sitzler

Sample Count Time: 1 min.

Activity Report in μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 21-2	2	58	1.9	0	6	0
21-3	0	86	0	13	0	30
21-4	2	84	1.9	11	6	26
21-5	0	56	0	0	0	0
22-1	0	98	0	25	0	58
22-2	0	120	0	47	0	109
22-3	0	88	0	15	0	35
23-1	0	80	0	7	0	16
23-2	0	92	0	19	0	44
23-3	0	78	0	5	0	12
* 22-4	0	72	0	0	0	0
23-4	4	78	3.9	5	11	12
24-1	0	90	0	17	0	40
24-2	0	108	0	35	0	81
24-3	4	90	3.9	17	11	40
✓ 25-1	0	74	0	1	0	2

Remarks:

Reviewed by: N. Whit

Date: 10/12/01

* Out of order

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES α : .34 β : .43

MDA: α : 13 β : 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report in μCi 1

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 25-2	0	98	0	25	0	58
26-1	0	112	0	39	0	91
26-2	0	78	0	5	0	12
26-3	0	76	0	3	0	7
27-1	0	72	0	0	0	0
27-2	0	78	0	5	0	12
27-3	0	82	0	9	0	21
28-1	2	334	1.9	261	6	607
28-2	0	92	0	19	0	44
28-3	2	370	1.9	297	6	691
28-4	0	98	0	25	0	58
29-1	2	290	1.9	217	6	505
29-2	0	92	0	19	0	44
29-3	4	112	3.9	39	11	91
30-1	6	308	5.9	235	17	547
30-2	0	2456	0	2383	0	5542

Remarks:

Reviewed by: Julia White

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 4310-1/171311

EFFICIENCIES α .34 β .43

MDA: α 13 β 484

PERFORMED BY J. Sitzler

Sample Count Time 1min.

Activity Report In: α dpm β μ Ci

α Background: .1 cpm

β Background 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 30-3	8	448	7.9	375	23	872
30-4	0	106	0	33	0	77
31-1	0	204	0	131	0	305
31-2	0	324	0	251	0	584
31-3	4	296	3.9	223	11	519
31-4	6	118	5.9	45	17	105
32-1	4	380	3.9	307	11	714
32-2	0	132	0	59	0	137
32-3	0	172	0	99	0	230
32-4	0	90	0	17	0	40
33-1	4	126	3.9	53	11	123
33-2	26	140	25.9	67	76	156
33-3	264	4504	263.9	4431	776	10,305
33-4	4	200	3.9	127	11	295
37-1	226	140	225.9	67	664	156
37-2	14	78	13.9	5	41	12

Remarks:

Reviewed by: [Signature]

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 4310-1/179311

EFFICIENCIES α .34 β .43

MDA: α 13 β 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: ☒ dpm ☐ μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 37-3	38	106	37.9	33	111	77
37-4	2	88	1.9	15	6	35
37-5	0	112	0	39	0	91
37-6	10	88	9.9	15	29	35
37-7	4	68	3.9	0	11	
37-8	20	100	19.9	27	59	63
37-9	16	168	15.9	95	47	221
37-10	0	92	0	19	0	44
38-1	12	108	11.9	35	35	81
38-2	0	84	0	11	0	26
38-3	6	92	5.9	19	17	44
38-4	0	106	0	33	0	77
38-5	20	70	19.9	0	59	0
38-6	0	106	0	33	0	77
39-1	14	128	13.9	55	41	128
✓ 39-2	2	74	1.9	1	6	2

Remarks:

Reviewed by:

Nel White

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171400

DETECTOR ID: 4310-1/179311

EFFICIENCIES α .34 β .43

MDA: α 13 β 484

PERFORMED BY: J. Sitzler

Sample Count Time 1 min.

Accuracy Report In: \times dpm α μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 39-3	18	116	17.9	43	53	100
39-4	2	100	1.9	24	6	63
39-5	0	104	0	31	0	72
39-6	22	224	21.9	151	64	351
40-1	6	96	5.9	23	17	53
40-2	4	86	3.9	13	11	30
40-3	18	96	17.9	23	53	53
40-4	2	106	1.9	33	6	77
40-5	0	80	0	7	0	16
40-6	8	86	7.9	13	23	30 20
41-1	246	204	245.9	131	723	305
41-2	0	79	0	6	0	14
41-3	2	90	1.9	17	6	40
41-4	4	116	3.9	43	11	100
41-5	38	166	37.9	93	111	216
✓ 41-6	2	70	1.9	0	6	0

Remarks:

Reviewed by:

N. Whitely

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES α .34 β .43

MDA α 13 β 484

PERFORMED BY J. Sitzler

Sample Count Time: 1 min.

Activity Report In: 2000 μ Ci

α Background .1 cpm

β Background 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 42-1	34	82	33.9	9	100	21
42-2	0	108	0	35	0	81
42-3	84	98	83.9	25	247	58
42-4	4	98	3.9	25	11	58
42-5	6	92	5.9	19	17	4
42-6	8	84	7.9	11	23	26
43-1	8	92	7.9	19	23	44
43-2	8	80	7.9	7	23	16
43-3	50	84	49.9	11	147	26
43-4	6	58	5.9	0	17	0
43-5	8	108	7.9	35	23	81
43-6	2	82	1.9	9	6	21
44-1	2	72	1.9	0	6	0
44-2	2	74	1.9	1	6	2
44-3	214	126	213.9	53	629	123
44-4	58	116	57.9	43	170	100

Remarks:

Reviewed by: N. [Signature]

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/18/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171400

DETECTOR ID: 43-10-1/179311

EFFICIENCIES α .34 β .43

MDA: α 13 β 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1min.

Activity Report In: 2 dpm 2 μ Ci

α Background: .1 cpm

β Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	β	α	β	α	β
Room 44-5	8	74	7.9	1	23	2
44-6	2	96	1.9	23	6	53
46-1	70	92	69.9	19	206	44
46-2	2	92	1.9	19	6	44
46-3	4	94	3.9	21	11	49
46-4	4	100	3.9	27	11	63
46-5	134	116	133.9	43	394	100
46-6	8	66	7.9	0	23	0
36-1	0	60	0	0	0	0
36-2	0	200	0	127	0	295
36-3	2	412	1.9	339	6	788
36-4	4	116	3.9	43	11	100
36-5	0	310	0	237	0	551
36-6	0	132	0	59	0	137

Remarks:

Reviewed by: NJ White

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES: α .34 $\beta\gamma$.43

MDA: α 13 $\beta\gamma$ 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: ☒ dpm ☐ μ Ci

α Background: .1 cpm

$\beta\gamma$ Background: 73 cpm

SAMPLE I.D. OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	$\beta\gamma$	α	$\beta\gamma$	α	$\beta\gamma$
68-1	2	68	1.9	0	6	0
68-2	12	104	11.9	31	35	72
68-3	2	78	1.9	5	6	12
68-4	12	108	11.9	35	35	81
68-5	8	100	7.9	27	23	63
68-6	18	100	17.9	27	53	63
68-7	16	110	15.9	37	47	86
69-1	4	950	3.9	877	11	2040
69-2	4	2168	3.9	2095	11	4872
69-4	2	170	1.9	97	6	226
70-1	54	482	53.9	409	159	951
70-2	84	140	83.9	67	247	156
70-3	62	134	61.9	61	182	142
70-4	194	342	193.9	269	570	626
71-1	44	178	43.9	105	129	244
71-2	38	150	37.9	77	111	179

Remarks: _____

Reviewed by: Nel White

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES: α .34 $\beta\gamma$.43

MDA: α 13 $\beta\gamma$ 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: α dpm β μ Ci

α Background: .1 cpm

$\beta\gamma$ Background: 73 cpm

SAMPLE I.D. OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	$\beta\gamma$	α	$\beta\gamma$	α	$\beta\gamma$
71-3	10	122	9.9	49	29	114
71-4	34	110	33.9	37	100	86
71-5	18	242	17.9	169	53	393
72-1	6	102	5.9	29	17	67
72-2	38	146	37.9	73	111	170
72-3	42	598	41.9	525	123	1221
72-4	0	102	0	29	0	67
73-13	1260	368	1259.9	295	3706	686
73-14	1136	416	1135.9	343	3341	798
73-15	2492	600	2491.9	527	7329	1226
73-16	1572	520	1571.9	447	4623	1040
74-6	16	86	15.9	13	47	30
74-7	8	82	7.9	9	23	21
74-8	10	72	9.9	0	29	0
74-9	18	134	17.9	61	53	142
74-10	10	62	9.9	0	29	0

Remarks:

Reviewed by:

Nal White

Date

10/13/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFFICIENCIES: α .34 $\beta\gamma$.43

MDA: α .13 $\beta\gamma$ 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: ☒ dpm ☐ μ Ci

α Background: .1 cpm

$\beta\gamma$ Background: 73 cpm

SAMPLE ID OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	$\beta\gamma$	α	$\beta\gamma$	α	$\beta\gamma$
74-11	6	64	5.9	0	17	0
74-12	280	142	279.9	69	823	160
75-1	0	88	0	15	0	35
75-2	8	82	7.9	9	23	24
75-3	6	96	5.9	23	17	50
75-4	20	80	19.9	7	59	16
75-5	0	68	0	0	0	0

Remarks: _____

Reviewed by: Neil White

Date: 10/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Jane Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/171600

DETECTOR ID: 43-10-1/179311

EFICIENCIES: α .34 β .43

MDA: α 13 B- 484

PERFORMED BY: J. Sitzer

Sample Count Time: 1 min.

Activity Report In α dpm c μ Ci

α Background: 1 cpm

By Background: 73 cpm

[illegible]

Remarks:

Reviewed by:

Date. 12/18/01

SMEAR COUNTING ANALYSIS REPORT

Date: 10/17/01

Analysis Performed by: Janet Sitzler

COUNTING SYSTEM DATA

INSTRUMENT ID: 2929/17/600

DETECTOR ID: 43-10-1/179311

EFICIENCIES α .34 $\beta\gamma$.43

MDA: α 13 $\beta\gamma$ 484

PERFORMED BY: J. Sitzler

Sample Count Time: 1 min.

Activity Report In: α dpm $\beta\gamma$ μ Ci

α Background: .1 cpm

$\beta\gamma$ Background: 73 cpm

SAMPLE I.D. OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	$\beta\gamma$	α	$\beta\gamma$	α	$\beta\gamma$
TCSL - 1	0	102	0	29	0	67
TCSL - 2	0	120	0	47	0	109
TCSL - 3	0	92	0	19	0	44
TCSL - 4	0	72	0	0	0	0
TCSL - 5	10	122	9.9	49	29	11
TCSL - 6	0	66	0	0	0	0
TCSL - 7	0	72	0	0	0	0
TCSL - 8	0	74	0	1	0	2
TCSL - 9	0	76	0	3	0	7
TCSL - 10	0	74	0	1	0	2
TCSL - 11	0	70	0	0	0	0
TCSL - 12	0	86	0	13	0	30
TCSL - 13	0	88	0	15	0	35
TCSL - 14	0	84	0	11	0	26
TCSL - 15	0	76	0	3	0	7
TCSL - 16	0	60	0	0	0	0

Remarks:

Reviewed by:

