Routine Radiological Survey for Phytotech, Inc.

August, 1999

Prepared by
Radiation Science Inc,
NRC License # 29-30310-01

Survey Description

This survey was performed on Monday, August 30, 1999 at the Phytotech, Inc., facility in Monmouth Junction, New Jersey. The survey included collection of wipe samples and the performance of a scanning survey in the laboratory area and hallways of the facility. A summary of reportable levels of contamination appears on page 2.

Wipe samples were obtained by wiping at least 100 cm^2 with a 4.25 cm diameter, cloth smear. A two minute integrated measurement was taken on each sample with a 100 cm^2 gas proportional meter at a distance of 0.5 cm.

Locations of the wipe samples are indicated on the room diagrams contained in this report. Analytical results are presented below each diagram. Results are reported as less than the Minimum Detectable Activity (MDA) of the instruments where appropriate.

Equipment, tabletops, the hood, and the floor directly in front of the hood were scanned with a 100 cm^2 gas proportional detector using the audio output to identify areas of elevated radioactivity. Hotspots are identified as areas greater than twice background. Each hotspot is identified on the corresponding room diagram along with the results of a one minute integrated measurement. The results are reported in disintegrations per minute based on the meter's efficiency to Thorium 230.

All meters and instrumentation used for this survey have been calibrated within the past twelve months to standards traceable to the National Institute of Standards and Testing (NIST).

Reviewed and Approved by: _____

Date: 8/31/99

Survey Summary - August 30, 1999

The following summary includes all removable and fixed contamination found to be greater than the MDA.

Removable Activity

No removable activity was detected by wipe analysis.

Direct Measurements

No activity was detected by direct measurement.

Minimum Detectable Activity

Calculations*

Equation

$$MDA = \frac{2.71 + 4.65\sqrt{Br \times t}}{t \times E \times A/100}$$

where:

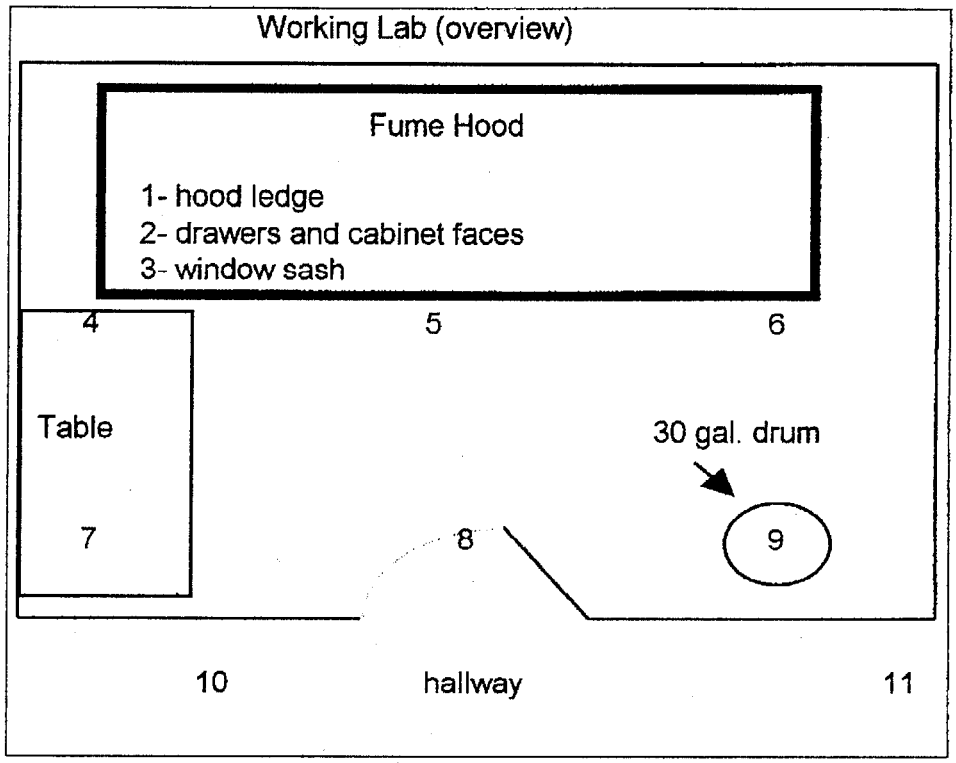
MDA = activity in dpm/100 cm^2
Br = background rate in counts per minute
t = counting time in minutes
E = detector efficiency in counts per disintegration (4π)
A = probe area or area wiped in cm^2

