

December 10, 2010

Katherine Streit
U.S. NRC Region III
2443 Warrenville Road
Suite 210
Lisle, Illinois 60532-4352

RE: Sigma-Aldrich (Sigma) Fort Mims Site, Executive Summary of Decommissioning Status, USNRC License # 24-16273-01

Dear Ms Streit,

This Executive Summary by Sigma provides an overview the status of Sigma's Decommissioning and Decontamination activities at the Fort Mims site. This includes a summary of the final soil surveys for residual 14C (carbon-14) and 3H (tritium) activity, and the methods used to demonstrate that the site, with building structures removed, is suitable for license termination with free release of the property for unrestricted use. The detailed reports covered by this overview are included as attachments and referenced appropriately.

Background and History

- On October 10, 2008, the NRC received notice from Sigma that Sigma had ceased normal operations on September 30, 2008 and intended to decommission the facility with a Decommissioning Plan. The notice further stated that the decommissioning would be conducted under contract with Philotechnics, Ltd, a company licensed by the Commonwealth of Massachusetts under reciprocity with the NRC, for radiological decommissioning work. The Sigma facility, which was used to produce 14C and 3H labeled products, consisted of a two-story, 20,000 square foot building on a lot approximately one acre in size.
- The Decommissioning Plan, submitted to the NRC on October 22, 2008, received initial acceptance by the NRC for technical review on November 25, 2008. The application to amend the license was posted in the Federal Register on December 29, 2008. The NRC submitted Requests for Additional Information (RAI's) to Sigma, and responses were provided on March 19, 2009. On May 7, 2009, after publishing an Environmental Impact finding of No Significant Impact related to the amendment, the NRC approved the amendment (#17) on May 12, 2009.

With NRC approval and oversight, the decommissioning project was performed in phases:

Phase 1

- Characterize, remediate, and perform final status survey of the building.
 - Remediation of the building, done within the scope of Philotechnics Reciprocity license from the state of Massachusetts, was initiated in October 2008. After completion, an NRC letter dated August 19, 2009 approved free release of the building.

Phase 2

- Demolish the building, excluding the concrete pad.
 - This phase, initiated after free release of the building, was performed by a demolition contractor and completed in October 2009.

Phase 3

- Survey underneath the concrete slab to identify the nonfunctional septic tank. If found and contaminated above release limits, septic is to be removed by the decommissioning contractor.
 - During the week of November 2, 2009, in conjunction with a soil sampling survey, the decommissioning contractor used ground-penetrating radar to survey underneath the concrete pad (Attachment – Fort Mims Facility Site Survey and Phase 2 Soil Sampling). No septic tank was identified using the scan. Based on those results, it was believed that the septic must have been removed during a previous expansion of the building. The nonfunctional septic tank was discovered later during the removal of the concrete pad (see Phase 4).

Phase 4

- Remove concrete pad and perform final status soil survey.
 - Based on the concrete pad meeting free release requirements and the assumption that the nonfunctional septic tank was previously removed, Sigma authorized the demolition contractor to remove the concrete pad during the week of May 17, 2010. The NRC agreed with this approach, under the condition that the project was being continuously monitored by the decommissioning contractor (Philotechnics). During removal of the concrete pad, the nonfunctional septic tank was discovered.
 - Radiological survey samples were collected from within the septic tank and in nearby soil. No significant elevations in nearby soil were found for 14C or 3H. Concentrations of radiological components within the free standing water in the tank met criteria for free-release to the sewer. Sludge found to be present in the septic tank required disposal as Low Level Radioactive Waste. NRC approved a plan (Attachment – Fort Mims Facility Phase 4 Septic Tank Removal and Oversight of Footing Removal) for the decommissioning contractor to

remove the contents of the septic tank, decontaminate to free-release level, and oversee removal of the septic tank and remaining concrete footing by the demolition contractor. This project was performed during the week November 15, 2010.

- The final status soil survey consisted of three separate surveys. After each survey, the soil was left undisturbed pending the outcome of all three surveys. Altogether, 208 soil samples were taken for 14C and 3H content, representing the final status survey. The results of these surveys are provided within the Survey Results section of this summary.

Survey Results

Detailed soil sampling results for the Fort Mims site are presented in each of the three soil sampling studies (Attachments - Open Land Sampling and Analysis Report Phase I; Open Land Sampling and Analysis Report Phase II; Open Land Sampling and Analysis Report Phase III Revision 1). Results from these reports represent the Final Status Survey.

A total of 208 samples were taken for 14C and 3H analysis. The measured average concentrations were 5.1 pCi/g of 3H and 42.7 pCi/g of 14C. Detectable levels of 14C and H3 were found two meters below the surface, but the levels varied widely between sampling locations. Radionuclide concentration was found to generally decrease with increasing depth. The measured maximum concentrations of each radionuclide were 42.5 pCi/g of 3H and 1290 pCi/g of 14C.

Consideration for Free Release for Unrestricted Use of the Fort Mims Property

The Final Status Survey results show that the highest concentration (42.5 pCi/g) and average concentration (5.1 pCi/g) for 3H in soil fall below the NRC default screening value of 110 pCi/g for free release. With respect to 3H, Sigma chooses to use the NRC default screening value as the basis for free release for unrestricted use. However, the estimated annual dose to the public due to the presence of 3H will be based on output from the RESRAD model.

Because Final Status Survey results show that the highest concentration (1,290 pCi/g) and average concentration (42.7 pCi/g) for 14C exceed the NRC default screening value of 12 pCi/g, Sigma decided to use the RESRAD model to determine annual dose to the public. The attached Philotechnics report (“Final RESRAD Modeling In Support of Release for Unrestricted Use”) provides the detailed discussion of RESRAD dose modeling. The RESRAD model described in this report demonstrates that, if soil on the entire site was uniform with the maximum concentration of 14C (1,290 pCi/g) and 3H (42.5 pCi/g) measured, the average dose to a member of the critical group is **0.79 mrem/year**.

Key Assumptions Used in the RESRAD Model

Site specific parameters used in the RESRAD model for the Fort Mims site are explained in the Philotechnics report. However, details on two critical parameters are given below because the calculated dose is particularly sensitive to the values used.

1. Occupancy Scenario

For the Fort Mims site, the “Industrial Worker” scenario was selected. In this case, the site remains a commercial/industrial use area. Residential use in the near future is unlikely due to local zoning restrictions. Sigma contacted the planning commission of Maryland Heights and verified that there are no plans to convert the area to a residential zone.

2. Unsaturated Zone Thickness

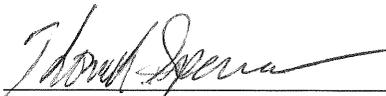
This value represents the distance from ground elevation to the aquifer, the source for drinking water. It is assumed in the RESRAD model that there is a drinking water well on the property. The default RESRAD value for this parameter is 4m. Sigma contracted with a geological engineering firm to report data from drilling sites near the Fort Mims site (Attachment – The EDR Geoscheck Report). Based on the data contained within the report, Sigma used a value of 44m for the unsaturated zone thickness.

Conclusion

10 CFR 20.1402 states, in part, “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 residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).” Additionally, Sigma has specified 10 mrem/year as an administrative limit.

The RESRAD model described in this summary and attached Philotechnics RESRAD demonstrates that, if soils across the entire site were uniform with the maximum concentrations of ¹⁴C and ³H found on the site, the average dose to a member of the critical group is **0.79 mrem/year**.

Based on these findings, the requirements for release for unrestricted use have been met.



Thomas K. Spencer
Radiation Safety Officer

ATTACHMENTS:

Final RESRAD Modeling In Support of Release for Unrestricted Use

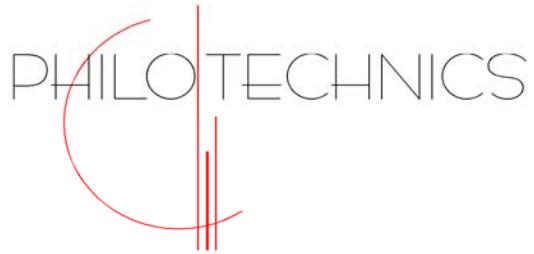
Open Land Sampling and Analysis Report Phase I

Open Land Sampling and Analysis Report Phase II

Open Land Sampling and Analysis Report Phase III Revision 1

The EDR Geocheck Report

Fort Mims Facility Phase 4 Septic Tank Removal and Oversight of Footing Removal



Fort Mims Facility
Decontamination and Decommissioning Project

Final RESRAD Modeling In Support of Release for Unrestricted Use

Sigma Aldrich Company
11542 Fort Mims Drive
Maryland Heights, Missouri

November 30, 2010

Prepared by:

**Philotechnics, Ltd.
201 Renovare Boulevard
Oak Ridge, TN 37830**

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Appendix A: RESRAD Summary Report for 11425 Fort Mims Drive

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1.0 Executive Summary

This document describes the dose modeling and radiological criteria for license termination of the Fort Mims facility. Activities performed at the site to remove residual radioactive material have been completed. Over 200 soil samples were collected on site and analyzed for ^3H (tritium) and ^{14}C . All tritium samples were well below the default screening values presented in NUREG 1757 Volume 1, Appendix B. RESRAD was used to estimate the radiation dose that a future occupant of the site would be likely to receive from residual radioactivity.

10 CFR 20.1402 states, in part, "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 residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA)." Additionally, Sigma-Aldrich has specified 10 mrem/year as an administrative limit.

The RESRAD model described in this report demonstrates that, if the entire site were contaminated with the maximum concentration of ^{14}C and ^3H measured the average dose to a member of the critical group is 0.79 mrem/year.

Based on these findings, the requirements for release for unrestricted use have been met.

2.0 The Fort Mims Property RESRAD Model

RESRAD Version 6.5 was used to predict the average annual dose to workers at the site from residual radioactivity from present time to 1000 years in the future. This section discusses the site location and physical dimensions, surrounding area, surface and subsurface soil characteristics, hydrology, climate, and zoning. Site-specific parameters are used to make the RESRAD model as realistic as possible.

2.1 Site and Surrounding Area

The site is located at 11542 Fort Mims Drive, Maryland Heights, Missouri. The area of the site is 12,000 m². The immediate surrounding area is zoned industrial and commercial. The nearest residential area is approximately 800 m due south. A drainage pond is across the street. A county park with lake

suitable for fishing and recreation is 4 km west; the Missouri River is 4 km northwest.

2.2 Soil Contamination

The soil is contaminated with varying concentrations of ^{14}C and ^3H . A total of 208 soil samples were collected and analyzed to measure the concentration of those radionuclides throughout the property. The measured average concentrations were 5.1 pCi/g of ^3H and 42.7 pCi/g of ^{14}C . Detectable contamination was measured two meters below the surface but is not uniform; radionuclide concentration decreases with increasing depth. The measured maximum concentrations of each radionuclide were 42.5 pCi/g of ^3H and 1290 pCi/g of ^{14}C . For this RESRAD model, the most conservative assumption—that producing the largest potential dose to a site occupant—is that the maximum measured concentration of each radionuclide is present throughout the soil to a depth of 3 meters.

2.3 Soil Characteristics

Surface and subsurface soils are a combination of silty clay and sandy clay. Available documentation indicates an aquifer is at least 140 feet (47 meters) below the ground surface.

The RESRAD model assumes uniform soil contamination at the maximum concentration measured exists to a depth of three meters—the contaminated zone. Uncertainty analyses were run on the thickness of the contaminated zone and the thickness of the unsaturated zone. These are described in Section 3.0.

2.4 Hydrology

There is no cover layer over the contamination.

Other site specific parameters were estimated using the RESRAD User Guide:

Soil Type	b Parameter	Hydraulic Conductivity (k_{sat})	Saturated Water Content (Θ_{sat})	Total Porosity (P_t)	Effective Porosity (P_e)
Silty Clay	10.4	32.6	0.492		
Sandy Clay	10.4	68.4	0.426		
Silt				0.45	0.2
Sand				0.42	0.6
Clay				0.4	0.32
Site (Average)	10.4	50.0	0.459	0.42	0.373

The Distribution coefficient was set to a value of 5 for ^{14}C (RESRAD Users Guide), and 0.04 for ^3H (EPA 1999); both values correspond to sandy soils.

The RESRAD User's Manual lists values of K_d of ^{14}C as 1 for clay, 5 for sand, 20 for loam, and 70 for organic matter. Lower values result in a higher dose. The soil is a mixture of sand, silt and clay, so the value associated with sand is conservative.