Del White

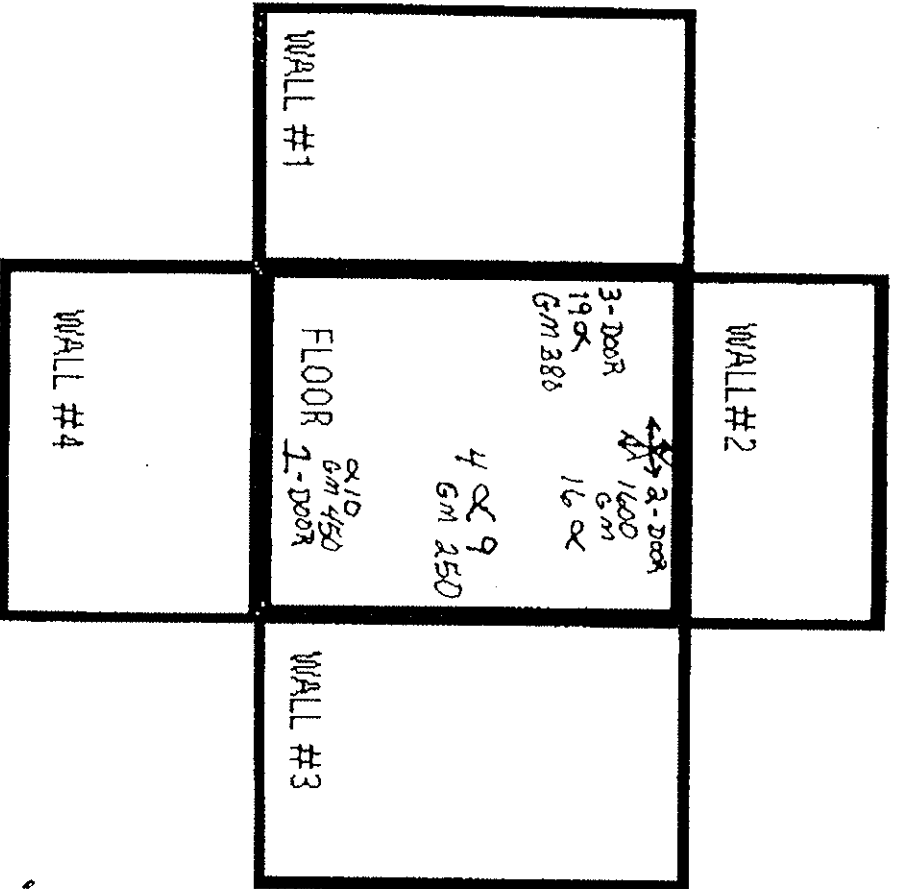
Date 10/18/01

Attachment F

Maps

5X. 400 CPM

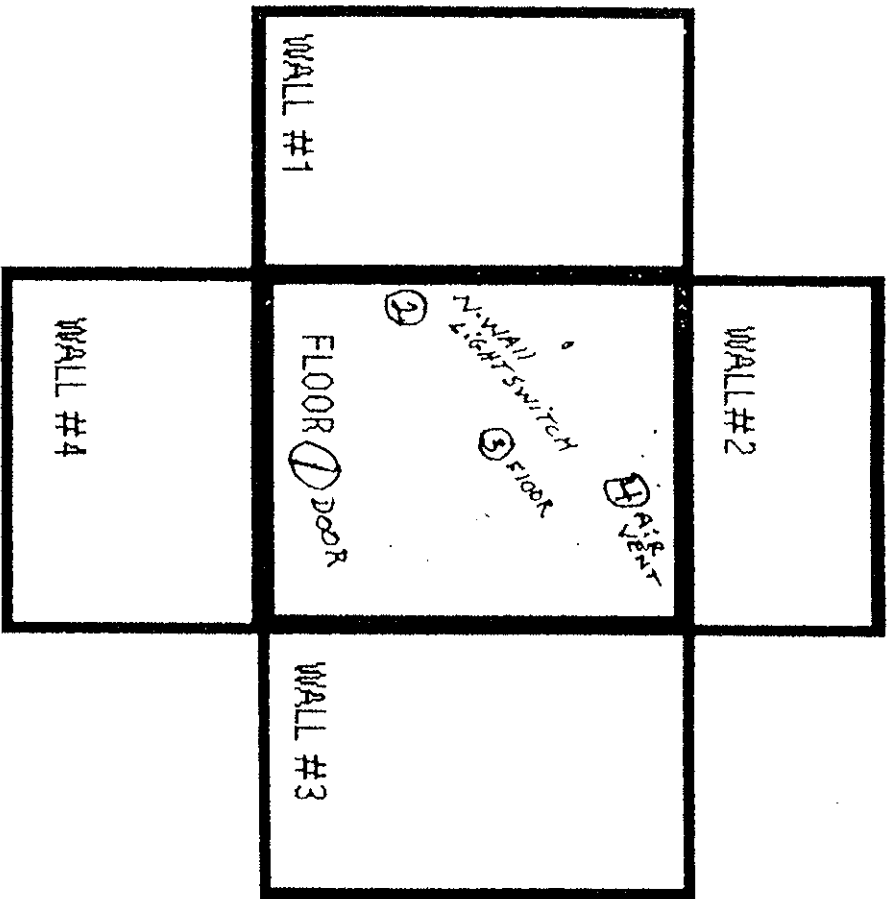
⑤ α
GM-320



ROOM NAME / # 22

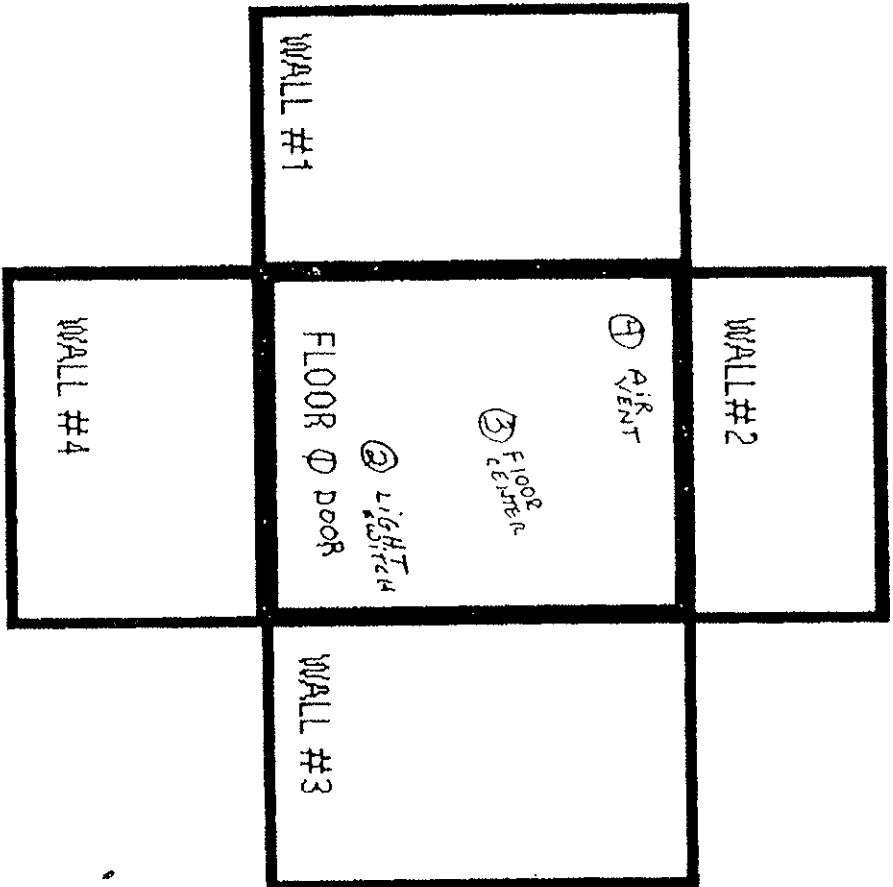
COMMENTS

BK 150
 ① 220 Gm $\alpha = 8$ $\gamma =$
 ② 150 Gm $\gamma =$
 ③ 150 Gm $\gamma =$
 ④ 150 Gm $\gamma =$



ROOM NAME / # 23
 COMMENTS _____

1-2-10 ~~24~~ 420/64 250
3 6M 250
4 BK 250



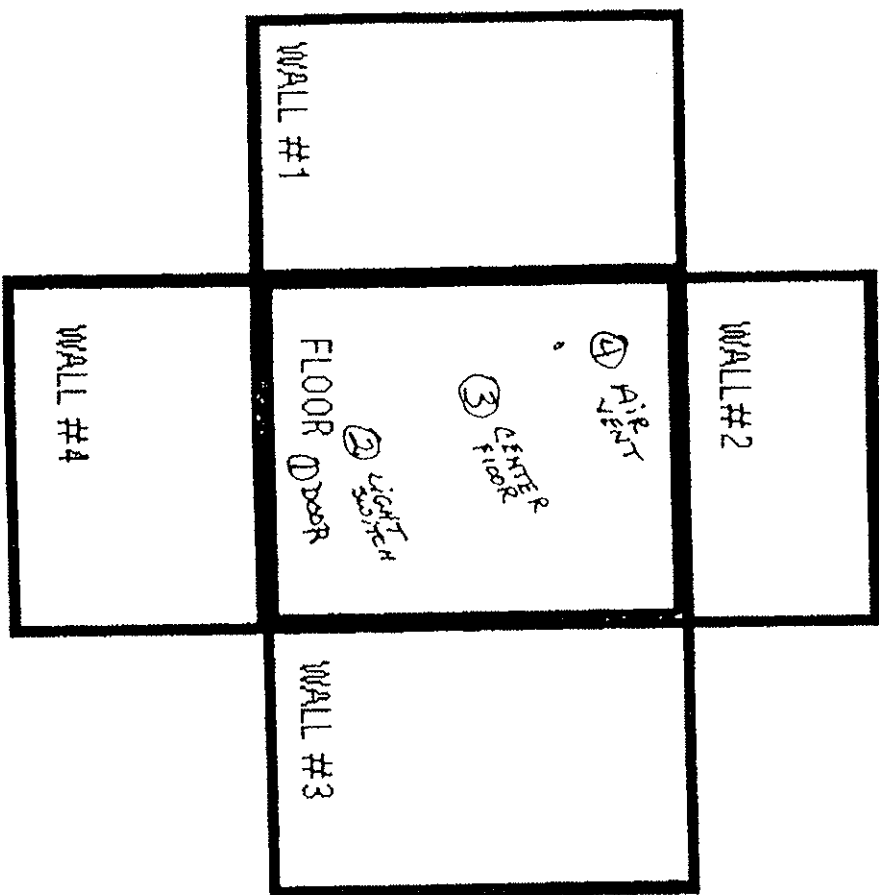
ROOM NAME / # 24

COMMENTS _____

OK 280

d = 12

- ① 280 cm
- ② 280 cm
- ③ 280 cm
- ④ 280 cm

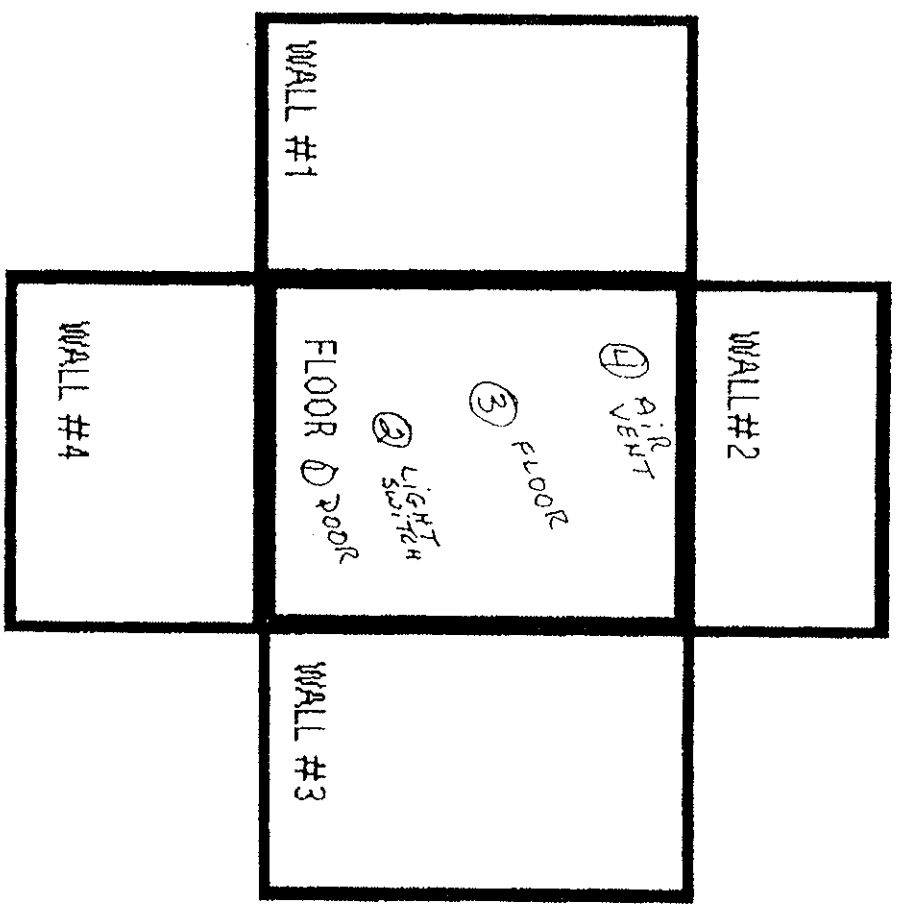


ROOM NAME / # 25

COMMENTS

1-2-10 10:20 AM 7:20 PM 2:20 PM

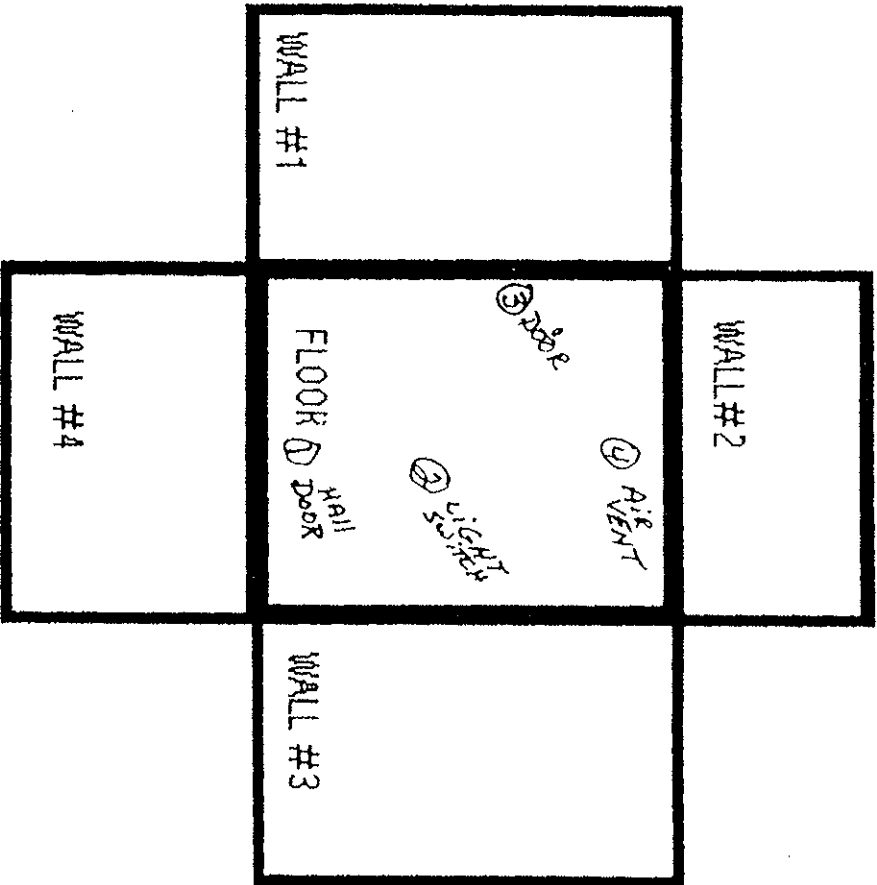
① GM. 400 9
 ② GM. 420 9
 ③ GM. 400 9
 ④ GM. 400 9