Total Activity Measurements

Meter: Ludlum model 12 serial # 153037
Probe: Ludlum 43-68 serial # 114376

MDA for detection of Thorium 230: 179 dpm/100 cm^2

* From: NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination". For an integrated measurement over a preset time.



Wipe Sample Results - Analysis by Gas Proportional Counting

Wipe #	Results
1	<MDA
2	<MDA
3	<MDA
4	<MDA
5	<MDA
6	<MDA
7	<MDA
8	<MDA
9	<MDA
10	<MDA
11	<MDA

All results in dpm / 100 cm^2

Routine Radiological Survey for Phytotech, Inc.

September, 1999

Prepared by
Radiation Science Inc,
NRC License # 29-30310-01

Survey Description

This survey was performed on Thursday, September 30, 1999 at the Phytotech, Inc., facility in Monmouth Junction, New Jersey. The survey included collection of wipe samples and the performance of a scanning survey in the laboratory area and hallways of the facility. A summary of reportable levels of contamination appears on page 2.

Wipe samples were obtained by wiping at least 100 cm^2 with a 4.25 cm diameter, cloth smear. A two minute integrated measurement was taken on each sample with a 100 cm^2 gas proportional meter at a distance of 0.5 cm.

Locations of the wipe samples are indicated on the room diagrams contained in this report. Analytical results are presented below each diagram. Results are reported as less than the Minimum Detectable Activity (MDA) of the instruments where appropriate.

Equipment, tabletops, the hood, and the floor directly in front of the hood were scanned with a 100 cm^2 gas proportional detector using the audio output to identify areas of elevated radioactivity. Hotspots are identified as areas greater than twice background. Each hotspot is identified on the corresponding room diagram along with the results of a one minute integrated measurement. The results are reported in disintegrations per minute based on the meter's efficiency to Thorium 230.

All meters and instrumentation used for this survey have been calibrated within the past twelve months to standards traceable to the National Institute of Standards and Testing (NIST).

Reviewed and Approved by: _____
Date: 10/4/99

Survey Summary - September 30, 1999

The following summary includes all removable and fixed contamination found to be greater than the MDA.

Removable Activity

No removable activity was detected by wipe analysis.

Direct Measurements

No activity was detected by direct measurement.

Minimum Detectable Activity

Calculations*

Equation

$$MDA = \frac{2.71 + 4.65\sqrt{Br \times t}}{t \times E \times A/100}$$

where:

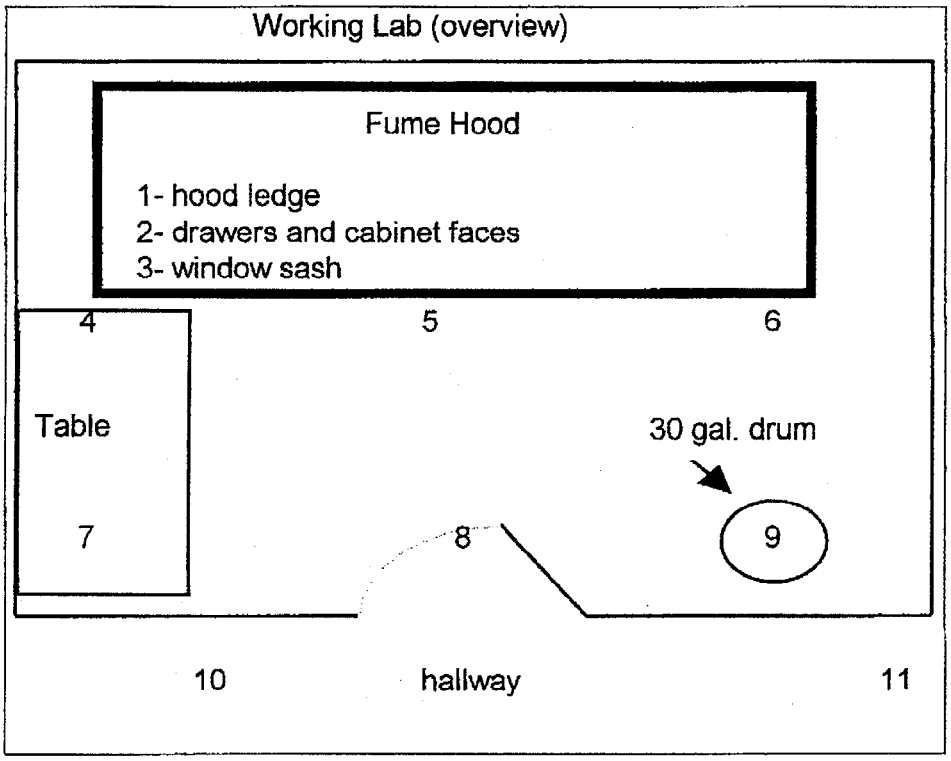
MDA = activity in dpm/100 cm^2
Br = background rate in counts per minute
t = counting time in minutes
E = detector efficiency in counts per disintegration (4π)
A = probe area or area wiped in cm^2

Total Activity Measurements

Meter: Ludlum model 12 serial # 153037
Probe: Ludlum 43-68 serial # 114376

MDA for detection of Thorium 230: 223 dpm/100 cm^2

* From: NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination". For an integrated measurement over a preset time.



Wipe Sample Results - Analysis by Gas Proportional Counting

Wipe #	Results
1	<MDA
2	<MDA
3	<MDA
4	<MDA
5	<MDA
6	<MDA
7	<MDA
8	<MDA
9	<MDA
10	<MDA
11	<MDA

All results in dpm / 100 cm^2

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 PHYTOTECH ORDER NO. 966245

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 126034

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR138216

Cal. Date 01/02/97 Cal Due Date 01/02/98 Cal. Interval 1 Year Meterface 202-663

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 40 % Alt 704.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ 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 12/19/89.

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

☐ HV Readout (2 points) Ref./Inst. ____ / ____ V Ref./Inst. ____ / ____ V

COMMENTS:

Cs-137 ≈ 1 µCi check source SN 3366 reads ≈ 3.3K x10 (33Kcpm) with the screen of the 44-9 facing the source at surface level with the source door open (analog reading)
Cs-137 ≈ 1 µCi check source SN 3366 reads ≈ 3314 with the screen of the 44-9 facing the source at surface level with the source door open (6sec count)
Cs-137 ≈ 1 µCi check source SN 3366 reads ≈ 0.75K x10 (7500cpm) with the end of the 44-2 facing the source at surface level with the source door open (analog reading)
Cs-137 ≈ 1 µCi check source SN 3366 reads ≈ 7334 with the end of the 44-2 facing the source at surface level with the source door open (6sec count)

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 100	400kcpm		4K
X 100	100kcpm		1K
X 10	40kcpm		4K
X 10	10kcpm		1K
X 1	4kcpm		4K
X 1	1kcpm		1K
X 0.1	400cpm		4K
X 0.1	100cpm		1K

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	40kcpm		4017 (0)
	4kcpm		402
	400cpm		40
	40cpm		4

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A 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 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ____ ☐ Beta S/N ____ ☐ Other ____

☑ m 500 S/N 50800 ☐ Oscilloscope S/N ____ ☑ Multimeter S/N 61341135

Calibrated By: Connie Tomlinson Date 1-2-97

Reviewed By: Elmer Chavez Jr. Date 1-2-97

FORM C22A 02/27/96

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 Detector

Detector 44-2 Serial No. PR138769

Customer PHYTOTECH Order #. 966245

Counter 3 Serial No. 126034 Counter Input Sensitivity 35 mV

Count Time 6 sec Distance Source to Detector surface

Other

High Voltage	Background	Isotope Am241 Size ≈1.6 μCi	Isotope ____ Size ____	Isotope ____ Size ____	Isotope ____ Size ____
800	176	6675			
850	169	6758			
900	185	6733			
950	202	6825			
1000	310	7417			