2.5 Climate

Average wind speed is $4.8 \text{ m}\cdot\text{s}^{-1}$ (National Oceanic and Atmospheric Administration <http://www.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html>)
Average annual precipitation is 1 m (National Oceanic and Atmospheric Administration http://www.crh.noaa.gov/lx/climate/COU/annual_rainfall.php)

2.6 Specific Modeling for ^{14}C

^{14}C behaves differently from other radionuclides in soil; therefore RESRAD contains a module that is specific to ^{14}C . Default parameters were used.

2.7 Occupancy Scenario and Exposure Pathways

RESRAD provides the user with a number of canned but editable occupancy scenarios. For the Fort Mims site, the "Industrial Worker" scenario was selected. In this case, the site remains as a commercial/industrial use area and commercial business is conducted on the site. All exposure pathways associated with working on the property are considered.

AEL/AED-4, "User's Manual for RESRAD Version 6", Tables 2.2 and 2.3 are reproduced below.

Pathways to be Considered for Resident Farmer, Suburban Resident, Industrial Worker, and Recreationist Scenarios (Table 2.2)

Pathway	Resident Farmer	Suburban Resident	Industrial Worker	Recreationist
External gamma exposure	Yes	Yes	Yes	Yes
Inhalation of dust	Yes	Yes	Yes	Yes
Radon Inhalation*	Yes	Yes	Yes	Yes
Ingestion of plant foods	Yes	Yes	No	No
Ingestion of meat	Yes	No	No	Yes
Ingestion of milk	Yes	No	No	No
Ingestion of fish	Yes	No	No	Yes
Ingestion of soil	Yes	Yes	Yes	Yes
Ingestion of water	Yes	No	No/Yes**	No

*Radon is not a contaminant of concern; this parameter is turned OFF.

**While the RESRAD default is OFF, this pathway is turned ON because EPA's industrial worker guidance assumes water is consumed from an onsite well.

Comparison of Key Default Parameters Used in the Resident Farmer, Suburban Resident, Industrial Worker, and Recreationist Scenarios (Table 2.3)

Parameter	Unit	Resident Farmer	Suburban Resident	Industrial Worker	Recreationist
Exposure duration	yr	30	30	25	30
Inhalation rate	m ³ /yr	8400	8400	11,400	14,000
Fraction of time indoors	-	.50	.50	.17	-
Fraction of time outdoors	-	.25	.25	.06	.006
Contaminated Fractions of food					
Plant food	-	.50	.10	-	-
Milk	-	1	-	-	-
Meat	-	1	-	-	1
Aquatic food	-	.50	-	-	.50
Soil ingestion	g/yr	36.5	36.5	36.5	36.5
Drinking water intake	L/yr	510	510*	510*	-

*EPA guidelines assume drinking water intake of 1.4 L/day

2.8 Site-Specific Parameters

The following table describes the parameters that were changed from the default value and the reason for the change.

Parameter	Default Value	Actual Value	Reason
Area of Contaminated Zone, m ²	10,000	12,000	Actual size
Thickness of contaminated zone, m	2	3	Conservative assumption
Contaminated zone hydraulic conductivity	10	50	RESRAD User's Manual based on soil type
Contaminated zone b parameter	5.3	10.4	RESRAD User's Manual based on soil type
Average annual wind speed, m/s	2	4.3	NOAA published data
Unsaturated zone thickness, m	4	44	Actual site data
Saturated zone total porosity	0.4	0.42	RESRAD User's Manual based on soil type
Saturated zone effective porosity	0.2	0.373	RESRAD User's Manual based on soil type
Saturated zone hydraulic conductivity	100	50	RESRAD User's Manual based on soil type
Distribution Coefficient for C-14	0	5	RESRAD User's Manual
Distribution Coefficient for H-3	0	0.04	EPA 1999
Inhalation rate, m ³ /yr	8400	11,400	RESRAD User's Manual
Exposure duration, yr	30	25	RESRAD User's Manual
Fraction of time spent indoors	0.5	0.17	RESRAD User's Manual
Fraction of time spent outdoors (on site)	0.25	0.06	RESRAD User's Manual

2.9 Dose Calculations

NUREG 1757, "Consolidated NMSS Decommissioning Guidance," contains default Screening Values, based on 25 mrem/year, for several radionuclides in soil. Licensees have the option of using the Screening Values without further justification or deriving site-specific release limits using RESRAD. The table below is provided to compare Screening Values with site-specific limits established for this project.

	NUREG 1757 Screening Value, pCi/g	RESRAD 10 mrem/yr, pCi/g	RESRAD 25 mrem/yr, pCi/g	MAX Value on site, pCi/g	AVG Value on site, pCi/g*
³ H	110	1.06E+05	2.65E+05	42.5	5.1
¹⁴ C	12	6.97E+04	1.74E+06	1290	44.7

* AVG value based on analysis results of 208 soil samples.

RESRAD calculated the maximum dose to a worker of 0.79 mrem/year. The administrative decommissioning criterion established by Sigma Aldrich is a radiation dose of 10 mrem per year. This analysis clearly indicates the Fort Mims site is acceptable for unrestricted release from radiological control.

3.0 Uncertainty Analysis

The RESRAD model depends on the setting of parameters that could significantly alter the projected dose to a future or current occupant of the site. ¹⁴C and ³H are both low energy beta emitters, so external radiation exposure is negligible. Because food is not grown on site, internal dose for contaminated foodstuffs is not considered. The largest variation in individual dose prediction is dependent on whether or not contaminated water is ingested.

Uncertainty was run on two parameters: thickness of the contaminated zone, and thickness of the unsaturated zone.

Regarding thickness of the contaminated zone, a triangular distribution was run with minimum value of 1 meter, maximum value of 10 meters, and mode of 3 meters.

Regarding thickness of the unsaturated zone, a bounded lognormal-N distribution was run as the RESRAD default.

Uncertainty analyses results are included as appendices to this report.

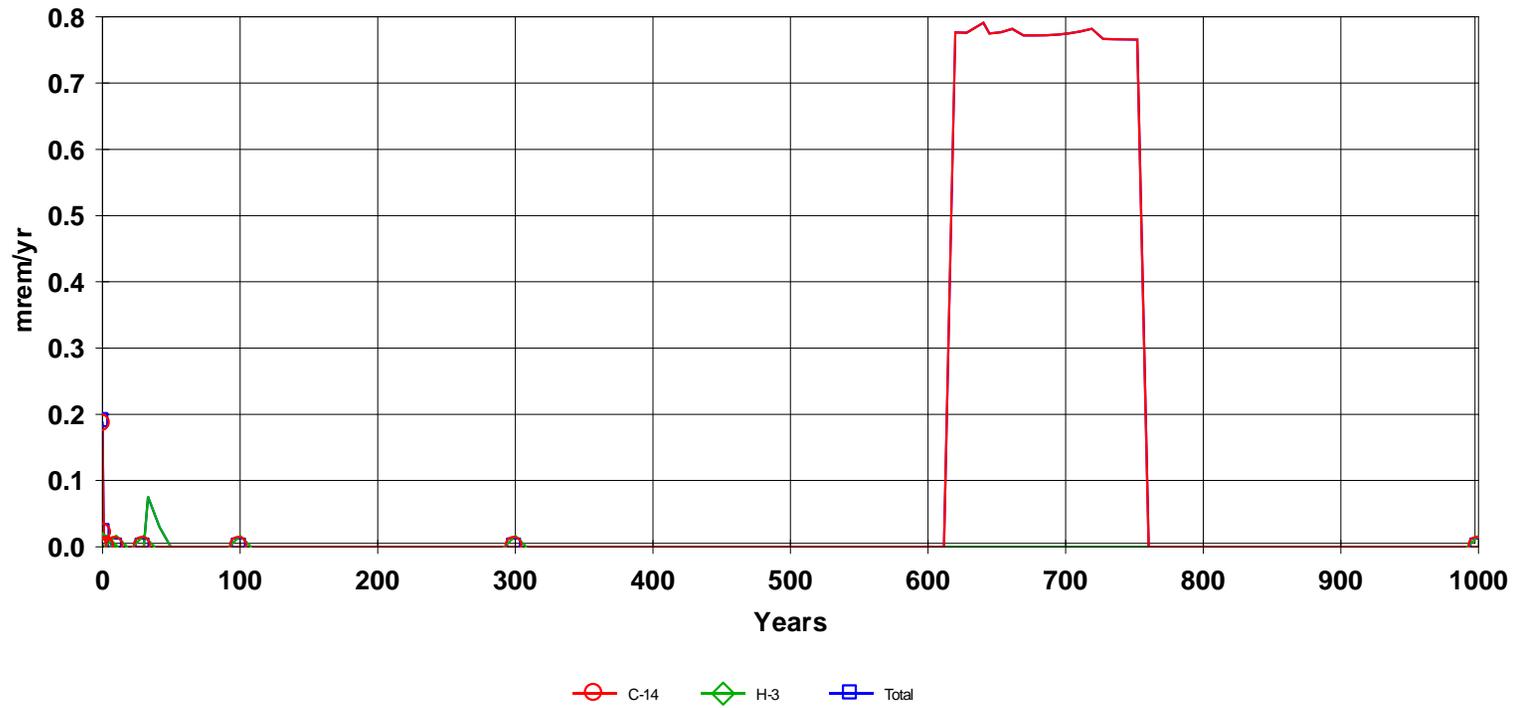
4.0 References

- 4.1 10 CFR 20, Standards for Protection Against Radiation
- 4.2 NUREG 1757, Consolidated NMSS Decommissioning Guidance
- 4.3 EPA402-R-99-004B, Understanding Variation in Partition Coefficient, K_d , Values; Volume II: Review of Geochemistry and Available K_d Values for Cadmium, Cesium, Chromium, Lead, Plutonium, Radon, Strontium, Thorium, Tritium (^3H), and Uranium
- 4.4 ANL/EAD-4, User's Manual for RESRAD Version

Appendix A

RESRAD Summary Report for 11425 Fort Mims Drive

DOSE: All Nuclides Summed, All Pathways Summed



RESRAD_FAMILY\RESRAD\6.5\USER FILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD 11/30/2010 14:24 GRAPHICS.ASC Includes All Pathwa

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

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Time = 3.000E+00	11
Time = 1.000E+01	12
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Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose Conversion Factor (and Related) Parameter Summary

Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	C-14 (Source: FGR 12)	1.345E-05	1.345E-05	DCF1(1)
A-1	H-3 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	C-14(p) (Class: ORGANIC)	2.090E-06	2.090E-06	DCF2(1)
B-1	C-14(g) (Class: CO2)	2.350E-08	2.350E-08	C14GInhDCF
B-1	H-3	6.400E-08	6.400E-08	DCF2(2)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	C-14	2.090E-06	2.090E-06	DCF3(1)
D-1	H-3	6.400E-08	6.400E-08	DCF3(2)
D-34	Food transfer factors:			
D-34	C-14, plant/soil concentration ratio, dimensionless	5.500E+00	5.500E+00	RTF(1,1)
D-34	C-14, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.100E-02	3.100E-02	RTF(1,2)
D-34	C-14, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.200E-02	1.200E-02	RTF(1,3)
D-34	H-3, plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(2,1)
D-34	H-3, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(2,2)
D-34	H-3, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(2,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	C-14, fish	5.000E+04	5.000E+04	BIOFAC(1,1)
D-5	C-14, crustacea and mollusks	9.100E+03	9.100E+03	BIOFAC(1,2)
D-5	H-3, fish	1.000E+00	1.000E+00	BIOFAC(2,1)
D-5	H-3, crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(2,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETRG table in Ground Pathway of Detailed Report.

*Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.200E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): C-14	1.290E+03	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): H-3	4.250E+01	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): C-14	not used	0.000E+00	---	W1 (1)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1 (2)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.200E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.040E+01	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.300E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.200E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.730E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.400E+01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.200E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.730E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.040E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for C-14				
R016	Contaminated zone (cm**3/g)	5.000E+00	0.000E+00	---	DCNUCC(1)
R016	Unsat. zone 1 (cm**3/g)	5.000E+00	0.000E+00	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	5.000E+00	0.000E+00	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.124E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	4.000E-02	0.000E+00	---	DCNUCC(2)
R016	Unsat. zone 1 (cm**3/g)	4.000E-02	0.000E+00	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	4.000E-02	0.000E+00	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.104E-01	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	1.140E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	2.500E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.700E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	6.000E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	2.000E-05	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	3.000E-02	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	2.000E-02	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	9.800E-01	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	3.000E-01	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	7.000E-07	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	1.000E-10	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	8.000E-01	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	2.000E-01	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	128	---	---	NPTS

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	12000.00 square meters	C-14	1.290E+03
Thickness:	3.00 meters	H-3	4.250E+01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 1.000E+01 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years)	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.892E-01	2.150E-02	5.144E-04	6.108E-07	1.303E-14	7.692E-25	0.000E+00	0.000E+00
M(t):	1.892E-02	2.150E-03	5.144E-05	6.108E-08	1.303E-15	7.692E-26	0.000E+00	0.000E+00

Maximum TDOSE(t): 7.912E-01 mrem/yr at t = 640 ± 1 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.403E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.403E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	7.912E-01	1.0000	0.000E+00	0.0000	7.912E-01	1.0000								
H-3	0.000E+00	0.0000	0.000E+00	0.0000										
Total	7.912E-01	1.0000	0.000E+00	0.0000	7.912E-01	1.0000								

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	3.049E-03	0.0161	1.595E-01	0.8430	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.263E-02	0.1196
H-3	0.000E+00	0.0000	3.989E-03	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.283E-05	0.0001
Total	3.049E-03	0.0161	1.635E-01	0.8641	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.266E-02	0.1198

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	1.852E-01	0.9788										
H-3	0.000E+00	0.0000	4.012E-03	0.0212										
Total	0.000E+00	0.0000	1.892E-01	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	3.265E-04	0.0152	1.708E-02	0.7945	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.424E-03	0.1127
H-3	0.000E+00	0.0000	1.658E-03	0.0771	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.493E-06	0.0004
Total	3.265E-04	0.0152	1.874E-02	0.8716	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.433E-03	0.1132

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	1.983E-02	0.9224										
H-3	0.000E+00	0.0000	1.668E-03	0.0776										
Total	0.000E+00	0.0000	2.150E-02	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	3.728E-06	0.0072	1.950E-04	0.3791	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.767E-05	0.0538
H-3	0.000E+00	0.0000	2.863E-04	0.5566	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.639E-06	0.0032
Total	3.728E-06	0.0072	4.813E-04	0.9358	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.931E-05	0.0570

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	2.264E-04	0.4402										
H-3	0.000E+00	0.0000	2.880E-04	0.5598										
Total	0.000E+00	0.0000	5.144E-04	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	5.659E-13	0.0000	2.960E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.200E-12	0.0000
H-3	0.000E+00	0.0000	6.073E-07	0.9943	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.477E-09	0.0057
Total	5.659E-13	0.0000	6.073E-07	0.9943	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.481E-09	0.0057

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	3.436E-11	0.0001										
H-3	0.000E+00	0.0000	6.108E-07	0.9999										
Total	0.000E+00	0.0000	6.108E-07	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	1.295E-14	0.9943	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.414E-17	0.0057
Total	0.000E+00	0.0000	1.295E-14	0.9943	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.414E-17	0.0057

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	0.000E+00	0.0000										
H-3	0.000E+00	0.0000	1.303E-14	1.0000										
Total	0.000E+00	0.0000	1.303E-14	1.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	0.000E+00	0.0000										
H-3	7.692E-25	1.0000	0.000E+00	0.0000	7.692E-25	1.0000								
Total	7.692E-25	1.0000	0.000E+00	0.0000	7.692E-25	1.0000								

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	0.000E+00	0.0000										
H-3	0.000E+00	0.0000	0.000E+00	0.0000										
Total	0.000E+00	0.0000	0.000E+00	0.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
C-14	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.										
C-14	0.000E+00	0.0000	0.000E+00	0.0000										
H-3	0.000E+00	0.0000	0.000E+00	0.0000										
Total	0.000E+00	0.0000	0.000E+00	0.0000										

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose/Source Ratios Summed Over All Pathways
 Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.435E-04	1.537E-05	1.755E-07	2.664E-14	5.858E-34	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	9.439E-05	3.924E-05	6.776E-06	1.437E-08	3.065E-16	1.810E-26	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
 Basic Radiation Dose Limit = 1.000E+01 mrem/yr

Radionuclide (i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14		6.966E+04	6.505E+05	5.698E+07	*4.455E+12	*4.455E+12	*4.455E+12	*4.455E+12	*4.455E+12
H-3		1.059E+05	2.549E+05	1.476E+06	6.959E+08	*9.597E+15	*9.597E+15	*9.597E+15	*9.597E+15

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
 and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
 at tmin = time of minimum single radionuclide soil guideline
 and at tmax = time of maximum total dose = 640 ± 1 years

Radionuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
C-14	1.290E+03	640 ± 1	6.133E-04	1.631E+04	6.133E-04	1.631E+04
H-3	4.250E+01	35.10 ± 0.07	2.248E-03	4.449E+03	0.000E+00	*9.597E+15

*At specific activity limit

Summary : RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.852E-01	1.983E-02	2.264E-04	3.436E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	4.012E-03	1.668E-03	2.880E-04	6.108E-07	1.303E-14	7.692E-25	0.000E+00	0.000E+00

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.290E+03	1.381E+02	1.577E+00	2.394E-07	5.265E-27	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	4.250E+01	1.767E+01	3.051E+00	6.471E-03	1.380E-10	7.907E-38	0.000E+00	0.000E+00

THF(i) is the thread fraction of the parent nuclide.

RESRAD.EXE execution time = 2.35 seconds

Appendix B

RESRAD Detailed Report for 11425 Fort Mims Drive

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

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Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Iteration Log for Computation of the Time of Maximum C-14 Dose/Source Ratio

Pathway: Water

Tolerance for tmax = 1.0E-03 (fractional accuracy)

Iteration Number	t (years)	DSR(t) (mrem/yr)/(pCi/g)	Step Size (years)	Step Type
0	6.36364E+02	6.06747E-04		
1	6.31591E+02	6.02697E-04	-4.77229E+00	parabolic
2	6.39520E+02	6.11788E-04	3.15674E+00	golden section
3	6.41471E+02	6.00510E-04	1.95098E+00	golden section
4	6.38315E+02	6.09606E-04	-1.20577E+00	golden section
5	6.40266E+02	6.13305E-04	7.45211E-01	golden section

Notes:

- 1) Step size always from t with current largest DSR(t) .
- 2) Parabolic step based on parabola maximum through the current best triplet.
- 3) Golden section step, $0.5*(3-\text{SQRT}(5))$ of larger interval bracketing maximum, taken only if trial parabolic step fails.
- 4) Direct step to a previous t only on last iteration and only if prior iteration met convergence test but DSR(t) was smaller than the previous value.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Iteration Log for Computation of the Time of Maximum C-14 Dose/Source Ratio

All Pathways Summed

Tolerance for tmax = 1.0E-03 (fractional accuracy)

Iteration Number	t (years)	DSR(t) (mrem/yr)/(pCi/g)	Step Size (years)	Step Type
0	6.36364E+02	6.06747E-04		
1	6.31591E+02	6.02697E-04	-4.77229E+00	parabolic
2	6.39520E+02	6.11788E-04	3.15674E+00	golden section
3	6.41471E+02	6.00510E-04	1.95098E+00	golden section
4	6.38315E+02	6.09606E-04	-1.20577E+00	golden section
5	6.40266E+02	6.13305E-04	7.45211E-01	golden section

Notes:

- 1) Step size always from t with current largest DSR(t) .
- 2) Parabolic step based on parabola maximum through the current best triplet.
- 3) Golden section step, $0.5*(3-\text{SQRT}(5))$ of larger interval bracketing maximum, taken only if trial parabolic step fails.
- 4) Direct step to a previous t only on last iteration and only if prior iteration met convergence test but DSR(t) was smaller than the previous value.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Iteration Log for Computation of the Time of Maximum H-3 Dose/Source Ratio

Pathway: Water

Tolerance for tmax = 1.0E-03 (fractional accuracy)

Iteration Number	t (years)	DSR(t) (mrem/yr)/(pCi/g)	Step Size (years)	Step Type
0	3.30578E+01	1.77893E-03		
1	2.25997E+01	0.00000E+00	-1.04581E+01	parabolic
2	3.31467E+01	1.83401E-03	8.88583E-02	parabolic
3	3.64844E+01	2.17510E-03	3.33768E+00	parabolic
4	3.83323E+01	1.99252E-03	1.84792E+00	golden section
5	3.61338E+01	2.20299E-03	-3.50573E-01	parabolic
6	3.49928E+01	2.24734E-03	-1.14097E+00	golden section
7	3.48508E+01	2.24448E-03	-1.42008E-01	parabolic
8	3.51407E+01	2.24754E-03	1.47811E-01	parabolic
9	3.50775E+01	2.24769E-03	-6.31839E-02	parabolic
10	3.50424E+01	2.24759E-03	-3.50775E-02	parabolic
11	3.50775E+01	2.24769E-03	0.00000E+00	direct

Notes:

- 1) Step size always from t with current largest DSR(t) .
- 2) Parabolic step based on parabola maximum through the current best triplet.
- 3) Golden section step, $0.5 \cdot (3 - \sqrt{5})$ of larger interval bracketing maximum, taken only if trial parabolic step fails.
- 4) Direct step to a previous t only on last iteration and only if prior iteration met convergence test but DSR(t) was smaller than the previous value.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Iteration Log for Computation of the Time of Maximum H-3 Dose/Source Ratio

All Pathways Summed

Tolerance for tmax = 1.0E-03 (fractional accuracy)

Iteration Number	t (years)	DSR(t) (mrem/yr)/(pCi/g)	Step Size (years)	Step Type
0	3.30578E+01	1.77893E-03		
1	2.23686E+01	2.62524E-13	-1.06892E+01	parabolic
2	2.89749E+01	7.59883E-16	-4.08291E+00	golden section
3	3.62146E+01	2.19694E-03	3.15674E+00	golden section
4	3.59282E+01	2.21715E-03	-2.86388E-01	parabolic
5	3.55725E+01	2.23644E-03	-3.55739E-01	parabolic
6	3.46120E+01	2.23320E-03	-9.60499E-01	golden section
7	3.51308E+01	2.24759E-03	-4.41629E-01	parabolic
8	3.50957E+01	2.24769E-03	-7.97346E-03	parabolic
9	3.50606E+01	2.24766E-03	-3.50957E-02	parabolic
10	3.50957E+01	2.24769E-03	0.00000E+00	direct

Notes:

- 1) Step size always from t with current largest DSR(t) .
- 2) Parabolic step based on parabola maximum through the current best triplet.
- 3) Golden section step, $0.5 \cdot (3 - \sqrt{5})$ of larger interval bracketing maximum, taken only if trial parabolic step fails.
- 4) Direct step to a previous t only on last iteration and only if prior iteration met convergence test but DSR(t) was smaller than the previous value.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Iteration Log for Computation of the Time of Maximum Total Dose

Pathway: Water

Tolerance for tmax = 1.0E-03 (fractional accuracy)

Iteration Number	t (years)	TDOSE(t) (mrem/yr)	Step Size (years)	Step Type
0	6.36364E+02	7.82704E-01		
1	6.31591E+02	7.77479E-01	-4.77228E+00	parabolic
2	6.39520E+02	7.89206E-01	3.15674E+00	golden section
3	6.41471E+02	7.74659E-01	1.95098E+00	golden section
4	6.38315E+02	7.86392E-01	-1.20577E+00	golden section
5	6.40266E+02	7.91163E-01	7.45211E-01	golden section

Notes:

- 1) Step size always from t with current largest TDOSE(t).
- 2) Parabolic step based on parabola maximum through the current best triplet.
- 3) Golden section step, $0.5*(3-\text{SQRT}(5))$ of larger interval bracketing maximum, taken only if trial parabolic step fails.
- 4) Direct step to a previous t only on last iteration and only if prior iteration met convergence test but TDOSE(t) was smaller than the previous value.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Iteration Log for Computation of the Time of Maximum Total Dose

All Pathways Summed

Tolerance for tmax = 1.0E-03 (fractional accuracy)

Iteration Number	t (years)	TDOSE(t) (mrem/yr)	Step Size (years)	Step Type
0	6.36364E+02	7.82704E-01		
1	6.31591E+02	7.77479E-01	-4.77228E+00	parabolic
2	6.39520E+02	7.89206E-01	3.15674E+00	golden section
3	6.41471E+02	7.74659E-01	1.95098E+00	golden section
4	6.38315E+02	7.86392E-01	-1.20577E+00	golden section
5	6.40266E+02	7.91163E-01	7.45211E-01	golden section

Notes:

- 1) Step size always from t with current largest TDOSE(t).
- 2) Parabolic step based on parabola maximum through the current best triplet.
- 3) Golden section step, $0.5*(3-\text{SQRT}(5))$ of larger interval bracketing maximum, taken only if trial parabolic step fails.
- 4) Direct step to a previous t only on last iteration and only if prior iteration met convergence test but TDOSE(t) was smaller than the previous value.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Source Factors for Ingrowth and Decay
Radioactivity Factors Only
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	ID(j,t) = THF(j)*S1(j,t)/S1(i,0) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	9.999E-01	9.996E-01	9.988E-01	9.964E-01	9.880E-01	9.644E-01	8.861E-01
H-3	H-3	1.000E+00	1.000E+00	9.454E-01	8.450E-01	5.705E-01	1.857E-01	3.652E-03	4.870E-08	4.218E-25