ROOM NAME / # 26
 COMMENTS _____

- ① 18 d
- ②
- ③ 3 d
- ④

BK-600

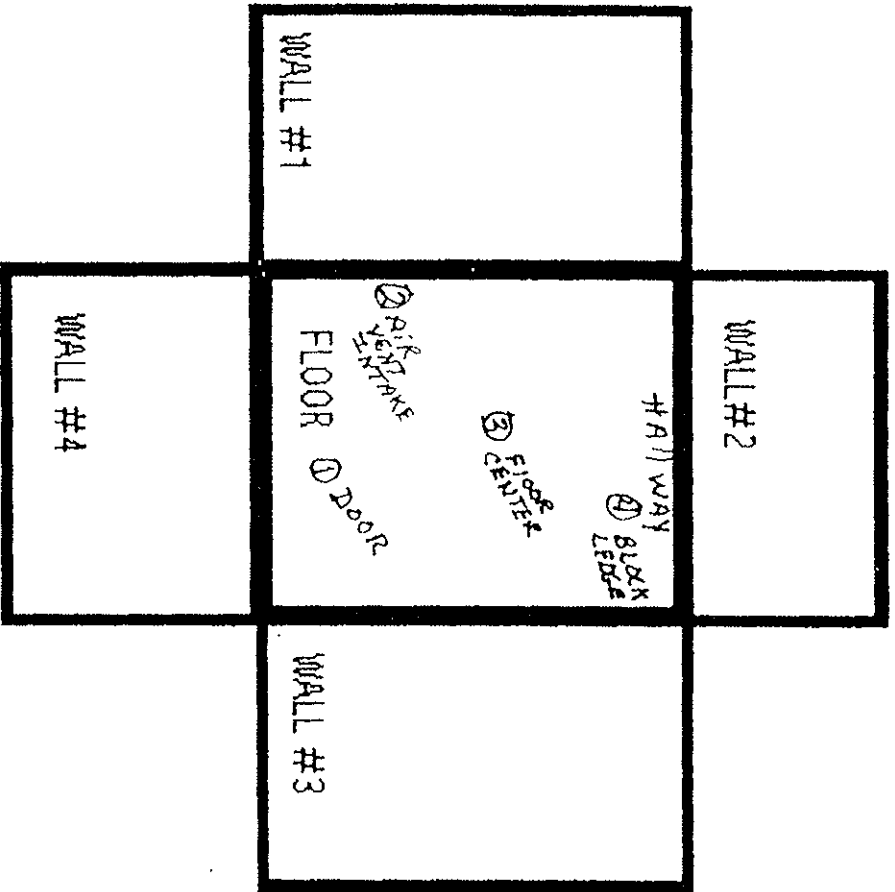


ROOM NAME / # 27

COMMENTS

CLEAN
HAIR
OF
28

② 39
③ 39
④ 39
BK = 1.2
BK



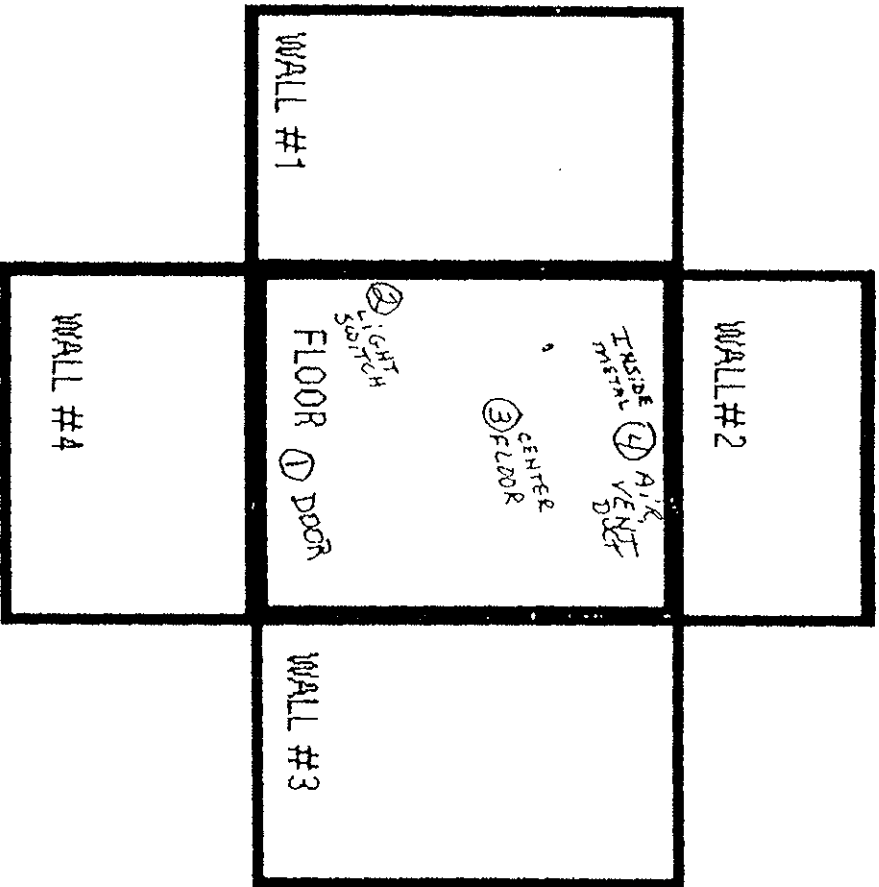
ROOM NAME / # 28

COMMENTS

①
②
③
④

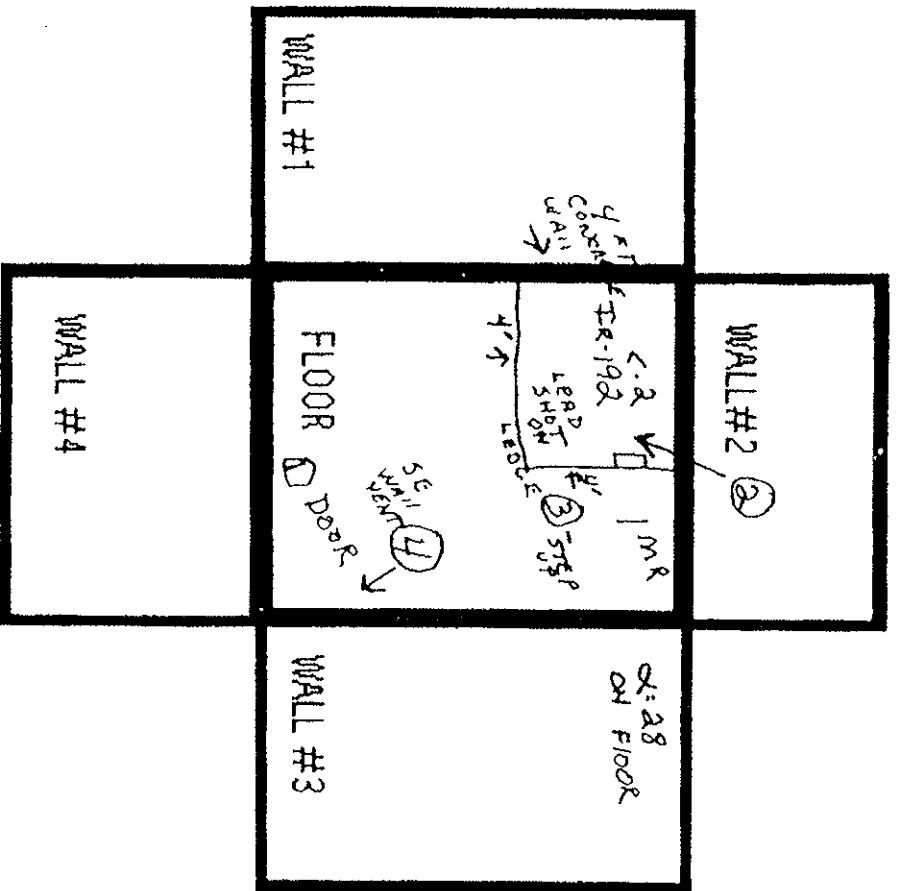
α = U

1.6. Rod SMAGNABLE



ROOM NAME / # 29

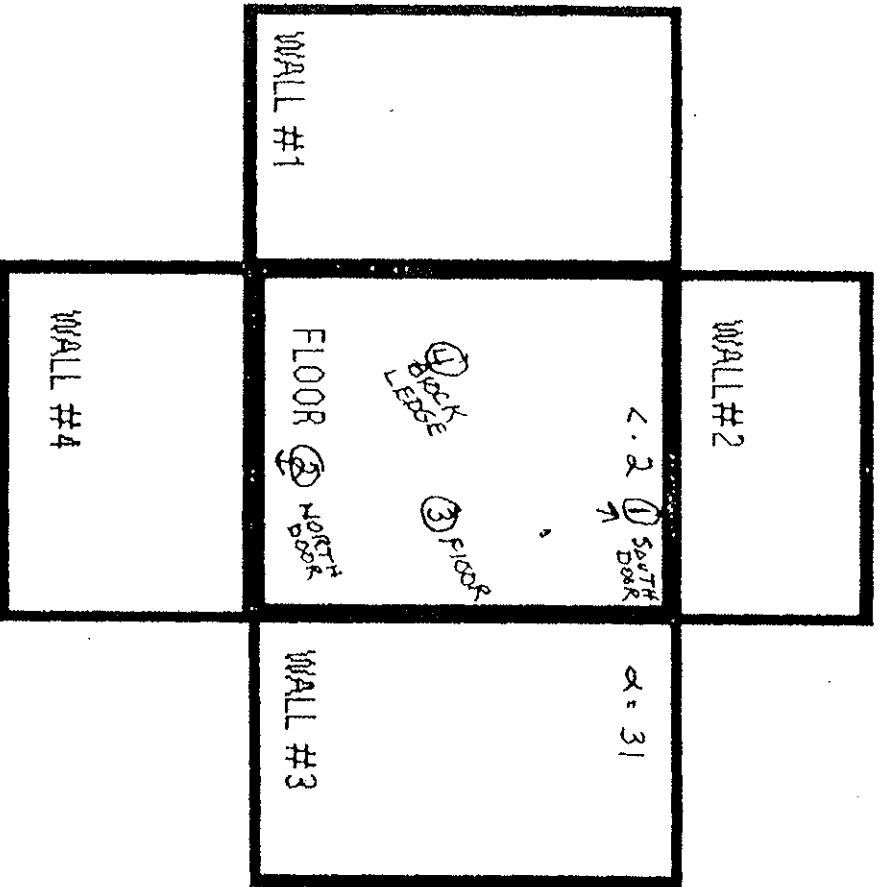
COMMENTS



N ↑

ROOM NAME / # 3D

COMMENTS

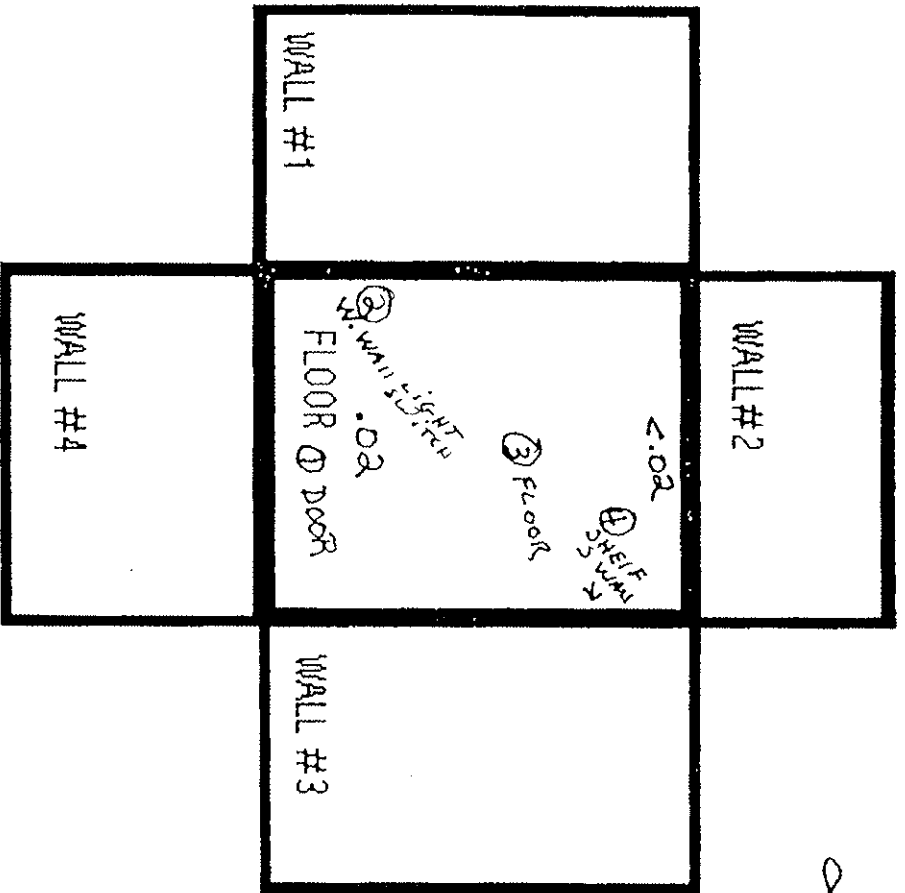


ROOM NAME / # 31