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

CONVERSION CHART

Customer PHYTOTECH Date 01/02/97 Order #. 966245

Model 3 Serial No. 126034 Detector Model 44-9 Serial No. PR138216

Source Cs-137 150 mCi High Voltage 900 V

Reference Point	"As Found" Readings (CPM): Analog	Range/Scale	After Adjustment Readings (CPM): Analog	Range/Scale
150 mR/hr			3.55K	X100
50 mR/hr			1.55K	"
15 mR/hr			3.3K	X10
5 mR/hr			1.6K	"
1.5 mR/hr			4.3K	X1
1.0 mR/hr			3K	

Reference Point	"As Found" Readings: Digital	Count Time	After Adjustment Readings: Digital	Count Time
150 mR/hr				6 sec
50 mR/hr			14937	
15 mR/hr			3248	
5 mR/hr			1645	
1.5 mR/hr			455	
1.0 mR/hr			310	

Signature: Connie Tomlinson Date 1-2-97

RSI

Certificate of Calibration

Certificate Number: 403

Linearity & Efficiency Test ☒ **Dose Rate Calibration** ☐

Meter: Ludlum 3 **Serial #:** 126034 **Detector:** 44-9 **Serial #:** 138216

Calibrated for: Phytotech

Battery check: pass ☒ fail ☐ **High voltage:** meter ☐ pulser ☒ 900v

Meter tested in: scaler ☒ or ratemeter ☐ mode?

Meter Multiplier or Scale	Reference Calibration Point mR/hr ☐ cpm ☒	Meter Reading	Reference Calibration Point mR/hr ☐ cpm ☒	Meter Reading
x 100*	170,000	170,000	340,000	340,000
x 10	17,000	16,962	34,000	34,021
x 1.0	1,700	1,697	3,400	3,398
x 0.1	170	170	340	340

For dose rate calibrations only: range(s) calibrated electronically.

Meter is: within 10% ☒ within 20% ☐ (graph attached)

Reference Instruments and/or sources:

	NIST Source	Activity (dpm)	Serial No.	Source Count (cpm)	Efficiency
☐	C-14	215,880	E948		
☐	Cl-36	23,376	D709		
☐	I-129	112,700	9004456		
☐	Pm-147	16,666	D715		
☐	Sr-90/Y-90	46,848	D712		
☐	Tc-99	23,154	D713		
☒	Other: Th-230	6,410	S-3689B	814	0.127

☐ Cs-137 200mCi Serial #: 11086

☒ Pulse generator: Ludlum model 500, serial # 114518, NIST traceable calibration date February 27, 1998.

Comments: *X 100 SCALE READINGS TAKEN IN RATE METER MODE.

ADDITIONAL DETECTOR 44-2 (S/N: 138769):
EFF. TO I-129 = 9.3%.
CHECK SOURCE = APPROX. 60,000 CPM.

DETECTOR 44-9:
CHECK SOURCE RESPONSE = 33,000 CPM.

Calibrated by: Gretchen Zeigler **Date:** 03/31/98

Approved by: [signature] **Date:** 4/1/98

RSI

Certificate of Calibration

Certificate Number: 746

Linearity & Efficiency Test ☒ **Dose Rate Calibration** ☐

Meter: Ludlum 3 **Serial #:** 139207 **Detector:** 44-9 **Serial #:** 145980

Calibrated for: Phytotek

Battery check: pass ☒ fail ☐ **High voltage:** meter ☐ pulser ☒ 900v

Meter tested in: scaler ☒ or ratemeter ☐ mode?