Source Factors for Ingrowth and Decay
Combined Radioactivity and Leaching Factors
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	SF(j,t) = THF(j)*S1(j,t)/S1(i,0) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.071E-01	1.223E-03	1.856E-10	4.081E-30	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	1.000E+00	4.157E-01	7.178E-02	1.522E-04	3.247E-12	1.860E-39	0.000E+00	0.000E+00

The effect of volatilization was also considered when computing the source factors for H-3 and C-14.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Parameters Used for Calculating Cover Depth and Contaminated Zone Thicknesses

Cover Erosion rate (vcv): 0.001000 m/yr
 Contaminated Zone Erosion rate (vcz): 0.001000 m/yr
 Water Table Drop rate (vwt): 0.000000 m/yr
 Precipitation rate (Pr): 1.000000 m/yr
 Cover Removal Time (Tc): 0.000E+00 yr
 Overhead irrigation rate (Irr): 0.200 m/yr Runoff coefficient (Cr): 0.200
 Evapotranspiration coeff. (Ce): 0.500 Infiltration rate (In): 0.500 m/yr
 Bulk soil density (rhob): 1.500 g/cm**3 Effective porosity (pe): 0.000

Radio-nuclide (i)	Distribution Coefficient Kd(i), cm**3/g	Leaching Ratio q(i)
C-14	5.000000E+00	4.411E-02
H-3	4.000000E-02	8.523E-01

Time Dependence of Source Geometry

Time Dependence of Cover Depth [Cd(i,t)]

Nuclide (i)	t=	Cd(i,t) (meters)							
		0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
H-3	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Time Dependence of Contaminated Zone Thicknesses [T(i,t)]

Nuclide (i)	t=	T(i,t) (meters)							
		0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	3.0000E+00	2.9990E+00	2.9970E+00	2.9900E+00	2.9700E+00	2.9000E+00	2.7000E+00	2.0000E+00	
H-3	3.0000E+00	2.9990E+00	2.9970E+00	2.9900E+00	2.9700E+00	2.9000E+00	2.7000E+00	2.0000E+00	

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Occupancy, Cover/Depth, and Area Factors for Ground Pathway

Occupancy Factor (FO1): 0.179
 Area (A): 12000. sq. meters
 Initial cover depth (Cd): 0.000 meters
 Initial contaminated zone thickness (T): 3.000 meters

Time Dependence of Cover/Depth Factor [FCTR_COV_DEPTH(i,t)]

Nuclide (i)	FCTR_COV_DEPTH(i,t) (dimensionless)								
	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	
H-3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	

Time Dependence of Area Factor [FCTR_AREA(i,t)]

Nuclide (i)	FCTR_AREA(i,t) (dimensionless)								
	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	9.818E-01	9.818E-01	9.818E-01	9.818E-01	9.818E-01	9.818E-01	9.818E-01	9.818E-01	
H-3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	

Dose Conversion and Environmental Transport Factors for the Ground Pathway (p=1)

Nuclide (i)	DCF(i,1)*	ETFG(i,t) At Time in Years (dimensionless)								
		t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	1.345E-05	1.757E-01	1.757E-01	1.757E-01	1.757E-01	1.757E-01	1.757E-01	1.757E-01		
H-3	0.000E+00	1.790E-01	1.790E-01	1.790E-01	1.790E-01	1.790E-01	1.790E-01	1.790E-01		

* - Units are (mrem/yr)/(pCi/g) at infinite depth and area. Multiplication by ETEG(i,t) converts to site conditions.

Dose/Source Ratios for External Radiation from the Ground (p=1)
 Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,1,t) At Time in Years (mrem/yr)/(pCi/g)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	2.364E-06	2.531E-07	2.890E-09	4.386E-16	9.647E-36	0.000E+00	0.000E+00	0.000E+00	
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Dose/Source Ratios for Inhalation Pathway, Excluding Radon (p=2)
 Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,2,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.236E-04	1.324E-05	1.512E-07	2.294E-14	5.046E-34	0.000E+00	0.000E+00	0.000E+00
C-14(g)	C-14(g)		1.236E-04	1.324E-05	1.511E-07	2.294E-14	5.045E-34	0.000E+00	0.000E+00	0.000E+00
C-14(p)	C-14(p)		2.476E-08	2.651E-09	3.027E-11	4.595E-18	1.010E-37	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	9.385E-05	3.902E-05	6.737E-06	1.429E-08	3.047E-16	1.752E-43	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Pathway Factors for the Inhalation Pathway (radon excluded)

Area (A): 1.2000E+04 m**2 Occupancy Factor (FO2): 1.2800E-01
 Area Factor (FA2): 8.1187E-02 Annual Air Intake (FI2): 1.1400E+04 m**3/yr
 Cover Depth [Cd(0)]: 0.0000E+00 m Mass Loading (ASR2): 1.0000E-04 g/m**3
 Contaminated Zone Thickness [T(0)]: 3.0000E+00 m FA2 * FO2 * FI2 * ASR2: 1.1847E-02 g/yr

Nuclide (i)	t=	Depth Factor [FD(i,2,t)] (dimensionless)							
		0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
H-3	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00

Dose Conversion and Environmental Transport Factors for the Inhalation Pathway, Excluding Radon (p=2)

Parent (i)	Product (j)	DCF(j,2)*	ETF(j,2,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	5.916E+01	5.916E+01	5.916E+01	5.916E+01	5.916E+01	5.916E+01	5.916E+01	5.916E+01
H-3	H-3	6.400E-08	1.466E+03	1.466E+03	1.466E+03	1.466E+03	1.466E+03	1.466E+03	1.466E+03	1.466E+03

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Transport Time Parameters for Unsaturated Zone Stratum No. 1

Stratum thickness [h(1)]: 44.000000 m
 Bulk soil material density [rhob(1)]: 1.500000 g/cm*3
 Effective porosity [peuz(1)]: 0.373000
 Hydraulic conductivity [Khuz(1)]: 50.000000 m/yr
 Total porosity [ptuz(1)]: 0.420000
 Soil specific b parameter [buz(1)]: 10.400000
 Saturation ratio [sruz(1)]: 0.824074

Radio- nuclide (i)	Distribution Coefficient Kduz(i,1), cm*3/g	Retardation Factor Rduz(i,1)	Transport Time Dtuz(i,1), yr
C-14	5.0000E+00	2.2669E+01	6.1319E+02
H-3	4.0000E-02	1.1734E+00	3.1739E+01

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dilution Factor and Rise Time Parameters for Nondispersion (ND) Model

Aquifer contamination depth at well (z): 5.00000E+01 m
 Depth of water intake below water table (dw): 1.00000E+01 m
 Infiltration rate (In): 5.00000E-01 m/yr
 Aquifer water flow rate (Vwfr): 1.00000E+00 m/yr
 Hydraulic gradient (J): 2.00000E-02
 Hydraulic conductivity of aquifer (Kszh): 5.00000E+01 m/yr
 Contaminated zone extent parallel to gradient (l): 1.00000E+02 m
 Distance below contaminated zone to water table (h): 0.44000E+02 m
 Initial thickness of uncontaminated cover (Cd): 0.00000E+00 m
 Initial thickness of contaminated zone (T): 0.30000E+01 m
 Effective porosity of saturated zone (pesz): 0.37300E+00

Radio-nuclide (i)	Dilution Factor	Retardation Factor	Horizontal Transport Time		Rise Time	Decay Time Parameter
	f(i)	Rdsz(i)	Onsite	Tauh(i), yr	dt(i), yr	1/lamda(i),yr
C-14	1.000E+00	1.886E+01		7.034E+02	1.407E+02	8.267E+03
H-3	1.000E+00	1.143E+00		4.263E+01	8.526E+00	1.782E+01

Primary Parameters Used for Calculating Water/Soil Concentration Ratios for Groundwater Pathway Segment

Model used: Nondispersion (ND)

Bulk soil density in contaminated zone (rhob): 1.500 g/cm**3

Radio-nuclide (i)	Dilution Factor	Retardation Factor	Breakthrough Time		Rise Time
	f(i)	Rdcz(i)	Chain year	Single Nuclide Dt(i), yr	dt(i), yr
C-14	1.000E+00	2.267E+01	6.132E+02	6.132E+02	1.407E+02
H-3	1.000E+00	1.173E+00	3.174E+01	3.174E+01	8.526E+00

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Water/Soil Concentration Ratios [WSR(j,1,t)] for Groundwater Pathway Segment

Parent (i)	Product (j)	Thread Fraction	WSR(j,1,t) At Time in Years (pCi/L)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.532E-22	0.000E+00	0.000E+00

Water/Soil Concentration Ratios [WSR(j,2,t)] for Surface Water Pathway Segment

Watershed Area (Aw) = 1.0000E+06 m**2
 Contaminated Zone Area (A) = 1.2000E+04 m**2
 Dilution Factor (f') = 1.2000E-02
 Soil Density (rhob) = 1.5000E+00 kg/m**3

Parent (i)	Product (j)	Thread Fraction	WSR(j,2,t) At Time in Years (pCi/L)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.638E-24	0.000E+00	0.000E+00

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Storage Times For Contaminated Foodstuffs

k	Food Item	STOR_T(k), days
1	non-leafy plants	14.
2	leafy plants	1.
3	milk	1.
4	meat	20.
5	fish	7.
6	crustacea	7.
7	well water	1.
8	surface water	1.
9	livestock fodder	45.

Storage Time Ingrowth and Decay Factors

Storage Time for k'th Foodstuff: $t = \text{STOR_T}(k)$, days

Parent (i)	Product (j)	Thread Fraction	STOR_ID(i,j,t) = CONCE(i,j,t)/CONCE(i,i,0)									
			t=	1.400E+01	1.000E+00	1.000E+00	2.000E+01	7.000E+00	7.000E+00	1.000E+00	1.000E+00	4.500E+01
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	9.979E-01	9.998E-01	9.998E-01	9.969E-01	9.989E-01	9.989E-01	9.998E-01	9.998E-01	9.998E-01	9.931E-01

CONCE(i,j,t)/CONCE(i,i,0) is the concentration ratio of Product(j) at time t to Parent(i) at start of storage time.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Storage Time Correction Factors

Drinking Water from Well and/or Surface

Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,1) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Irrigation Water for Nonleafy Plants from Well and/or Surface

Harvest Time = t - 4.11E-02 yr; Consumption Time = t - 3.83E-02 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,2) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Irrigation Water for Leafy Plants from Well and/or Surface

Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,3) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Irrigation Water for Livestock (Milk) Fodder from Well and/or Surface

Harvest Time = t - 1.29E-01 yr; Consumption Time = t - 1.26E-01 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,5) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Storage Time Correction Factors

Irrigation Water for Livestock (Meat) Fodder from Well and/or Surface
 Harvest Time = t - 1.81E-01 yr; Consumption Time = t - 1.78E-01 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,7) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Livestock (Milk) Water from Well and/or Surface

Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,4) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors

Livestock (Meat) Water from Well and/or Surface

Harvest Time = t - 5.75E-02 yr; Consumption Time = t - 5.48E-02 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,6) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Nonleafy Plants

Harvest Time = t - 3.83E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF3(j,1,t) # At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.979E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Storage Time Correction Factors for Leafy Plants

Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF3(j,2,t)# At Time in Years								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01							

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Livestock (Meat) Fodder

Harvest Time = t - 1.78E-01 yr; Consumption Time = t - 5.48E-02 yr

Parent (i)	Product (j)	Thread Fraction	CFLF(j,1,t)# At Time in Years								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.931E-01							

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Livestock (Milk) Fodder

Harvest Time = t - 1.26E-01 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Thread Fraction	CFLF(j,2,t)# At Time in Years								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.931E-01							

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Meat

Harvest Time = t - 5.48E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF45(j,1,t)# At Time in Years								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.969E-01							

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Storage Time Correction Factors for Milk

Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF45(j,2,t)# At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.998E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Fish & Crustacea

Harvest Time = t - 1.92E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF45(j,1,t)# At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
H-3	H-3	1.000E+00	1.000E+00	9.989E-01						

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Overhead Irrigation (q=4)

Area Factor for Plant Foods [FA(3)] = 0.50

The Depth Factor Value

$FD(i,p,q,t) = 1.0000E+00$

is applicable for all radionuclides(i) and times(t).