COMMENTS

$\alpha = 30$

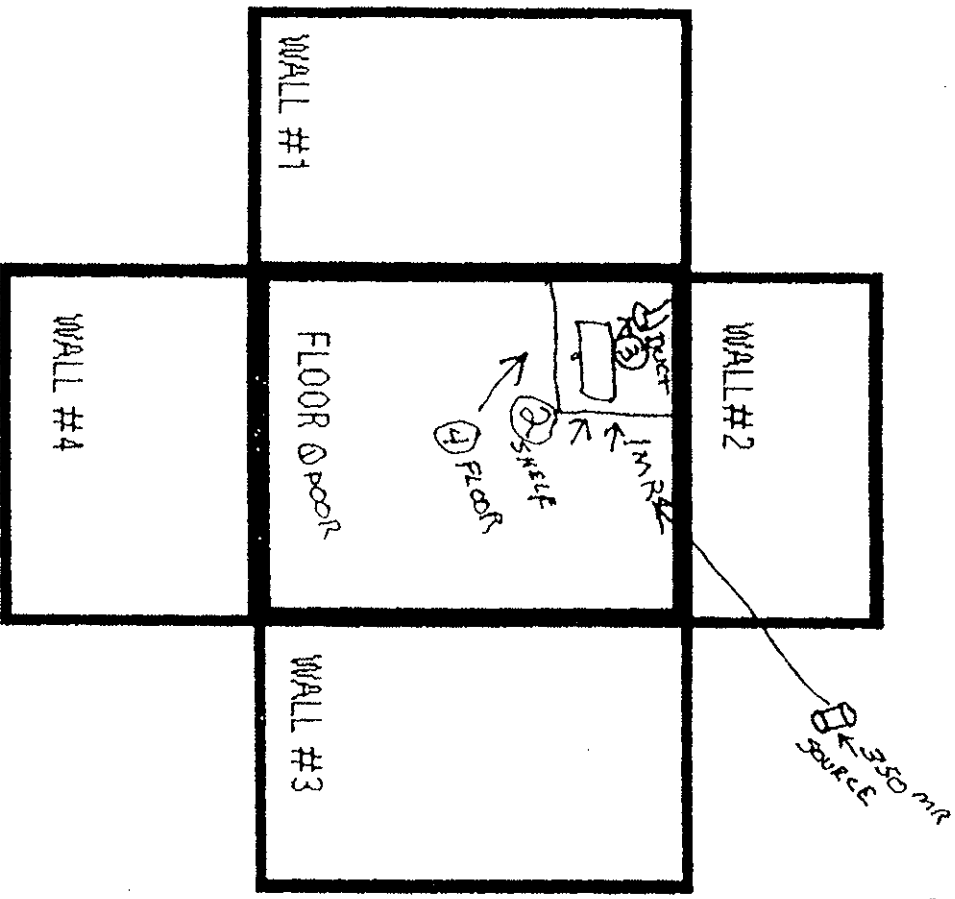
N ↑



ROOM NAME / # 32

COMMENTS _____

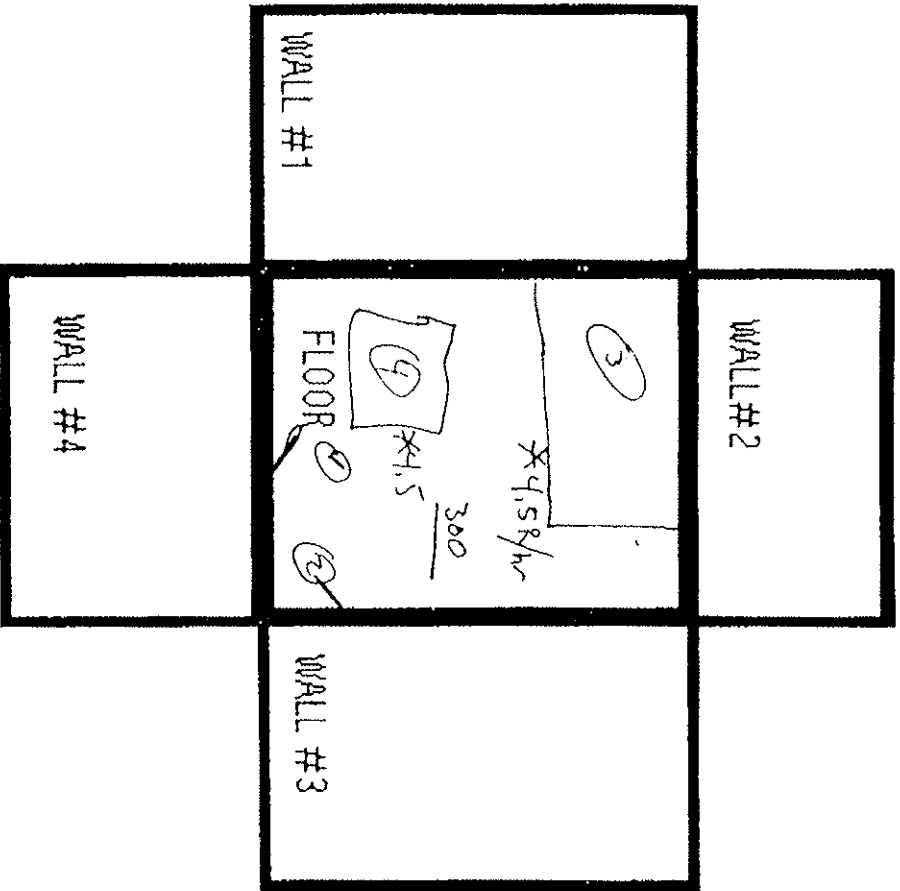
- ① 2000 < .2 CW
- ② .2 CW .40W
- ③ VENT 1.40W .2 CW
INSIDE
- ④ CW < .2 OW .2



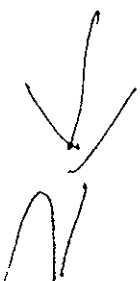
ROOM NAME / # 33

COMMENTS _____

2-light switches
 3-0/5 cell
 4-0/5 cell #2



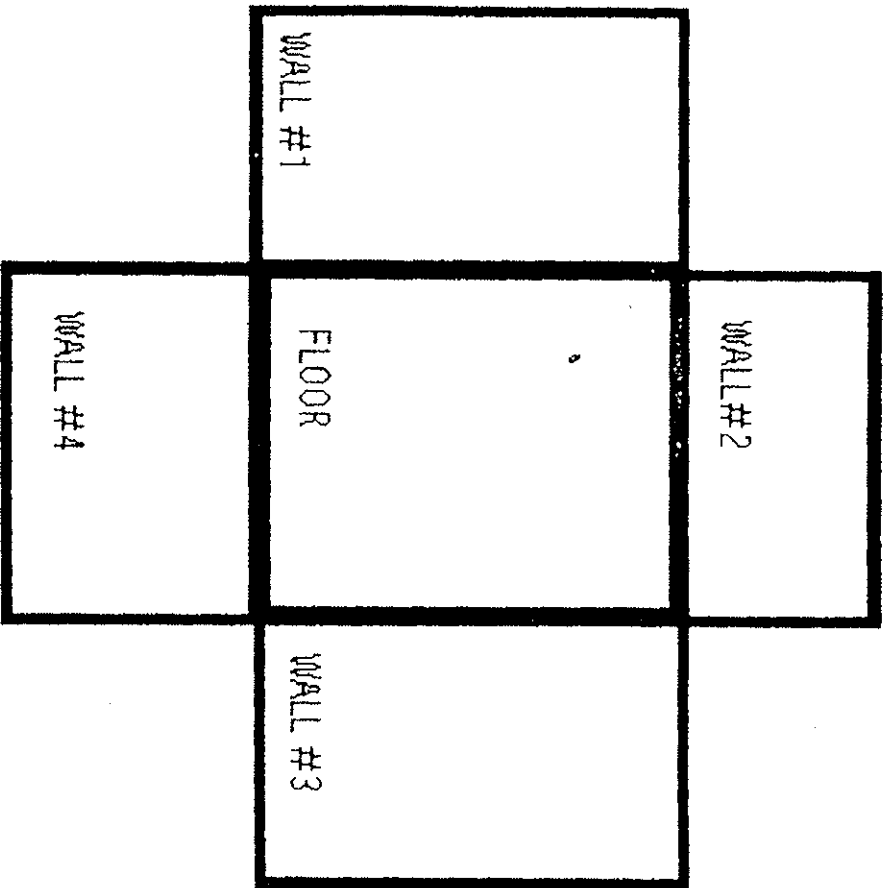
- ① <.2CW 50W
- ② <.2CW 2.6 DW
- ③ <.2CW 6 DW
- ④ <.2CW 5 DW



Small cell-12 gauge st.
 4" lead
 12 gauge st.