Meter Multiplier or Scale	Reference Calibration Point mR/hr ☐ cpm ☒	Meter Reading	Reference Calibration Point mR/hr ☐ cpm ☒	Meter Reading
x100	200,000	199,100	400,000	398,220
x10	20,000	19,920	40,000	39,830
x1	2,000	1,990	4,000	3,990
x0.1	200	200	400	400

For dose rate calibrations only: range(s) calibrated electronically.

Meter is: within 10% ☒ within 20% ☐ (graph attached)

Reference Instruments and/or sources:

	NIST Source	Activity (dpm)	Serial No.	Source Count (cpm)	Efficiency
☐	C-14	215,880	E948		
☐	Cl-36	23,376	D709		
☐	I-129	112,700	9004456		
☐	Pm-147	16,666	D715		
☒	Sr-90/Y-90	46,848	D712	11,590	0.25
☐	Tc-99	23,154	D713		
☐	Other:				

☐ **Cs-137 200mCi Serial #: 11086**

☒ **Pulse generator: Ludlum model 500, serial # 114518, NIST traceable calibration date February 27, 1998.**

Comments: CHECK SOURCE RESPONSE WITH LUDLUM 44-2 PROBE: 105 KCPM.

Calibrated by: Toli Mikell **Date:** 12/29/98

Approved by: [signature] **Date:** 1/4/98 SD

RSI

Certificate of Calibration

Certificate Number: 1105

Linearity & Efficiency Test ☒ **Dose Rate Calibration** ☐

Meter: Ludlum 3 **Serial #:** 126034 **Detector:** 44-9 **Serial #:** 138216

Calibrated for: Phytotech

Battery check: pass ☒ fail ☐ **High voltage:** meter ☐ pulser ☒ 900v

Meter tested in: scaler ☒ or ratemeter ☒ mode?

Meter Multiplier or Scale	Reference Calibration Point mR/hr ☐ cpm ☒	Meter Reading	Reference Calibration Point mR/hr ☐ cpm ☒	Meter Reading
x100	100,000	100,000	400,000	400,000
x10	10,000	10,000	40,000	40,000
x1	1,000	1,000	4,000	4,000
x0.1	100	100	400	400

For dose rate calibrations only: range(s) calibrated electronically.

Meter is: within 10% ☒ within 20% ☐ (graph attached)

Reference Instruments and/or sources:

	NIST Source	Activity (dpm)	Serial No.	Source Count (cpm)	Efficiency
☐	C-14	215,880	E948		
☐	Cl-36	23,376	D709		
☐	I-129	112,700	9004456		
☐	Pm-147	9,590	D715		
☐	Sr-90/Y-90	46,848	D712		
☐	Tc-99	23,154	D713		
☒	Other: Th-230	6,410	S-3689B	700	0.11

☐ Cs-137 200mCi Serial #: 11086

☒ **Pulse generator: Ludlum model 500, serial # 114518, NIST traceable calibration date February 22, 1999.**

Comments: SCALER ALSO WITHIN 10%. MODEL 44-2 (S/N 138769) PROBE PRESENT. I-129 EFFICIENCY: 6%. CHECK SOURCE RESPONSE: (44-9) 32K CPM. (44-2) 70 K CPM.

Calibrated by: Toli Mikell **Date:** 9/1/99

Approved by: Thomas P. Basile **Date:** 9/1/99

C. Contamination Surveys

Contamination surveys were performed by Radiation Science, Inc. on a monthly basis in the restricted area where SNM are handled and on a quarterly basis in unrestricted areas (i.e., the lunch room) to verify that no contamination exists outside of the restricted area. These surveys began in October, 1997, that is, before SNM was placed in the room to document any native contamination in the room not associated with the SNM, and is current to November, 1998. For each survey, 11 and 6 wipe samples were taken from various locations in the restricted and unrestricted area, respectively. Each wipe sample was obtained by wiping at least 100 cm^2 with a 4.25 cm diameter, cloth smear. A five minute integrated measurement was taken on each sample with a 100 cm^2 gas proportional meter at a distance of 0.5 cm. For all wipe samples throughout this year, removal and total activities in both the restricted and unrestricted areas were less than the minimum detectable activity (81 dpm per 100 cm^2 for removable activity and 186 dpm per 100 cm^2 for total activity). These less than detection activities, particularly those from the unrestricted areas, are expected as all work involving SNM is confined to the fume hood in the SNM lab. All documentation related to these surveys are located in the file cabinet of the RSO.