Area and Depth Factors for Meat (p=4) and Milk (p=5) Pathways
Transfer from Livestock Water (q=5) and Soil (q=6) Intake

Area Factor for Meat and Milk [FA(p),p=4,5] = 0.60

The livestock water subpathway (q=5) and livestock soil intake subpathway (q=6)
occur only for the meat (p=4) and milk (p=5) pathways.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)

Subpathway: Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,1,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)

Subpathway: Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,2,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)

Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,3,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)

Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,4,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,1,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,2,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,3,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,4,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)

Subpathway: Livestock Water (q=5)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,5,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,1,t) At Time in Years (g/yr)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,2,t) At Time in Years (g/yr)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,3,t) * SF(j,t) At Time in Years (g/yr)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,4,t) * SF(j,t) At Time in Years (g/yr)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)

Subpathway: Livestock Water (q=5)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,5,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

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Dose Conversion and Environmental Transport Factors for the Fish Pathway (p=6)

Parent (i)	Product (j)	DCF(j,6)*	ETF(j,6,t) * SF(j,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Drinking Water Pathway (p=7)

Parent (i)	Product (j)	DCF(j,7)*	ETF(j,7,t) * SF(j,t) At Time in Years (g/yr)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	2.090E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
H-3	H-3	6.400E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.828E-19	0.000E+00	

* - The dose conversion factor units are mrem/pCi.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)

Subpathway: Root Uptake from Contaminated Soil (q=1)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,1t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)

Subpathway: Foliar Uptake from Contaminated Dust (q=2)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,2t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)

Subpathway: Ditch Irrigation (q=3)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,3t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)

Subpathway: Overhead Irrigation (q=4)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,4t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)

Total for All Subpathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,t) At Time in Years (mrem/yr)/(pCi/g)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)

Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,1t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)

Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,2t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)

Subpathway: Ditch Irrigation (q=3)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,3t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)

Subpathway: Overhead Irrigation (q=4)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,4t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)

Subpathway: Livestock Water (q=5)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,5t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)

Total for All Subpathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,1t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,2t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Subpathway: Ditch Irrigation (q=3)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,3t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Subpathway: Overhead Irrigation (q=4)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,4t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Subpathway: Livestock Water (q=5)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)

Total for All Subpathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose/Source Ratios for Internal Radiation from the Ingestion of Fish (p=6)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,6,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose/Source Ratios for Internal Radiation from the Ingestion of Drinking Water (p=7)

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,7,t) At Time in Years (mrem/yr)/(pCi/g)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.810E-26	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Meat/Fodder, Milk/Fodder, Fodder/Air and Fodder/Water Concentration Ratios

FI(4,q): 68.0 kg/day FI(5,q): 55.0 kg/day q=1,2,3,4
 FI(4,q): 50.0 L/day FI(5,q): 160.0 L/day q=5
 FI(4,q): 0.5 kg/day FI(5,q):

Nuclide (i)	FQR(i,4) d/kg	FQR(i,5) d/kg	FAR(i,3,2,3) m**3/g	FWR(i,3,3,3) L/g	FWR(i,3,4,3) L/g
C-14	1.0435E-02	8.3550E-03	2.8659E-01	7.1050E-05	0.0000E+00
H-3	5.7397E-03	4.3109E-03	2.8659E-01	2.0650E-04	0.0000E+00

FI(p,q) are the fodder (q=1,2,3,4), livestock water (q=5) and soil (q=6) intake rates;

FQR(i,p) are the transfer coefficients from contaminated fodder of livestock

water to meat (p=4) or milk (p=5). FAR(i,3,2,3) are the fodder/air

concentration ratios, and FWR(i,3,3,3) and FWR(i,3,4,3) are the fodder/

water concentration ratios for ditch and overhead irrigation, respectively.

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Fodder/Soil Concentration Ratios, QSR(i,p,q,t), for Meat and Milk Pathways

Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i)		QSR(i,p,1)	QSR(i,p,2)
Parent	Product		
C-14	C-14	7.6090E+00	2.3267E-06
H-3	H-3	2.9519E+00	2.3267E-06

Fodder/Soil Concentration Ratio, QSR(j,p,q,t), for Meat and Milk Pathways

Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	QSR(j,p,3,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.341E-25	0.000E+00

Fodder/Soil Concentration Ratio, QSR(j,p,q,t), for Meat and Milk Pathways

Overhead Irrigation (q=4)

Parent (i)	Product (j)	Thread Fraction	QSR(j,p,4,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Fodder/Soil Concentration Ratio, QSR(j,p,q,t), for Meat and Milk Pathways

Livestock Water (q=5)

Parent (i)	Product (j)	Thread Fraction	QSR(j,p,5,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.820E-25	0.000E+00

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Meat/Soil Concentration Ratios, FSR(i,4,q,t)
 Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i)		FSR(i,4,1)	FSR(i,4,2)
Parent	Product		
C-14	C-14	5.3991E+00	1.6510E-06
H-3	H-3	1.1521E+00	9.0812E-07

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
 Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	FSR(j,4,3,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.196E-26	0.000E+00	0.000E+00

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
 Overhead Irrigation (q=4)

Parent (i)	Product (j)	Thread Fraction	FSR(j,4,4,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
 Livestock Water (q=5)

Parent (i)	Product (j)	Thread Fraction	FSR(j,4,5,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.670E-25	0.000E+00	0.000E+00

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Milk/Soil Concentration Ratios, FSR(i,5,q,t)
 Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i)		FSR(i,5,1)	FSR(i,5,2)
Parent	Product		
C-14	C-14	1.5724E+00	1.0692E-06
H-3	H-3	6.9989E-01	5.5166E-07

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
 Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	FSR(j,5,3,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.014E-26	0.000E+00

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
 Overhead Irrigation (q=4)

Parent (i)	Product (j)	Thread Fraction	FSR(j,5,4,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
 Livestock Water (q=5)

Parent (i)	Product (j)	Thread Fraction	FSR(j,5,5,t) * SF(j,t) At Time in Years							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.834E-25	0.000E+00

Detailed: RESRAD Default Parameters Industrial Worker Scenario

File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Dose/Source Ratios for Soil Ingestion Pathway (p=8)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,8,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	1.000E+00	1.755E-05	1.879E-06	2.145E-08	3.256E-15	7.160E-35	0.000E+00	0.000E+00	0.000E+00
H-3	H-3	1.000E+00	5.373E-07	2.234E-07	3.857E-08	8.180E-11	1.745E-18	1.401E-45	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Dose Conversion and Environmental Transport Factors for the Soil Ingestion Pathway (p=8)

Parent (i)	Product (j)	DCF(j,8)*	ETF(j,8,t) At Time in Years (g/yr)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
C-14	C-14	2.090E-06	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00
H-3	H-3	6.400E-08	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00	8.395E+00

* - The dose conversion factor units are mrem/pCi.

Appendix C

RESRAD Uncertainty Analysis Thickness of the Contaminated Zone

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Probabilistic Input

Number of Sample Runs: 300

Number	Name	Distribution	Parameters			
1	H(1)	BOUNDED LOGNORMAL-N	2.296	1.276	.18	320
2	THICK0	TRIANGULAR	1	3	10	

Probabilistic Total Dose Summary

Nuclide (j)	Peak Time	Peak Dose	t=	DOSE(j,t), mrem/yr							
				0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14											
Min	0.00E+00	1.85E-01	1.85E-01	1.00E-03	2.86E-08	2.76E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.00E+03	2.68E+00	1.85E-01	9.14E-02	2.22E-02	1.49E+00	2.57E+00	2.64E+00	2.37E+00	1.61E+00	1.61E+00
Avg	2.31E+02	1.24E+00	1.85E-01	4.18E-02	4.27E-03	2.02E-02	1.40E-01	4.99E-01	2.37E-01	1.56E-02	1.56E-02
Std	2.11E+02	5.78E-01	0.00E+00	2.38E-02	5.25E-03	1.52E-01	4.43E-01	7.02E-01	5.38E-01	1.28E-01	1.28E-01
H-3											
Min	0.00E+00	4.01E-03	4.01E-03	5.56E-04	1.07E-05	9.88E-12	3.68E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	9.71E+01	1.22E+00	4.01E-03	3.11E-01	8.48E-01	1.12E+00	3.47E-01	5.76E-03	0.00E+00	0.00E+00	0.00E+00
Avg	1.67E+01	4.67E-01	4.01E-03	1.27E-02	1.05E-01	3.12E-01	1.76E-02	2.62E-05	0.00E+00	0.00E+00	0.00E+00
Std	1.56E+01	2.72E-01	0.00E+00	4.77E-02	2.09E-01	3.11E-01	5.35E-02	3.43E-04	0.00E+00	0.00E+00	0.00E+00
ΣALL											
Min	0.00E+00	1.89E-01	1.89E-01	1.56E-03	1.07E-05	9.88E-12	3.68E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.00E+03	2.68E+00	1.89E-01	3.66E-01	8.60E-01	1.99E+00	2.57E+00	2.64E+00	2.37E+00	1.61E+00	1.61E+00
Avg	2.30E+02	1.24E+00	1.89E-01	5.44E-02	1.09E-01	3.32E-01	1.58E-01	4.99E-01	2.37E-01	1.56E-02	1.56E-02
Std	2.12E+02	5.81E-01	0.00E+00	5.29E-02	2.10E-01	3.48E-01	4.41E-01	7.02E-01	5.38E-01	1.28E-01	1.28E-01

ΣALL is total dose summed for all nuclides.

Probabilistic Risk Summary

Nuclide (j)	t=	RISK(j,t)							
		0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14									
Min		3.97E-06	2.15E-08	6.13E-13	5.04E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max		3.97E-06	1.96E-06	4.76E-07	2.76E-05	4.77E-05	4.90E-05	4.39E-05	2.98E-05
Avg		3.97E-06	8.95E-07	9.14E-08	3.75E-07	2.59E-06	9.25E-06	4.40E-06	2.89E-07
Std		0.00E+00	5.10E-07	1.13E-07	2.81E-06	8.22E-06	1.30E-05	9.98E-06	2.38E-06
H-3									
Min		1.33E-06	1.84E-07	3.53E-09	3.27E-15	1.22E-25	0.00E+00	0.00E+00	0.00E+00
Max		1.33E-06	1.43E-05	3.74E-05	4.90E-05	1.52E-05	2.52E-07	0.00E+00	0.00E+00
Avg		1.33E-06	1.15E-06	4.79E-06	1.37E-05	7.72E-07	1.15E-09	0.00E+00	0.00E+00
Std		0.00E+00	2.09E-06	9.17E-06	1.36E-05	2.34E-06	1.50E-08	0.00E+00	0.00E+00
ΣALL									
Min		5.30E-06	2.06E-07	3.53E-09	3.27E-15	1.22E-25	0.00E+00	0.00E+00	0.00E+00
Max		5.30E-06	1.55E-05	3.77E-05	4.93E-05	4.77E-05	4.90E-05	4.39E-05	2.98E-05
Avg		5.30E-06	2.05E-06	4.88E-06	1.40E-05	3.37E-06	9.25E-06	4.40E-06	2.89E-07
Std		0.00E+00	2.18E-06	9.18E-06	1.39E-05	8.31E-06	1.30E-05	9.98E-06	2.38E-06

ΣALL is total risk summed for all nuclides.

Probabilistic Dose vs Pathway(1): Ground External

Nuclide (j)	DOSE(i,j,t), mrem/yr								
	t=	0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14									
Min		3.05E-03	1.65E-05	4.71E-10	4.54E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max		3.05E-03	1.50E-03	3.66E-04	2.59E-06	1.78E-12	0.00E+00	0.00E+00	0.00E+00
Avg		3.05E-03	6.88E-04	7.02E-05	1.32E-07	2.50E-14	0.00E+00	0.00E+00	0.00E+00
Std		0.00E+00	3.92E-04	8.65E-05	3.64E-07	1.48E-13	0.00E+00	0.00E+00	0.00E+00
H-3									
Min		0.00E+00							
Max		0.00E+00							
Avg		0.00E+00							
Std		0.00E+00							
ΣALL									
Min		3.05E-03	1.65E-05	4.71E-10	4.54E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max		3.05E-03	1.50E-03	3.66E-04	2.59E-06	1.78E-12	0.00E+00	0.00E+00	0.00E+00
Avg		3.05E-03	6.88E-04	7.02E-05	1.32E-07	2.50E-14	0.00E+00	0.00E+00	0.00E+00
Std		0.00E+00	3.92E-04	8.65E-05	3.64E-07	1.48E-13	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Inhalation (w/o Radon)

Nuclide (j)	t=	DOSE(i,j,t), mrem/yr						
		0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02
C-14								
Min	1.59E-01	8.63E-04	2.46E-08	2.38E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.59E-01	7.87E-02	1.91E-02	1.35E-04	9.30E-11	0.00E+00	0.00E+00	0.00E+00
Avg	1.59E-01	3.60E-02	3.67E-03	6.92E-06	1.31E-12	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	2.05E-02	4.52E-03	1.90E-05	7.74E-12	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	3.99E-03	5.53E-04	1.06E-05	9.83E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	3.99E-03	2.91E-03	1.55E-03	1.69E-04	3.01E-07	6.57E-17	0.00E+00	0.00E+00
Avg	3.99E-03	2.07E-03	6.65E-04	2.65E-05	1.37E-08	7.40E-19	0.00E+00	0.00E+00
Std	0.00E+00	5.34E-04	4.08E-04	3.74E-05	4.03E-08	5.05E-18	0.00E+00	0.00E+00
ΣALL								
Min	1.63E-01	1.42E-03	1.06E-05	9.83E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	1.63E-01	8.16E-02	2.07E-02	3.04E-04	3.01E-07	6.57E-17	0.00E+00	0.00E+00
Avg	1.63E-01	3.81E-02	4.34E-03	3.34E-05	1.37E-08	7.40E-19	0.00E+00	0.00E+00
Std	0.00E+00	2.10E-02	4.90E-03	5.48E-05	4.03E-08	5.05E-18	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Radon (Water Ind.)