ROOM NAME / # 34

COMMENTS _____



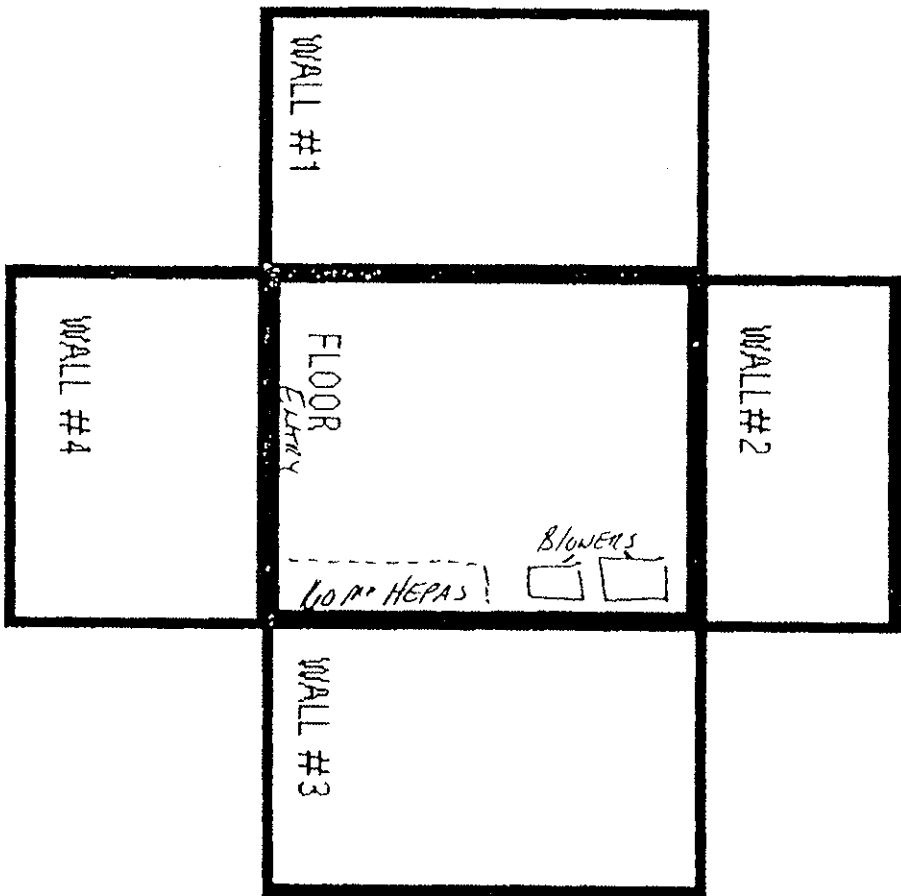
ROOM NAME / # 35

COMMENTS _____

1 - view - 1/1/1

← N

Klorix:
932



ROOM NAME / # Room 86

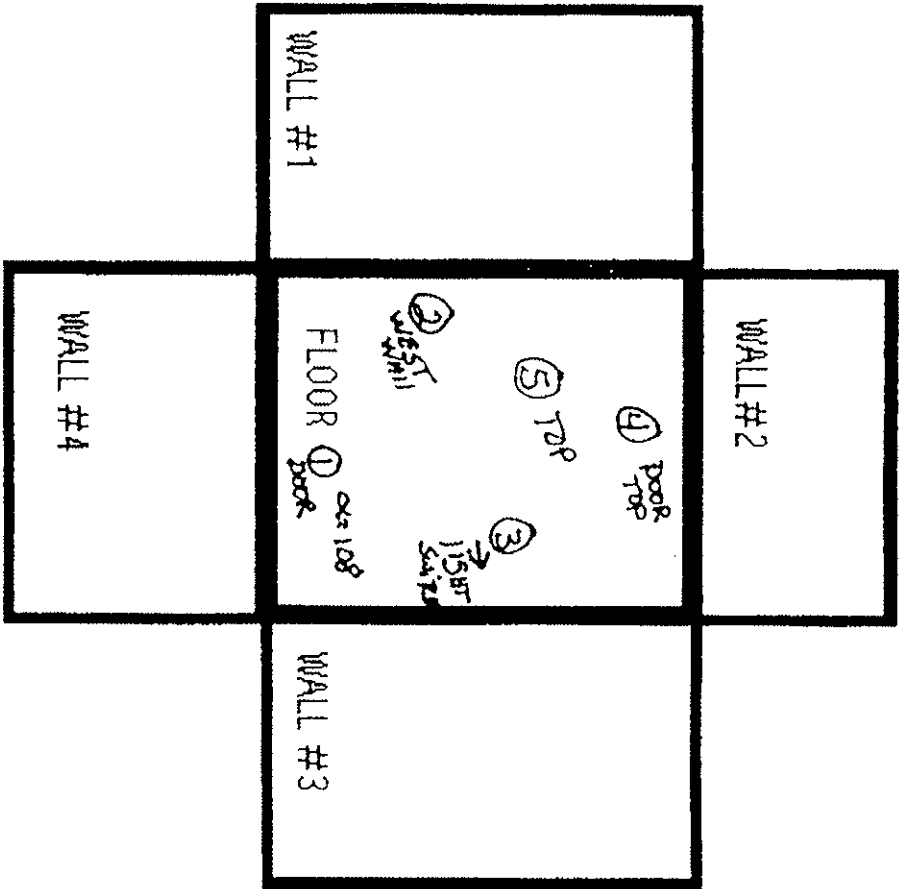
COMMENTS

Smear 1 Entry, Smear 2 at Top of Black Wall, Smear 3 Front of Door
Smear 4 Blower Case, Smear 5 Front of Door 03, Smear 6 at Top of Black Wall Next Window N.

BK = 450
DRAIN # 2 = 740 cfm
DRAIN # 3 = 500 cfm - BK = 400
DRAIN # 1
All DRAINS CLOSED & CLOSED
3 AIR VENTS SOUTH WALL TOP

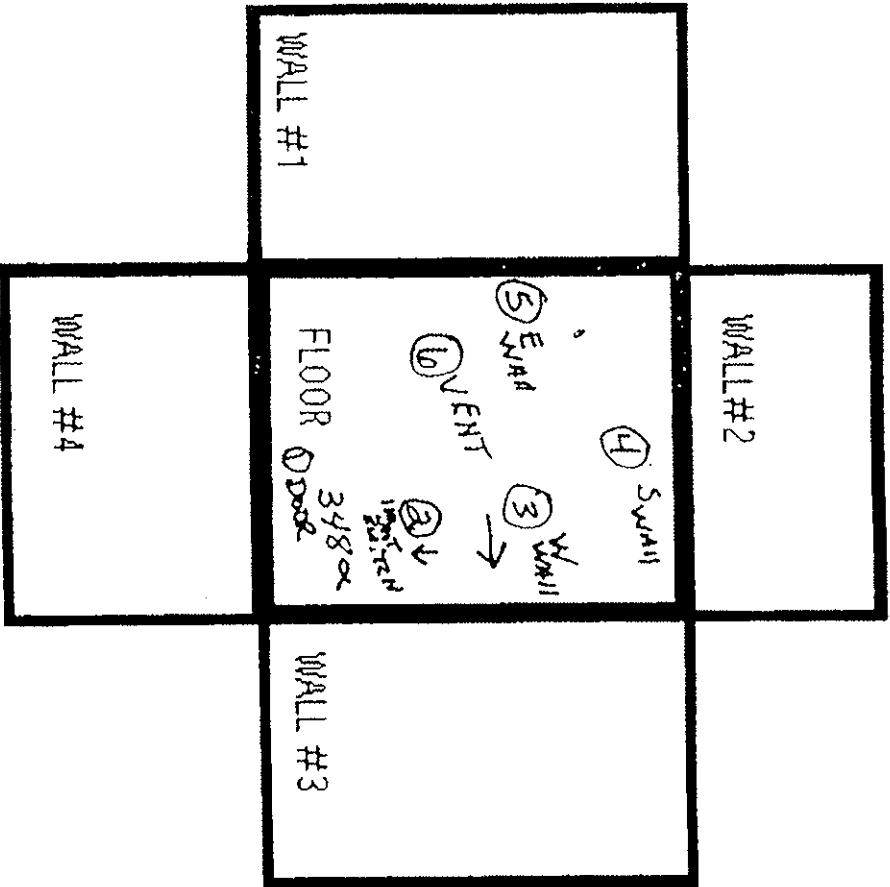
[illegible]