D. Survey Meter Calibration

Two Ludlum Model 3 Survey Meters, each with a gamma scintillator and pancake GM detector, were purchased and initially calibrated by Ludlum and have since been calibrated by Radiation Science, Inc. The two detectors have calibration dates approximately 4 months apart so that there is a calibrated survey meter available at all times. Both surveys meters are currently calibrated and possess a valid calibration sticker.

E. Receipt of SNM

SNM was received by Phytotech from the GE plant in Wilmington, NC on December 9, 1997. Form 14-3 "Phytotech Radioactive Material Receipt" from our SNM license was completed upon receipt of the SNM. Radiation levels at the surface and at 30 cm distance were both < 0.05 mRem/hr. The integrity of the package remained intact with no visible damage noted during shipping. Because the package integrity was not compromised and because the package did not require DOT labeling due to its limited quantity of radioactive material, no contamination survey was required or performed. The receipt form for this soil is located in the file cabinet of the RSO. No other SNM from any other source has been received by Phytotech.

F. Shipping and Waste Disposal Manifests

All SNM shipped to Phytotech by GE has remained at Phytotech. There has been no offsite transfers of SNM from Phytotech. A copy of the shipping form used by GE to ship the soils to Phytotech is located in the file cabinet of the RSO. In addition, currently no waste from our activities using the SNM has been picked up for disposal; all waste resides within a waste receptacle in the SNM lab. Teledyne Brown, our SNM waste broker, is expected to pick up

our waste soon and transport it to the Barnwell, SC facility where Phytotech is permitted to dispose of this waste.

G. Material Inventory

Phytotech received from GE 16.75 kg of contaminated soil having a total uranium concentration of 319.6 mg/kg and a ^{235}U enrichment of 2.300% and 15.33 kg of contaminated soil having a total uranium concentration of 387.1 mg/kg and a ^{235}U enrichment of 2.258%. Thus, the quantities of ^{235}U in both samples are 0.123 g and 0.257 g for a total quantity of < 0.4 g of ^{235}U. This total quantity of ^{235}U is well below the license limit of 3.7 g for ^{235}U. Because no offsite transfers have occurred with this soil, all ^{235}U originally present when received has remained in the SNM lab. All records pertaining to the material inventory are up to date and are located in the file cabinet of the RSO.

H. Reports of Theft, Loss of Material, or Similar Incidents

No theft, loss of material, or similar incidents were reported during this review period. The SNM lab is under constant surveillance during normal working hours and is locked at all times to prevent theft or access to SNM by unauthorized persons.

I. License Properly Reflects Use and Quantities of SNM

All activities involving handling SNM are performed in compliance with the issued license. In addition, the quantities of SNM received at Phytotech are well below the possession limit as specified in our license. Thus, no license amendment is necessary to continue our work on the GE soils as the current license properly reflects the use and quantities of SNM at Phytotech.

J. Radiation Protection Program Properly Reflects the Necessary Level of Safety

All activities involving handling SNM are performed in compliance with the written Radiation Protection Program at Phytotech, Inc. No additional safety measures are needed to continue working safely with the SNM. The lack of significant doses measured by the dosimeters worn by the authorized users is strong evidence that Phytotech's Radiation Protection Program is protecting the authorized users and keeping measured doses as low as reasonable achievable. No amendment to Phytotech's Radiation Protection Program is necessary at this time.