Nuclide (j)	DOSE (i,j,t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Plant (Water Ind.)

Nuclide (j)	DOSE (i, j, t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Meat (Water Ind.)

Nuclide (j)	t=	DOSE (i,j,t), mrem/yr							
		0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Milk (Water Ind.)

Nuclide (j)	DOSE(i,j,t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Soil Ingestion

Nuclide (j)	t=	DOSE(i,j,t), mrem/yr							
		0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14									
Min	2.26E-02	1.22E-04	3.50E-09	3.37E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.26E-02	1.12E-02	2.72E-03	1.92E-05	1.32E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	2.26E-02	5.11E-03	5.21E-04	9.82E-07	1.86E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	2.91E-03	6.42E-04	2.70E-06	1.10E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3									
Min	2.28E-05	3.17E-06	6.07E-08	5.63E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.28E-05	1.66E-05	8.85E-06	9.68E-07	1.72E-09	3.76E-19	0.00E+00	0.00E+00	0.00E+00
Avg	2.28E-05	1.19E-05	3.81E-06	1.52E-07	7.84E-11	4.23E-21	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	3.06E-06	2.33E-06	2.14E-07	2.31E-10	2.89E-20	0.00E+00	0.00E+00	0.00E+00
ΣALL									
Min	2.27E-02	1.26E-04	6.42E-08	5.63E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	2.27E-02	1.12E-02	2.72E-03	2.02E-05	1.74E-09	3.76E-19	0.00E+00	0.00E+00	0.00E+00
Avg	2.27E-02	5.12E-03	5.25E-04	1.13E-06	7.85E-11	4.23E-21	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	2.91E-03	6.44E-04	2.89E-06	2.32E-10	2.89E-20	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Water Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr								
	t=	0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	1.49E+00	2.57E+00	2.64E+00	2.37E+00	1.61E+00	
Avg	0.00E+00	0.00E+00	0.00E+00	2.02E-02	1.40E-01	4.99E-01	2.37E-01	1.56E-02	
Std	0.00E+00	0.00E+00	0.00E+00	1.52E-01	4.43E-01	7.02E-01	5.38E-01	1.28E-01	
H-3									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.08E-01	8.47E-01	1.12E+00	3.47E-01	5.76E-03	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	1.06E-02	1.04E-01	3.12E-01	1.76E-02	2.62E-05	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	4.77E-02	2.09E-01	3.11E-01	5.35E-02	3.43E-04	0.00E+00	0.00E+00	0.00E+00
ΣALL									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	3.08E-01	8.47E-01	1.99E+00	2.57E+00	2.64E+00	2.37E+00	1.61E+00	
Avg	0.00E+00	1.06E-02	1.04E-01	3.32E-01	1.58E-01	4.99E-01	2.37E-01	1.56E-02	
Std	0.00E+00	4.77E-02	2.09E-01	3.48E-01	4.41E-01	7.02E-01	5.38E-01	1.28E-01	

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Fish Ingestion

Nuclide (j)	DOSE(i,j,t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Radon (Water Dep.)

Nuclide (j)	DOSE(i,j,t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Plant (Water Dep.)

Nuclide (j)	t=	DOSE(i,j,t), mrem/yr							
		0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL									
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Meat (Water Dep.)

Nuclide (j)	DOSE(i,j,t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Probabilistic Dose vs Pathway(i): Milk (Water Dep.)

Nuclide (j)	DOSE(i,j,t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
C-14								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ΣALL								
Min	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Avg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Std	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ΣALL is total pathway dose summed for all nuclides.

Cumulative Probability	Dose(t), mrem/yr							
	t= 0.00E+00	1.00E+00	3.00E+00	1.00E+01	3.00E+01	1.00E+02	3.00E+02	1.00E+03
0.025	1.89E-01	4.66E-03	5.57E-05	8.52E-09	7.45E-16	0.00E+00	0.00E+00	0.00E+00
0.050	1.89E-01	7.32E-03	1.20E-04	1.24E-07	1.53E-13	0.00E+00	0.00E+00	0.00E+00
0.075	1.89E-01	1.03E-02	1.96E-04	3.91E-07	1.18E-12	0.00E+00	0.00E+00	0.00E+00
0.100	1.89E-01	1.27E-02	2.41E-04	9.44E-07	3.62E-11	0.00E+00	0.00E+00	0.00E+00
0.125	1.89E-01	1.48E-02	3.41E-04	1.81E-06	1.02E-09	0.00E+00	0.00E+00	0.00E+00
0.150	1.89E-01	1.71E-02	4.48E-04	2.72E-06	3.15E-09	1.95E-28	0.00E+00	0.00E+00
0.175	1.89E-01	1.92E-02	5.66E-04	4.94E-06	1.10E-08	5.21E-25	0.00E+00	0.00E+00
0.200	1.89E-01	2.10E-02	6.92E-04	7.54E-06	2.91E-08	7.30E-24	0.00E+00	0.00E+00
0.225	1.89E-01	2.32E-02	8.63E-04	1.10E-05	1.41E-07	5.17E-23	0.00E+00	0.00E+00
0.250	1.89E-01	2.51E-02	1.05E-03	1.75E-05	3.39E-07	5.19E-22	0.00E+00	0.00E+00
0.275	1.89E-01	2.69E-02	1.21E-03	2.90E-05	1.27E-06	3.11E-21	0.00E+00	0.00E+00
0.300	1.89E-01	2.88E-02	1.49E-03	4.36E-05	2.00E-06	2.33E-20	0.00E+00	0.00E+00
0.325	1.89E-01	3.07E-02	1.78E-03	5.88E-05	4.45E-06	9.62E-20	0.00E+00	0.00E+00
0.350	1.89E-01	3.30E-02	2.36E-03	1.03E-04	1.07E-05	1.29E-18	0.00E+00	0.00E+00
0.375	1.89E-01	3.52E-02	2.70E-03	1.56E-04	2.05E-05	3.66E-18	0.00E+00	0.00E+00
0.400	1.89E-01	3.68E-02	3.08E-03	2.41E-04	3.41E-05	2.29E-17	0.00E+00	0.00E+00
0.425	1.89E-01	3.91E-02	3.67E-03	1.82E-01	5.96E-05	1.49E-16	0.00E+00	0.00E+00
0.450	1.89E-01	4.13E-02	4.15E-03	2.31E-01	8.33E-05	9.04E-16	0.00E+00	0.00E+00
0.475	1.89E-01	4.30E-02	4.61E-03	2.83E-01	1.37E-04	1.20E-14	0.00E+00	0.00E+00
0.500	1.89E-01	4.53E-02	5.67E-03	2.99E-01	2.02E-04	1.12E-13	0.00E+00	0.00E+00
0.525	1.89E-01	4.69E-02	6.46E-03	3.40E-01	3.78E-04	9.22E-13	0.00E+00	0.00E+00
0.550	1.89E-01	4.90E-02	7.52E-03	3.59E-01	4.92E-04	8.28E-12	0.00E+00	0.00E+00
0.575	1.89E-01	5.14E-02	8.49E-03	3.84E-01	8.07E-04	5.06E-09	0.00E+00	0.00E+00
0.600	1.89E-01	5.31E-02	9.61E-03	4.11E-01	9.31E-04	5.76E-03	0.00E+00	0.00E+00
0.625	1.89E-01	5.56E-02	1.06E-02	4.43E-01	1.60E-03	5.41E-01	0.00E+00	0.00E+00
0.650	1.89E-01	5.83E-02	1.18E-02	4.61E-01	2.16E-03	6.52E-01	0.00E+00	0.00E+00
0.675	1.89E-01	6.00E-02	1.36E-02	5.07E-01	3.31E-03	7.23E-01	0.00E+00	0.00E+00
0.700	1.89E-01	6.33E-02	1.56E-02	5.33E-01	4.73E-03	8.09E-01	0.00E+00	0.00E+00
0.725	1.89E-01	6.56E-02	1.85E-02	5.51E-01	6.95E-03	8.82E-01	4.30E-27	0.00E+00
0.750	1.89E-01	6.80E-02	2.25E-02	5.75E-01	1.11E-02	9.65E-01	1.07E-15	0.00E+00
0.775	1.89E-01	7.02E-02	1.24E-01	5.99E-01	3.15E-02	1.08E+00	2.41E-10	0.00E+00
0.800	1.89E-01	7.27E-02	2.30E-01	6.20E-01	8.07E-02	1.13E+00	8.44E-05	0.00E+00
0.825	1.89E-01	7.53E-02	3.22E-01	6.62E-01	1.13E-01	1.25E+00	5.49E-01	0.00E+00
0.850	1.89E-01	7.83E-02	3.70E-01	7.05E-01	1.92E-01	1.34E+00	7.83E-01	0.00E+00
0.875	1.89E-01	8.16E-02	4.19E-01	7.26E-01	2.56E-01	1.48E+00	9.65E-01	0.00E+00
0.900	1.89E-01	8.60E-02	4.72E-01	7.86E-01	6.04E-01	1.61E+00	1.17E+00	0.00E+00
0.925	1.89E-01	8.86E-02	5.22E-01	8.60E-01	8.42E-01	1.81E+00	1.35E+00	0.00E+00
0.950	1.89E-01	1.23E-01	6.25E-01	9.24E-01	1.14E+00	2.01E+00	1.63E+00	0.00E+00
0.975	1.89E-01	2.57E-01	7.27E-01	1.01E+00	1.76E+00	2.26E+00	1.87E+00	0.00E+00
1.000	1.89E-01	3.66E-01	8.60E-01	1.99E+00	2.57E+00	2.64E+00	2.37E+00	1.61E+00