COMMENTS



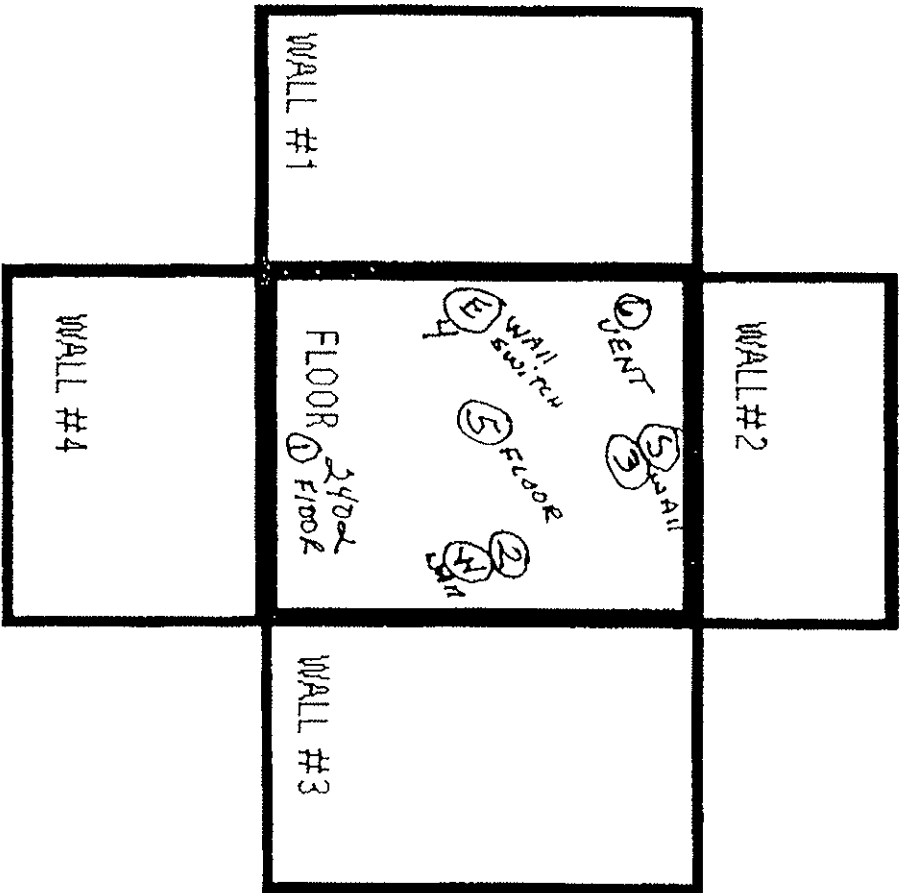
ROOM NAME / # 38

COMMENTS



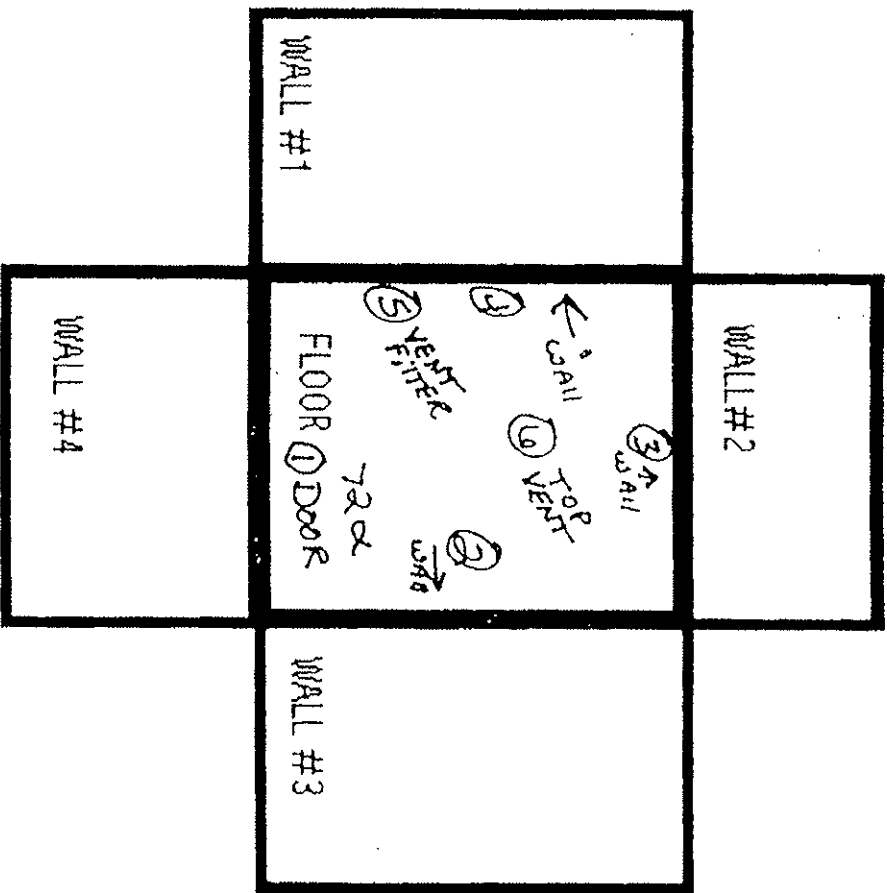
ROOM NAME / # 39

COMMENTS _____



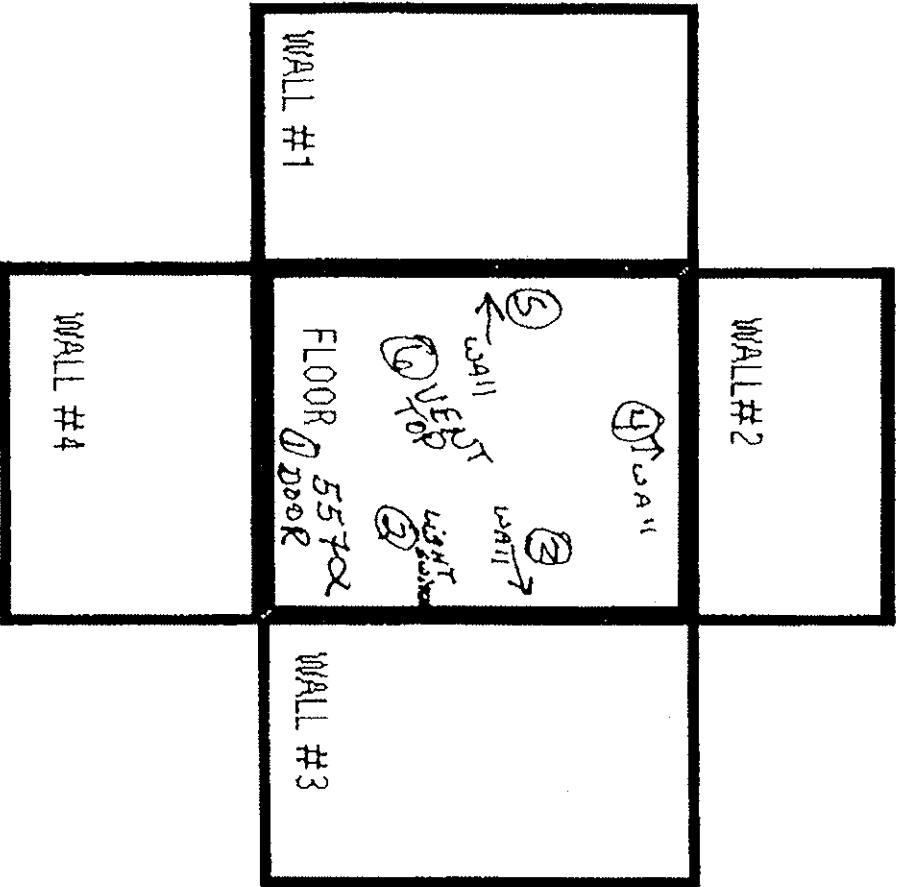
ROOM NAME / # 40

COMMENTS



ROOM NAME / # 41

COMMENTS _____

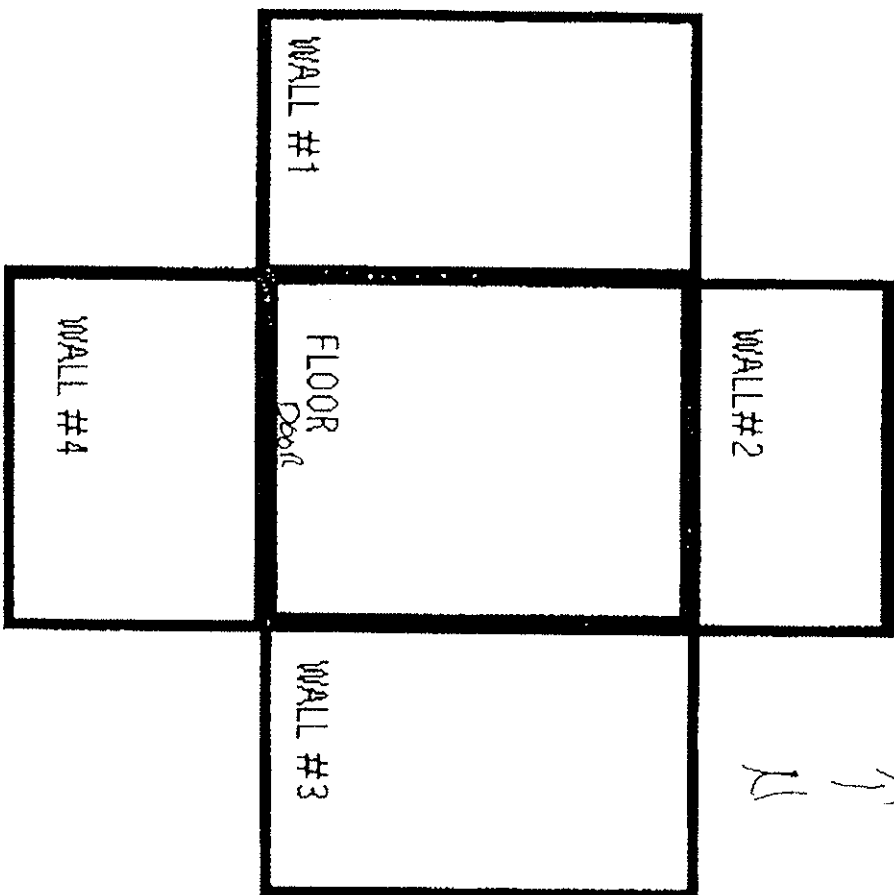


ROOM NAME / # 42

COMMENTS _____



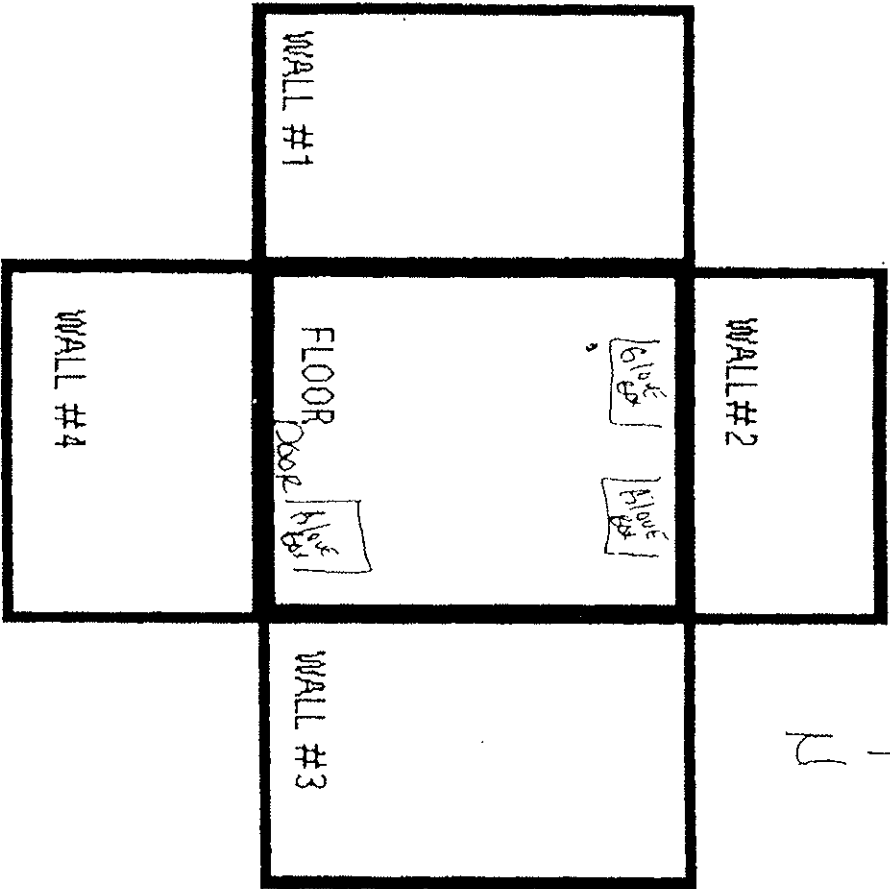
NOTE: ALPH - O



ROOM NAME / # 44

COMMENTS Since 1 - Door Since 2 Light Switch, Since 3 Door Knob of Closet.
Since 4 Center of Floor, Since 5 Door To Am-CAB. Since 6 Vent over HO CAB

NOTE: ALPH - D

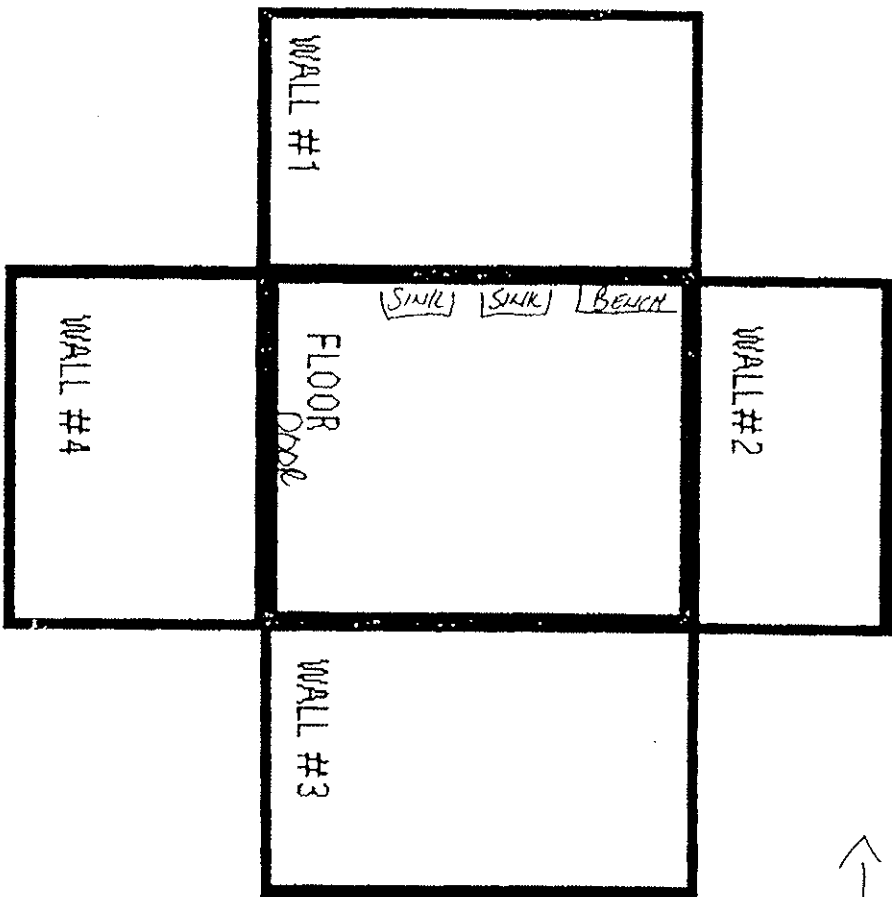


ROOM NAME / # 46

COMMENTS

SWAN 1. DOORWAY, SWAN 2 LIGHT SWITCH, SWAN 3. TAN E. WALL,
SWAN 4 ABOVE BOX N.E. CORNER, SWAN 5 CENTER OF FLOOR, SWAN 6 AIR VENT.

← N



Notes:

9-ENTRY SOURCE FOR
BUILT DOORWAY TRAIL
JAN
CLEANING AREA - JAN.

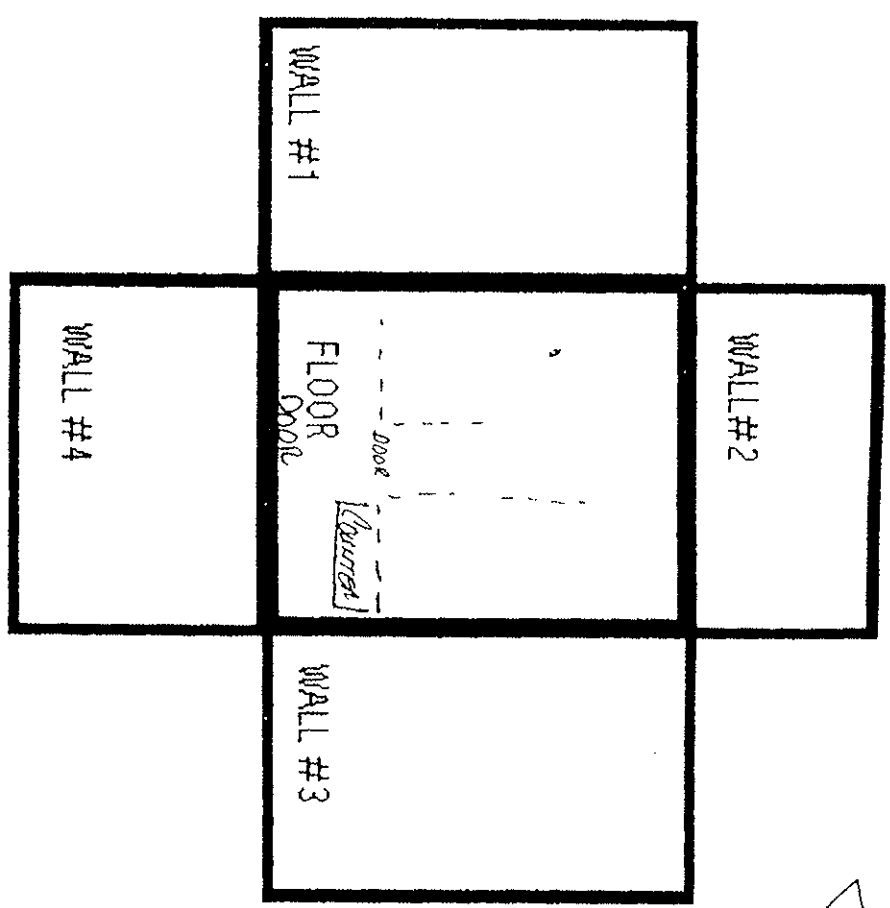
ROOM NAME / # 166

COMMENTS APPROX 1 INSIDE DOOR APPROX 2 INSIDE BUILT APPROX 3 ON BENCH PLUMBING 4 FLOOR BELL AREA.