Minutes of the First Annual Review of Phytotech's Radiation Protection Program From December 1997 to December 1998

Minutes

- The annual review of Phytotech's Radiation Protection Program was conducted on January 20, 1999 by Dr. Mark P. Elless, Radiation Safety Officer (RSO) of Phytotech as required by Phytotech's license with the NRC for handling special nuclear material (license # SNM-2005). The review period encompasses activities from December 1997 to December 1998. Those in attendance were Dr. Cindy Orser, Director of Scientific Affairs and Dr. Michael Blaylock, Laboratory Head.
- The RSO highlighted the major points of his annual review report which included:
  - Training and Authorization of Users
    - Only two users were authorized to handle special nuclear material (SNM), Dr. Jianwei Huang and Mr. Chris Gussman. All authorization forms located in the file cabinet of the RSO.
  - Dosimetry Results of Authorized and Supervised Users
    - No detectable dose was measured from the dosimeters of Dr. Huang and Mr. Gussman or from the dosimeter left in the SNM lab at all times. A slight dose (27 mRem), just above the detection limit (20 mRem) was measured from the dosimeter of the RSO. All dosimetry results are located in the file cabinet of the RSO.
  - Contamination Surveys
    - Surveys were performed by Radiation Science, Inc., beginning in October 1997 (i.e., before any SNM material was placed in the room), on a monthly basis in the restricted area and on a quarterly basis in unrestricted areas. For all surveys, removal and total activities in both the restricted and unrestricted areas were less than the minimum detectable activity. All documentation related to these surveys are located in the file cabinet of the RSO.
  - Survey Meter Calibration
    - Both survey meters are currently calibrated and possess a calibration sticker. Initially, the survey meters were calibrated by Ludlum and now are calibrated by Radiation Science, Inc.
  - Receipt of SNM
    - SNM was received in good condition at Phytotech on December 9, 1997. Form 14-3 "Phytotech Radioactive Material Receipt" form from our SNM license was completed upon receipt of the SNM. This form is located in the file cabinet of the RSO.
  - Shipping and Waste Manifests
    - All SNM shipped to Phytotech has remained at Phytotech. There has been no offsite transfers of SNM from Phytotech. A copy of the shipping form to ship the soils to Phytotech is located in the file cabinet of the RSO. Also, no waste from our activities has been picked up for disposal.
  - Material Inventory
    - The total quantity of ^{235}U in the SNM received at Phytotech was < 0.4 g. This total quantity is well below the license limit of 3.7 g of ^{235}U. Because no offsite transfers

have occurred, all ^{235}U originally present when received has remained in the SNM lab. All records pertaining to the material inventory are up to date and are located in the file cabinet of the RSO.

- Reports of Theft, Loss of Material, or Similar Incidents
  - No thefts, loss of material, or similar incidents were reported during this review period.
- License Properly Reflects Use and Quantities of SNM
  - Quantities of SNM received at Phytotech are well below the possession limit as specified in our license. Thus, no license amendment is necessary to continue our work with SNM.
- Radiation Protection Program Properly Reflects the Necessary Level of Safety
  - All activities involving SNM are performed in compliance with the written Radiation Protection Program. The lack of significant doses measured by the dosimeters is strong evidence that Phytotech's Radiation Protection Program is protecting the authorized users and keeping measured doses as low as reasonable achievable. No amendment to Phytotech's Radiation Protection Program is necessary at this time.

- The above review was completed and all questions answered by the RSO. The signatures listed below certify that this review was conducted by the RSO and understood by the participants at this review meeting.

Dr. Mark P. Elless, Radiation Safety Officer

_____

Dr. Cindy Orser, Director of Sci. Affairs

Dr. Michael Blaylock, Laboratory Head

Certificate of Completion

Presented to:

Mark Elless

For successfully completing

Radiation Safety Training

November 22, 1996

PRINCETON PLASMA PHYSICS LABORATORY

NITON®

CORPORATION

Certificate of Achievement

Mark Elless

Phytotech

has successfully completed the Manufacturer's Training Course for the **NITON Spectrum Analyzer** *and is now certified in radiation safety and monitoring, measurement technology, and machine maintenance of the* **NITON XRF Spectrum Analyzer.**

V1997124-3
Certificate Number

1/24/97 Monmouth Juncton
Course Date & Site

Director of Training

President & CEO - NITON