Summary of dose at graphical times, reptition 1

Time Years	Dose statistics at graphical times, mrem/yr							
	Minimum	Maximum	Mean	Median	90%	95%	97.5%	99%
0.00E+00	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01
1.00E+00	1.99E-03	3.10E-01	5.42E-02	4.56E-02	8.75E-02	1.52E-01	2.65E-01	3.10E-01
3.00E+00	1.51E-05	7.98E-01	1.06E-01	5.95E-03	4.59E-01	6.26E-01	7.04E-01	7.97E-01
8.26E+00	5.15E-08	1.28E+00	3.12E-01	2.48E-01	8.46E-01	9.45E-01	1.09E+00	1.27E+00
1.00E+01	4.81E-09	1.04E+00	3.25E-01	2.99E-01	8.38E-01	9.25E-01	9.80E-01	1.04E+00
1.65E+01	6.30E-13	1.08E+00	1.79E-01	5.24E-02	5.44E-01	6.95E-01	1.04E+00	1.08E+00
2.48E+01	2.28E-16	2.28E+00	1.49E-01	2.75E-03	4.36E-01	1.07E+00	1.62E+00	2.28E+00
3.00E+01	3.61E-19	2.29E+00	1.50E-01	3.52E-04	5.43E-01	1.06E+00	1.94E+00	2.29E+00
3.31E+01	8.12E-21	2.29E+00	1.60E-01	8.51E-05	7.08E-01	1.24E+00	1.94E+00	2.29E+00
4.13E+01	2.78E-25	2.29E+00	1.96E-01	2.64E-06	1.02E+00	1.46E+00	1.95E+00	2.29E+00
4.96E+01	0.00E+00	2.31E+00	2.45E-01	2.58E-07	1.06E+00	1.64E+00	1.95E+00	2.30E+00
5.79E+01	0.00E+00	2.28E+00	2.92E-01	1.39E-08	1.26E+00	1.67E+00	2.09E+00	2.28E+00
6.61E+01	0.00E+00	2.28E+00	3.39E-01	4.79E-10	1.45E+00	1.79E+00	2.08E+00	2.28E+00
7.44E+01	0.00E+00	2.29E+00	3.81E-01	1.95E-11	1.51E+00	1.81E+00	2.08E+00	2.29E+00
8.26E+01	0.00E+00	2.56E+00	4.47E-01	7.26E-12	1.67E+00	2.03E+00	2.28E+00	2.56E+00
9.09E+01	0.00E+00	2.57E+00	4.82E-01	4.73E-14	1.74E+00	2.04E+00	2.28E+00	2.57E+00
9.92E+01	0.00E+00	2.57E+00	5.09E-01	5.65E-14	1.74E+00	2.04E+00	2.27E+00	2.57E+00
1.00E+02	0.00E+00	2.57E+00	5.09E-01	4.17E-14	1.74E+00	2.04E+00	2.27E+00	2.57E+00
1.07E+02	0.00E+00	2.58E+00	5.29E-01	4.21E-15	1.74E+00	2.05E+00	2.28E+00	2.58E+00
1.16E+02	0.00E+00	2.61E+00	5.61E-01	1.10E-14	1.75E+00	2.08E+00	2.26E+00	2.61E+00
1.24E+02	0.00E+00	2.56E+00	5.80E-01	1.97E-15	1.80E+00	2.04E+00	2.26E+00	2.56E+00
1.32E+02	0.00E+00	2.56E+00	6.07E-01	1.54E-04	1.80E+00	2.04E+00	2.27E+00	2.56E+00
1.40E+02	0.00E+00	2.57E+00	6.22E-01	1.88E-01	1.80E+00	2.05E+00	2.27E+00	2.57E+00
1.49E+02	0.00E+00	2.58E+00	6.48E-01	4.08E-01	1.84E+00	2.07E+00	2.26E+00	2.58E+00
1.57E+02	0.00E+00	2.60E+00	6.31E-01	1.87E-01	1.84E+00	2.03E+00	2.26E+00	2.60E+00
1.65E+02	0.00E+00	2.55E+00	5.86E-01	1.73E-04	1.80E+00	2.01E+00	2.17E+00	2.54E+00
1.74E+02	0.00E+00	2.55E+00	5.82E-01	6.35E-07	1.82E+00	2.01E+00	2.18E+00	2.54E+00
1.82E+02	0.00E+00	2.54E+00	5.55E-01	4.83E-15	1.79E+00	2.02E+00	2.18E+00	2.54E+00
1.90E+02	0.00E+00	2.55E+00	5.37E-01	5.86E-13	1.82E+00	2.03E+00	2.19E+00	2.54E+00
1.98E+02	0.00E+00	2.55E+00	5.14E-01	7.75E-18	1.79E+00	2.04E+00	2.21E+00	2.54E+00
2.07E+02	0.00E+00	2.55E+00	4.69E-01	1.00E-24	1.64E+00	2.05E+00	2.21E+00	2.55E+00
2.15E+02	0.00E+00	2.55E+00	4.55E-01	4.23E-26	1.60E+00	1.94E+00	2.16E+00	2.55E+00
2.23E+02	0.00E+00	2.17E+00	4.03E-01	0.00E+00	1.53E+00	1.87E+00	2.05E+00	2.17E+00
2.31E+02	0.00E+00	2.26E+00	3.87E-01	0.00E+00	1.53E+00	1.87E+00	2.14E+00	2.26E+00
2.40E+02	0.00E+00	2.33E+00	3.67E-01	0.00E+00	1.53E+00	1.87E+00	2.14E+00	2.33E+00
2.48E+02	0.00E+00	2.33E+00	3.58E-01	0.00E+00	1.49E+00	1.87E+00	2.15E+00	2.33E+00
2.56E+02	0.00E+00	2.34E+00	3.37E-01	0.00E+00	1.42E+00	1.75E+00	2.15E+00	2.34E+00
2.64E+02	0.00E+00	2.37E+00	3.14E-01	0.00E+00	1.40E+00	1.75E+00	2.14E+00	2.37E+00
2.73E+02	0.00E+00	2.34E+00	3.10E-01	0.00E+00	1.49E+00	1.86E+00	2.24E+00	2.34E+00
2.81E+02	0.00E+00	2.35E+00	3.07E-01	0.00E+00	1.40E+00	1.86E+00	2.24E+00	2.35E+00
2.89E+02	0.00E+00	2.35E+00	2.80E-01	0.00E+00	1.30E+00	1.73E+00	2.24E+00	2.35E+00
2.98E+02	0.00E+00	2.36E+00	2.73E-01	0.00E+00	1.30E+00	1.73E+00	2.25E+00	2.36E+00
3.00E+02	0.00E+00	2.37E+00	2.71E-01	0.00E+00	1.30E+00	1.73E+00	2.25E+00	2.37E+00
3.06E+02	0.00E+00	2.34E+00	2.50E-01	0.00E+00	1.26E+00	1.66E+00	2.24E+00	2.34E+00
3.14E+02	0.00E+00	2.34E+00	2.32E-01	0.00E+00	1.20E+00	1.62E+00	2.24E+00	2.34E+00
3.22E+02	0.00E+00	2.35E+00	2.15E-01	0.00E+00	1.15E+00	1.37E+00	2.24E+00	2.34E+00
3.31E+02	0.00E+00	2.35E+00	2.03E-01	0.00E+00	1.10E+00	1.36E+00	1.96E+00	2.35E+00
3.39E+02	0.00E+00	2.37E+00	1.79E-01	0.00E+00	1.01E+00	1.18E+00	1.96E+00	2.37E+00
3.47E+02	0.00E+00	2.33E+00	1.80E-01	0.00E+00	1.00E+00	1.19E+00	1.96E+00	2.33E+00
3.55E+02	0.00E+00	2.33E+00	1.53E-01	0.00E+00	7.76E-01	1.16E+00	1.82E+00	2.33E+00
3.64E+02	0.00E+00	2.35E+00	1.67E-01	0.00E+00	7.77E-01	1.17E+00	2.33E+00	2.35E+00
3.72E+02	0.00E+00	2.37E+00	1.44E-01	0.00E+00	7.57E-01	1.16E+00	1.81E+00	2.37E+00
3.80E+02	0.00E+00	2.37E+00	1.48E-01	0.00E+00	7.83E-01	1.16E+00	1.82E+00	2.37E+00
3.88E+02	0.00E+00	2.38E+00	1.51E-01	0.00E+00	7.71E-01	1.26E+00	1.82E+00	2.38E+00
3.97E+02	0.00E+00	2.41E+00	1.51E-01	0.00E+00	7.45E-01	1.32E+00	2.16E+00	2.41E+00
4.05E+02	0.00E+00	2.37E+00	1.50E-01	0.00E+00	7.45E-01	1.31E+00	2.17E+00	2.36E+00

Probabilistic results summary : RESRAD Default Parameters Industrial Worker Sce-

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Summary of dose at graphical times, reptition 2

Time Years	Dose statistics at graphical times, mrem/yr							
	Minimum	Maximum	Mean	Median	90%	95%	97.5%	99%
0.00E+00	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01
1.00E+00	1.56E-03	3.59E-01	5.49E-02	4.56E-02	8.60E-02	1.22E-01	3.15E-01	3.59E-01
3.00E+00	1.07E-05	8.04E-01	1.11E-01	5.49E-03	4.62E-01	6.25E-01	7.81E-01	8.04E-01
8.26E+00	3.12E-10	1.54E+00	3.23E-01	2.78E-01	8.19E-01	9.90E-01	1.32E+00	1.54E+00
1.00E+01	9.88E-12	1.99E+00	3.41E-01	2.94E-01	7.86E-01	9.53E-01	1.25E+00	1.98E+00
1.65E+01	2.18E-17	1.73E+00	1.91E-01	5.42E-02	5.41E-01	6.87E-01	1.38E+00	1.73E+00
2.48E+01	3.07E-17	2.25E+00	1.54E-01	1.72E-03	4.09E-01	1.15E+00	1.66E+00	2.24E+00
3.00E+01	3.17E-20	2.34E+00	1.55E-01	1.80E-04	7.03E-01	1.41E+00	1.66E+00	2.33E+00
3.31E+01	5.54E-22	2.34E+00	1.65E-01	5.65E-05	7.68E-01	1.41E+00	1.68E+00	2.33E+00
4.13E+01	1.33E-20	2.33E+00	2.00E-01	3.23E-06	9.59E-01	1.47E+00	1.65E+00	2.33E+00
4.96E+01	2.58E-26	2.34E+00	2.56E-01	1.28E-07	1.17E+00	1.61E+00	1.72E+00	2.34E+00
5.79E+01	0.00E+00	2.51E+00	3.08E-01	1.10E-08	1.42E+00	1.63E+00	2.07E+00	2.51E+00
6.61E+01	0.00E+00	2.51E+00	3.58E-01	5.10E-10	1.54E+00	1.80E+00	2.17E+00	2.51E+00
7.44E+01	0.00E+00	2.52E+00	3.95E-01	2.08E-11	1.53E+00	1.82E+00	2.34E+00	2.51E+00
8.26E+01	0.00E+00	2.53E+00	4.16E-01	7.15E-13	1.52E+00	1.80E+00	2.35E+00	2.53E+00
9.09E+01	0.00E+00	2.51E+00	4.58E-01	1.15E-13	1.58E+00	1.99E+00	2.35E+00	2.51E+00
9.92E+01	0.00E+00	2.51E+00	4.78E-01	2.13E-14	1.59E+00	1.99E+00	2.35E+00	2.51E+00
1.00E+02	0.00E+00	2.51E+00	4.83E-01	6.25E-14	1.59E+00	1.99E+00	2.35E+00	2.51E+00
1.07E+02	0.00E+00	2.51E+00	5.15E-01	3.27E-14	1.57E+00	1.99E+00	2.33E+00	2.51E+00
1.16E+02	0.00E+00	2.52E+00	5.65E-01	1.67E-13	1.59E+00	2.04E+00	2.40E+00	2.52E+00
1.24E+02	0.00E+00	2.54E+00	5.93E-01	1.24E-13	1.62E+00	2.15E+00	2.44E+00	2.54E+00
1.32E+02	0.00E+00	2.53E+00	6.22E-01	4.62E-08	1.68E+00	2.15E+00	2.43E+00	2.53E+00
1.40E+02	0.00E+00	2.54E+00	6.56E-01	5.18E-01	1.70E+00	2.15E+00	2.44E+00	2.54E+00
1.49E+02	0.00E+00	2.56E+00	6.62E-01	5.15E-01	1.74E+00	2.18E+00	2.41E+00	2.56E+00
1.57E+02	0.00E+00	2.53E+00	6.45E-01	4.01E-02	1.81E+00	2.14E+00	2.41E+00	2.53E+00
1.65E+02	0.00E+00	2.53E+00	6.11E-01	3.49E-02	1.74E+00	2.02E+00	2.41E+00	2.53E+00
1.74E+02	0.00E+00	2.53E+00	5.92E-01	1.60E-05	1.74E+00	2.02E+00	2.41E+00	2.53E+00
1.82E+02	0.00E+00	2.54E+00	5.69E-01	1.27E-09	1.78E+00	2.03E+00	2.41E+00	2.54E+00
1.90E+02	0.00E+00	2.56E+00	5.14E-01	2.78E-14	1.73E+00	2.04E+00	2.23E+00	2.56E+00
1.98E+02	0.00E+00	2.51E+00	4.91E-01	2.09E-18	1.73E+00	2.00E+00	2.24E+00	2.51E+00
2.07E+02	0.00E+00	2.51E+00	4.48E-01	5.54E-20	1.62E+00	1.90E+00	2.13E+00	2.51E+00
2.15E+02	0.00E+00	2.51E+00	4.19E-01	2.43E-25	1.60E+00	1.87E+00	2.12E+00	2.51E+00
2.23E+02	0.00E+00	2.51E+00	4.06E-01	1.28E-27	1.60E+00	1.87E+00	2.12E+00	2.51E+00
2.31E+02	0.00E+00	2.51E+00	3.98E-01	0.00E+00	1.60E+00	1.81E+00	2.13E+00	2.51E+00
2.40E+02	0.00E+00	2.52E+00	3.90E-01	0.00E+00	1.60E+00	1.87E+00	2.13E+00	2.51E+00
2.48E+02	0.00E+00	2.52E+00	3.65E-01	0.00E+00	1.61E+00	1.88E+00	2.15E+00	2.52E+00
2.56E+02	0.00E+00	2.09E+00	3.24E-01	0.00E+00	1.48E+00	1.77E+00	1.90E+00	2.09E+00
2.64E+02	0.00E+00	2.09E+00	3.06E-01	0.00E+00	1.32E+00	1.77E+00	1.89E+00	2.09E+00
2.73E+02	0.00E+00	2.09E+00	2.88E-01	0.00E+00	1.25E+00	1.76E+00	1.90E+00	2.09E+00
2.81E+02	0.00E+00	2.09E+00	2.51E-01	0.00E+00	1.20E+00	1.77E+00	1.88E+00	2.09E+00
2.89E+02	0.00E+00	2.10E+00	2.45E-01	0.00E+00	1.20E+00	1.59E+00	1.89E+00	2.10E+00
2.98E+02	0.00E+00	2.10E+00	2.20E-01	0.00E+00	1.13E+00	1.51E+00	1.83E+00	2.10E+00
3.00E+02	0.00E+00	2.10E+00	2.23E-01	0.00E+00	1.13E+00	1.51E+00	1.88E+00	2.10E+00
3.06E+02	0.00E+00	2.11E+00	2.17E-01	0.00E+00	1.13E+00	1.51E+00	1.96E+00	2.11E+00
3.14E+02	0.00E+00	2.12E+00	2.28E-01	0.00E+00	1.15E+00	1.75E+00	1.96E+00	2.11E+00
3.22E+02	0.00E+00	2.04E+00	2.06E-01	0.00E+00	1.14E+00	1.52E+00	1.89E+00	2.04E+00
3.31E+02	0.00E+00	2.07E+00	2.04E-01	0.00E+00	1.12E+00	1.50E+00	1.89E+00	2.07E+00
3.39E+02	0.00E+00	2.03E+00	1.87E-01	0.00E+00	1.02E+00	1.34E+00	1.91E+00	2.03E+00
3.47E+02	0.00E+00	2.04E+00	1.97E-01	0.00E+00	1.12E+00	1.49E+00	1.93E+00	2.04E+00
3.55E+02	0.00E+00	2.05E+00	1.89E-01	0.00E+00	1.12E+00	1.49E+00	1.93E+00	2.05E+00
3.64E+02	0.00E+00	2.06E+00	1.99E-01	0.00E+00	1.15E+00	1.85E+00	1.95E+00	2.06E+00
3.72E+02	0.00E+00	2.12E+00	1.74E-01	0.00E+00	1.00E+00	1.32E+00	2.01E+00	2.12E+00
3.80E+02	0.00E+00	2.12E+00	1.60E-01	0.00E+00	8.39E-01	1.32E+00	2.00E+00	2.12E+00
3.88E+02	0.00E+00	2.13E+00	1.50E-01	0.00E+00	6.92E-01	1.32E+00	2.00E+00	2.13E+00
3.97E+02	0.00E+00	2.16E+00	1.52E-01	0.00E+00	8.00E-01	1.32E+00	2.00E+00	2.16E+00
4.05E+02	0.00E+00	2.11E+00	1.61E-01	0.00E+00	7.99E-01	1.60E+00	2.01E+00	2.11E+00