← N

Notes:

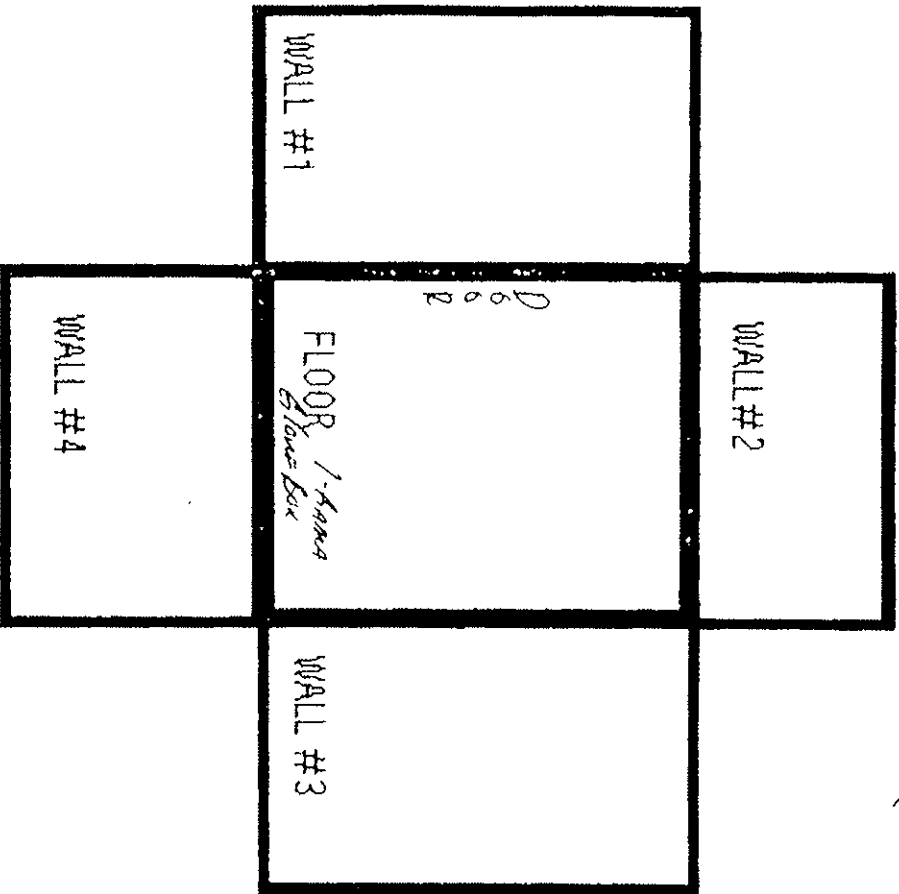
- 1-CABINETS - Full Acid
- 1-495 Full CEMENTS
- 2-Pks - ~~CS~~ CS 137
- 2-Pks - 74 228
- 3 Pks 60 158
- 3 Boxes Unknown
- 1-6" Pw. Full CEM



ROOM NAME / # 67

COMMENTS Sweater 1. Fruit de Dore, Sweater 2, 3 Four Star, Sweater 4 Acid Cabinets

← - 21

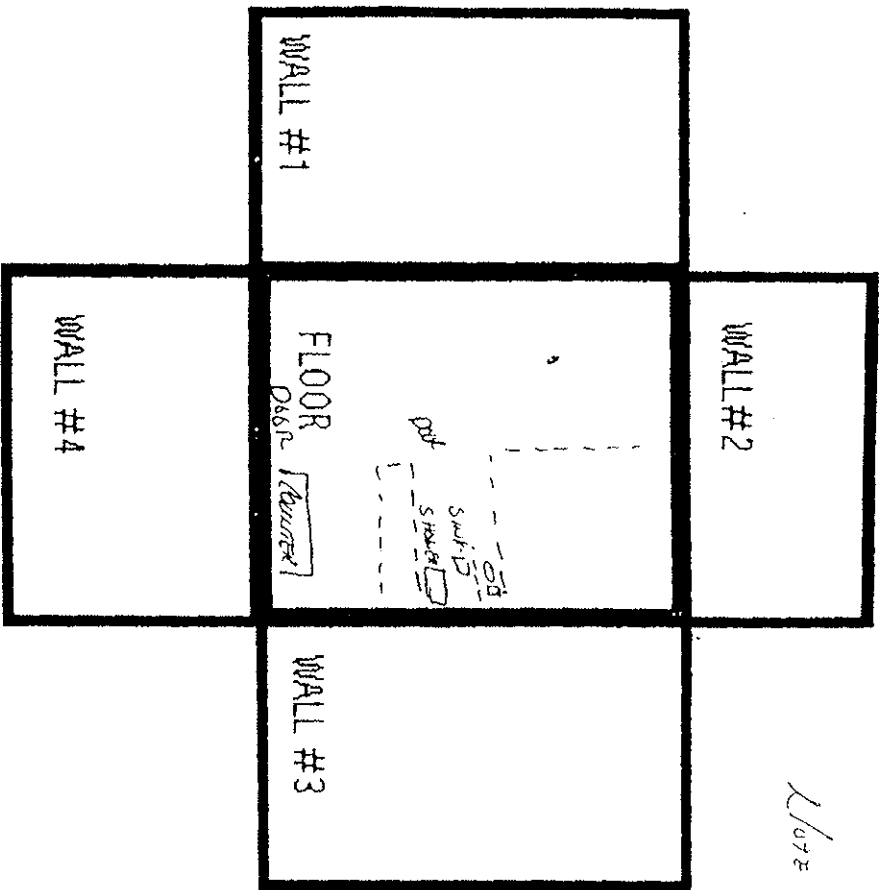


ROOM NAME / # 67

COMMENTS *Shower /*

Note: Sink / Shower Drain To
Hollow Tank

Hollow Tank = 4mm



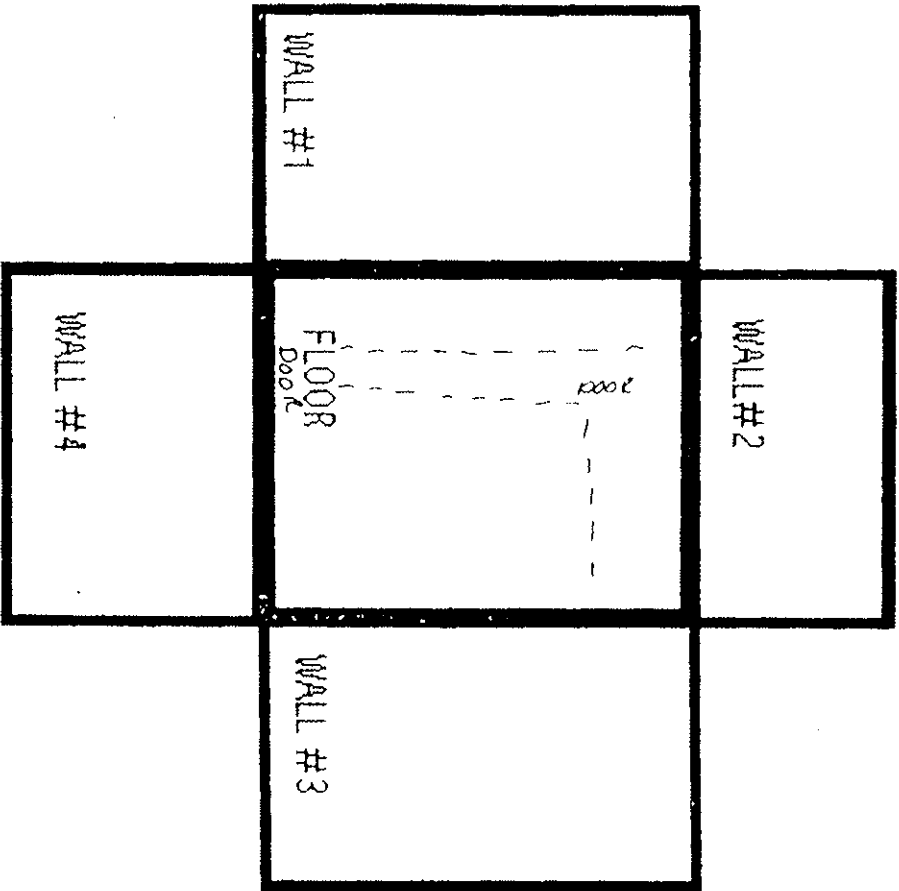
ROOM NAME / # 68

COMMENTS

Room 1 Door / Door Keys, Room 2 Shower / Drain, Room 3 Sink,
Room 4 Floor Shower Area, Room 5 Hollow Tank, Room 6 Counter, Room 7 Floor - Door OSS.

2-11

Notes - Room Full - hardware
Notes - 110 To 40 at Door



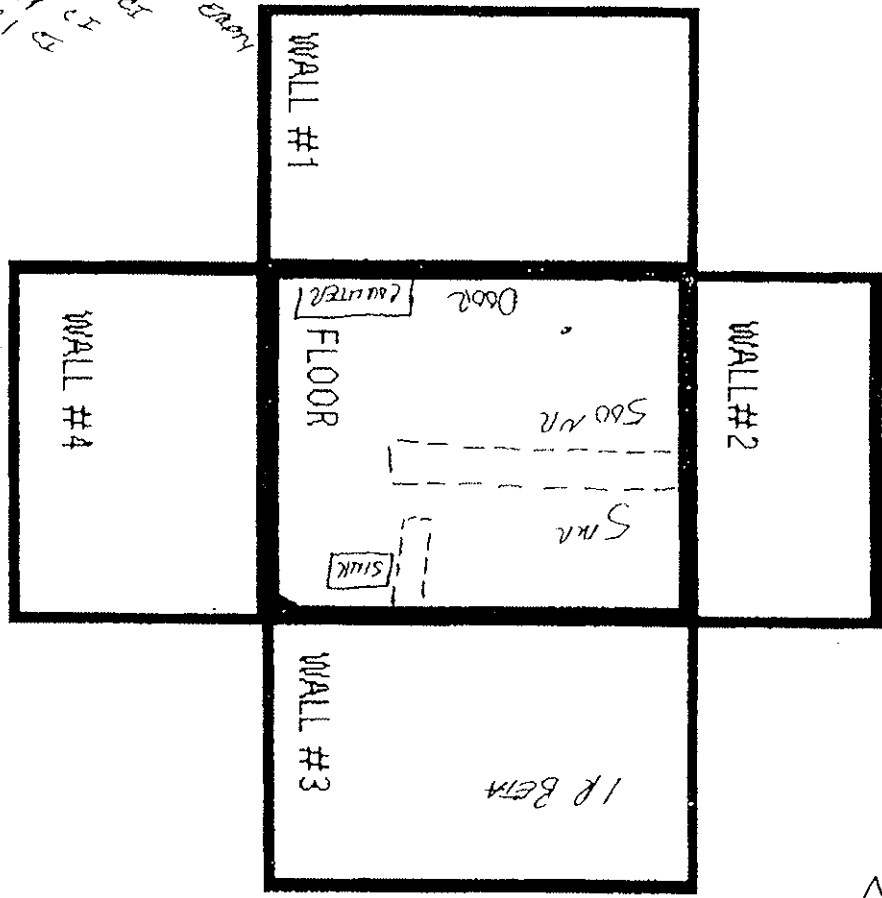
ROOM NAME / # Room 69

COMMENTS Insane 4 - Door, Insane 5 - hardware Area Insane 69 door, Insane 1 - hardware Area 110 door

Silver 110-AB110
 450 A.M.
 RD153
 32500 DPM - ERM
 CL-60 10+ MCE
 I-131 3.1 CF
 H 131 3.31 CF

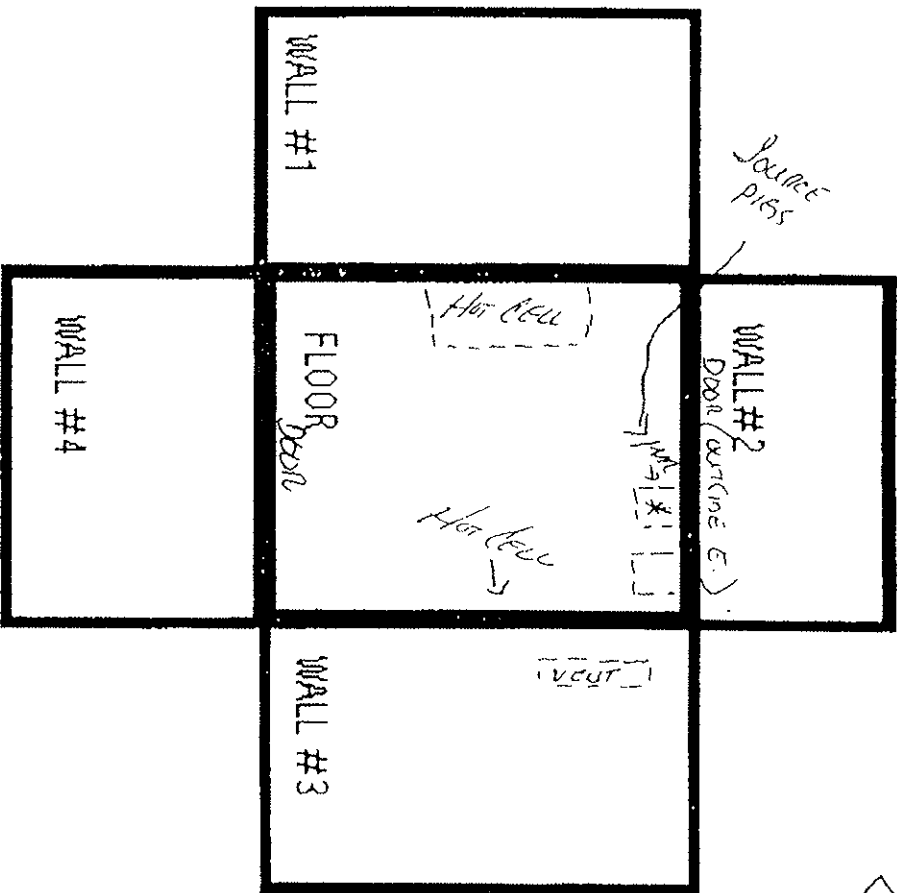
ROOM NAME / # 70

COMMENTS
 Section 4 Entryway, Section 3 Quarter Tor, Section 2 Inside Hook, Section 1 Floor
 Back Area. General Area 500 MCE



15 source R61
 all written

← N

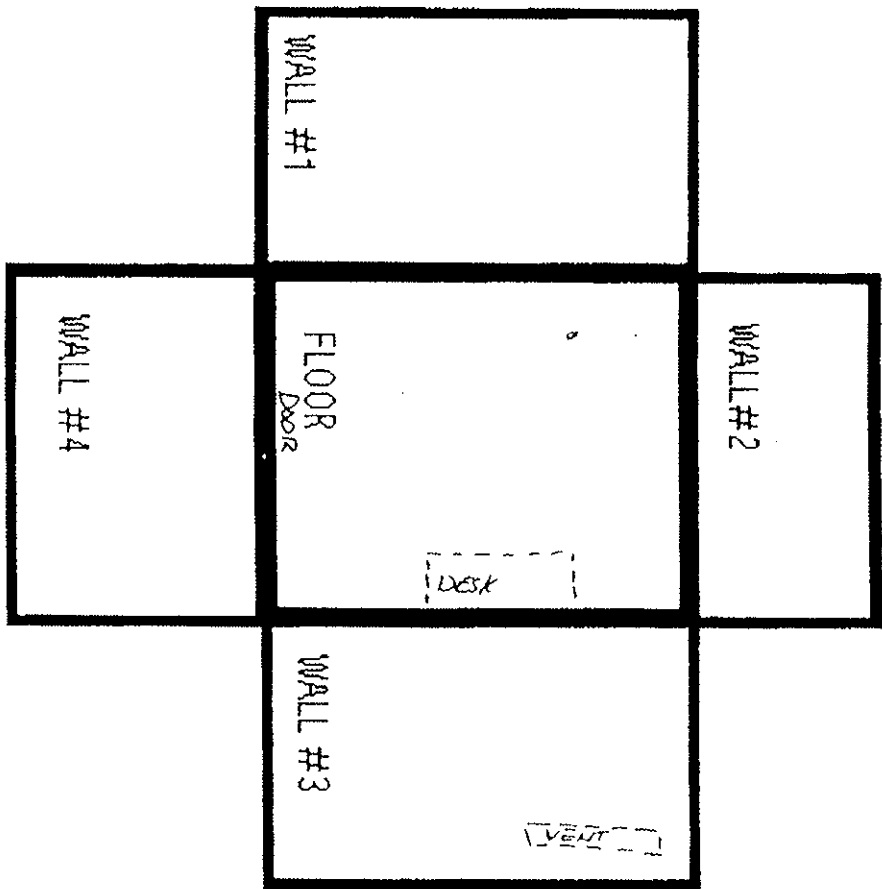


ROOM NAME / # TRAILER LAB 71

COMMENTS

Interior / Exterior Area Floor Plan, Interior 3 Door To Hot Cell, Interior 3 Entry Way To Hot Cell, Interior 4 Door To Outside (Outside East), Interior 5 Inside Above Box.

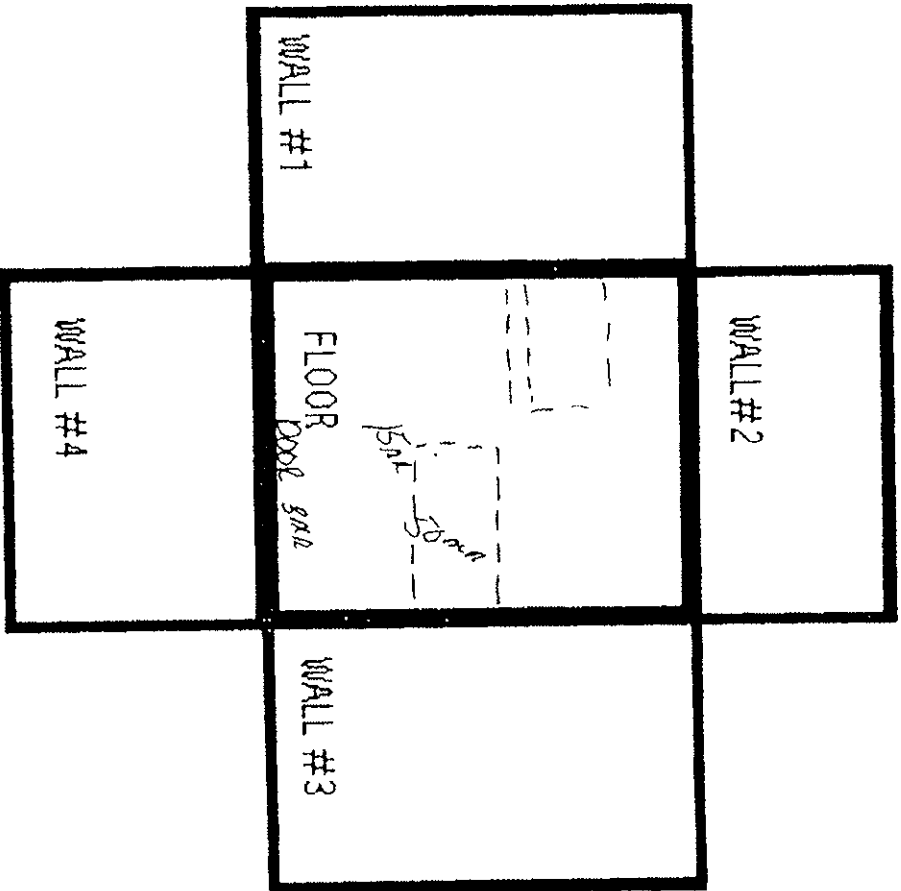
← N



ROOM NAME / # TRUCK BAY # 72

COMMENTS SPACE 1-2 FLOOR HEIGHT AREA, SPACE 3 DOOR KIOSK + JOY, HEIGHT AREA 140 CM MEAN 4 VENT

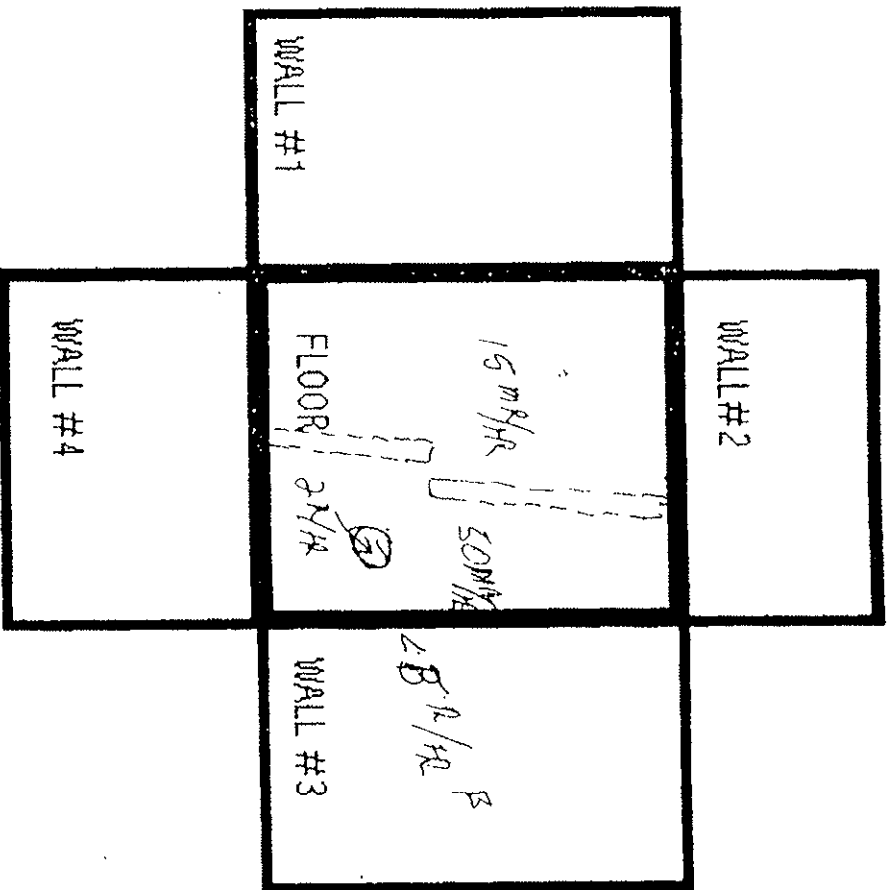
N →



ROOM NAME / # Waste Storage Room #73

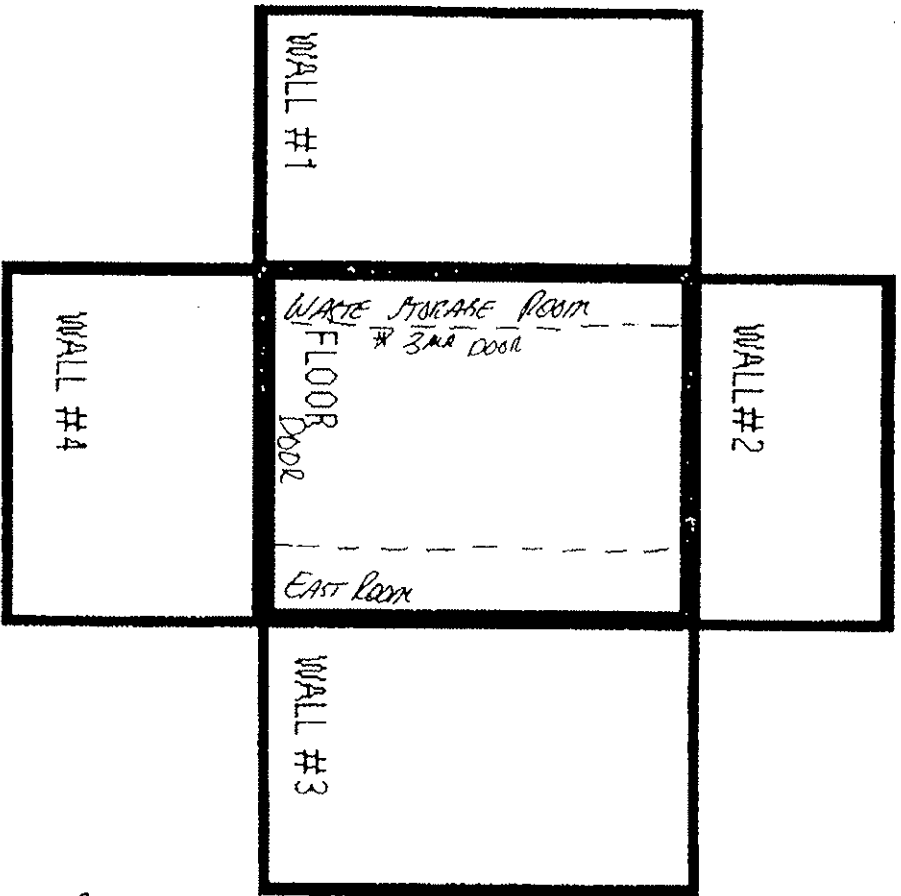
COMMENTS _____

N →



ROOM NAME / # WASTE STORAGE ROOM # 73

COMMENTS holes in roof, biggest 4' vent, walls 4' concrete



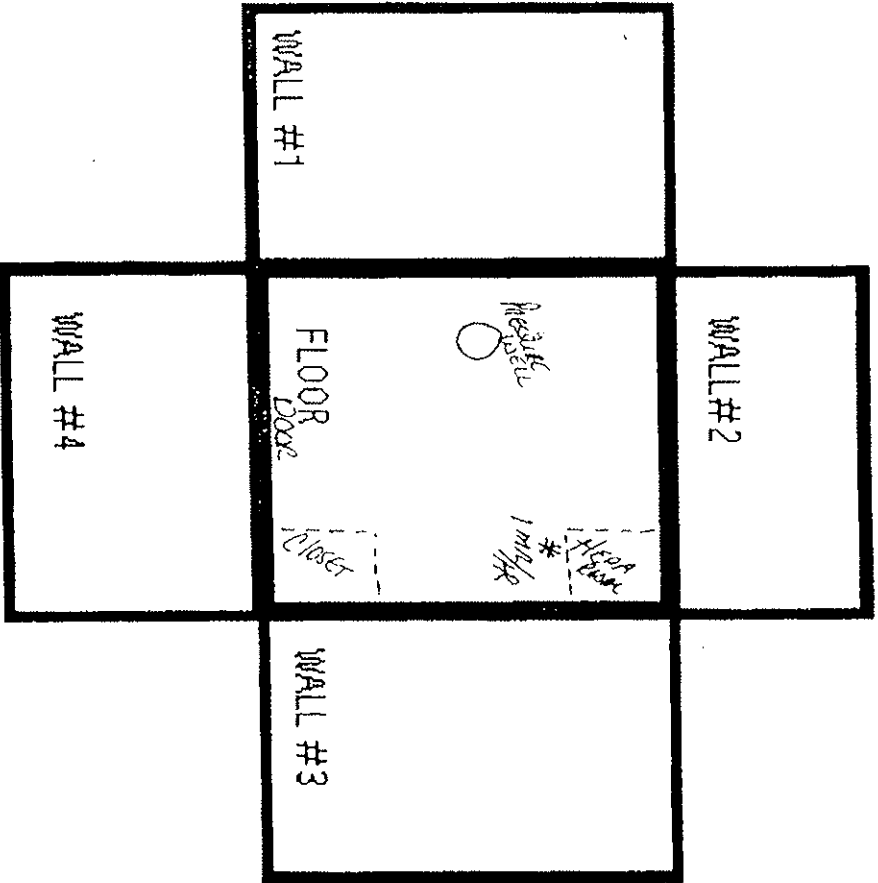
↑
N

ROOM NAME / # Waste Room Waste # 74

COMMENTS Roof leaks, Airman Pass, Leak

← N

East Room



COMMENTS

ROOM NAME / # East Room 1175e # 75