Probabilistic results summary : RESRAD Default Parameters Industrial Worker Sce-

C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Summary of dose at graphical times, reptition 3

Time Years	Dose statistics at graphical times, mrem/yr							
	Minimum	Maximum	Mean	Median	90%	95%	97.5%	99%
0.00E+00	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01	1.89E-01
1.00E+00	3.29E-03	3.66E-01	5.41E-02	4.40E-02	8.58E-02	1.42E-01	2.74E-01	3.65E-01
3.00E+00	2.98E-05	8.60E-01	1.11E-01	4.96E-03	5.03E-01	6.66E-01	7.81E-01	8.59E-01
8.26E+00	5.14E-09	1.90E+00	3.19E-01	2.32E-01	8.00E-01	1.03E+00	1.14E+00	1.90E+00
1.00E+01	2.95E-10	1.94E+00	3.32E-01	3.07E-01	7.53E-01	9.22E-01	1.08E+00	1.93E+00
1.65E+01	1.42E-13	2.08E+00	1.70E-01	3.39E-02	5.14E-01	6.08E-01	1.16E+00	2.08E+00
2.48E+01	7.82E-19	2.04E+00	1.27E-01	1.16E-03	3.40E-01	9.25E-01	1.74E+00	2.04E+00
3.00E+01	3.68E-22	2.57E+00	1.68E-01	9.29E-05	5.82E-01	1.52E+00	2.04E+00	2.57E+00
3.31E+01	4.05E-24	2.63E+00	1.79E-01	2.87E-05	7.85E-01	1.51E+00	2.06E+00	2.62E+00
4.13E+01	0.00E+00	2.63E+00	2.41E-01	7.95E-07	1.17E+00	1.95E+00	2.16E+00	2.63E+00
4.96E+01	0.00E+00	2.63E+00	2.91E-01	3.43E-08	1.28E+00	2.03E+00	2.22E+00	2.63E+00
5.79E+01	0.00E+00	2.64E+00	3.27E-01	1.82E-09	1.45E+00	2.03E+00	2.22E+00	2.64E+00
6.61E+01	0.00E+00	2.67E+00	3.76E-01	1.16E-10	1.49E+00	2.04E+00	2.23E+00	2.67E+00
7.44E+01	0.00E+00	2.62E+00	4.09E-01	5.70E-11	1.50E+00	2.06E+00	2.24E+00	2.62E+00
8.26E+01	0.00E+00	2.63E+00	4.55E-01	4.19E-12	1.57E+00	2.02E+00	2.22E+00	2.62E+00
9.09E+01	0.00E+00	2.63E+00	4.75E-01	4.11E-12	1.58E+00	2.02E+00	2.22E+00	2.63E+00
9.92E+01	0.00E+00	2.64E+00	5.05E-01	1.07E-12	1.60E+00	2.02E+00	2.23E+00	2.64E+00
1.00E+02	0.00E+00	2.64E+00	5.05E-01	7.50E-13	1.57E+00	2.02E+00	2.23E+00	2.64E+00
1.07E+02	0.00E+00	2.66E+00	5.25E-01	1.53E-13	1.57E+00	2.02E+00	2.25E+00	2.66E+00
1.16E+02	0.00E+00	2.61E+00	5.54E-01	2.80E-14	1.57E+00	2.02E+00	2.21E+00	2.61E+00
1.24E+02	0.00E+00	2.61E+00	5.73E-01	6.89E-13	1.57E+00	2.03E+00	2.21E+00	2.61E+00
1.32E+02	0.00E+00	2.61E+00	5.93E-01	1.60E-06	1.64E+00	2.04E+00	2.21E+00	2.60E+00
1.40E+02	0.00E+00	2.61E+00	6.30E-01	1.89E-01	1.81E+00	2.07E+00	2.34E+00	2.61E+00
1.49E+02	0.00E+00	2.61E+00	6.38E-01	5.34E-01	1.81E+00	2.07E+00	2.34E+00	2.61E+00
1.57E+02	0.00E+00	2.61E+00	6.23E-01	1.94E-01	1.65E+00	2.08E+00	2.35E+00	2.61E+00
1.65E+02	0.00E+00	2.61E+00	6.05E-01	9.11E-04	1.65E+00	2.04E+00	2.36E+00	2.61E+00
1.74E+02	0.00E+00	2.44E+00	5.51E-01	4.49E-04	1.55E+00	1.92E+00	2.23E+00	2.44E+00
1.82E+02	0.00E+00	2.44E+00	4.99E-01	1.01E-08	1.45E+00	1.75E+00	1.95E+00	2.43E+00
1.90E+02	0.00E+00	2.44E+00	4.61E-01	4.91E-11	1.41E+00	1.73E+00	1.92E+00	2.44E+00
1.98E+02	0.00E+00	2.45E+00	4.38E-01	2.99E-16	1.50E+00	1.78E+00	1.92E+00	2.45E+00
2.07E+02	0.00E+00	2.46E+00	4.03E-01	5.95E-19	1.41E+00	1.74E+00	1.88E+00	2.46E+00
2.15E+02	0.00E+00	2.43E+00	3.91E-01	6.24E-20	1.51E+00	1.80E+00	1.99E+00	2.42E+00
2.23E+02	0.00E+00	2.43E+00	3.58E-01	4.06E-23	1.38E+00	1.72E+00	2.02E+00	2.42E+00
2.31E+02	0.00E+00	2.42E+00	3.47E-01	5.37E-29	1.36E+00	1.72E+00	2.02E+00	2.42E+00
2.40E+02	0.00E+00	2.42E+00	3.31E-01	0.00E+00	1.35E+00	1.72E+00	2.03E+00	2.42E+00
2.48E+02	0.00E+00	2.43E+00	3.24E-01	0.00E+00	1.37E+00	1.72E+00	2.03E+00	2.42E+00
2.56E+02	0.00E+00	2.43E+00	3.17E-01	0.00E+00	1.50E+00	1.77E+00	2.01E+00	2.42E+00
2.64E+02	0.00E+00	2.43E+00	3.12E-01	0.00E+00	1.38E+00	1.74E+00	1.97E+00	2.43E+00
2.73E+02	0.00E+00	2.44E+00	2.96E-01	0.00E+00	1.39E+00	1.72E+00	1.98E+00	2.43E+00
2.81E+02	0.00E+00	2.08E+00	2.58E-01	0.00E+00	1.36E+00	1.68E+00	1.83E+00	2.07E+00
2.89E+02	0.00E+00	2.08E+00	2.50E-01	0.00E+00	1.35E+00	1.69E+00	1.82E+00	2.07E+00
2.98E+02	0.00E+00	2.08E+00	2.34E-01	0.00E+00	1.27E+00	1.70E+00	1.82E+00	2.07E+00
3.00E+02	0.00E+00	2.08E+00	2.17E-01	0.00E+00	1.09E+00	1.54E+00	1.82E+00	2.07E+00
3.06E+02	0.00E+00	2.08E+00	2.12E-01	0.00E+00	1.07E+00	1.54E+00	1.81E+00	2.07E+00
3.14E+02	0.00E+00	2.08E+00	2.12E-01	0.00E+00	1.08E+00	1.68E+00	1.80E+00	2.08E+00
3.22E+02	0.00E+00	2.08E+00	2.04E-01	0.00E+00	1.07E+00	1.68E+00	1.80E+00	2.08E+00
3.31E+02	0.00E+00	2.09E+00	1.87E-01	0.00E+00	1.03E+00	1.53E+00	1.78E+00	2.08E+00
3.39E+02	0.00E+00	2.09E+00	1.85E-01	0.00E+00	1.02E+00	1.37E+00	1.77E+00	2.09E+00
3.47E+02	0.00E+00	2.24E+00	1.81E-01	0.00E+00	1.03E+00	1.68E+00	1.97E+00	2.24E+00
3.55E+02	0.00E+00	2.24E+00	1.67E-01	0.00E+00	9.71E-01	1.37E+00	1.78E+00	2.23E+00
3.64E+02	0.00E+00	2.24E+00	1.62E-01	0.00E+00	8.95E-01	1.37E+00	1.80E+00	2.24E+00
3.72E+02	0.00E+00	2.26E+00	1.53E-01	0.00E+00	7.87E-01	1.37E+00	1.78E+00	2.26E+00
3.80E+02	0.00E+00	2.23E+00	1.47E-01	0.00E+00	7.82E-01	1.33E+00	1.76E+00	2.23E+00
3.88E+02	0.00E+00	2.23E+00	1.34E-01	0.00E+00	7.04E-01	1.07E+00	1.76E+00	2.23E+00
3.97E+02	0.00E+00	2.24E+00	1.24E-01	0.00E+00	7.10E-01	1.07E+00	1.52E+00	2.23E+00
4.05E+02	0.00E+00	2.25E+00	1.30E-01	0.00E+00	6.97E-01	1.08E+00	1.77E+00	2.25E+00

Peak of the mean dose (averaged over observations) at graphical times

Repetition	Time of peak mean dose	Peak mean dose
	Years	mrem/yr
1	1.488E+02	6.484E-01
2	1.488E+02	6.625E-01
3	1.488E+02	6.377E-01

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	1	-0.45	1	-0.42	1	-0.78	1	-0.73
Thickness of contaminated zone	2	0.34	2	0.30	2	0.54	2	0.38
R-SQUARE		0.31		0.31		0.67		0.67

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	1	-0.46	1	-0.43	1	-0.80	1	-0.71
Thickness of contaminated zone	2	0.42	2	0.38	2	0.64	2	0.45
R-SQUARE		0.33		0.33		0.71		0.71

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak of mean dose time Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	1	-0.41	1	-0.39	1	-0.79	1	-0.74
Thickness of contaminated zone	2	0.31	2	0.28	2	0.54	2	0.37
R-SQUARE		0.24		0.24		0.66		0.66

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak All Pathways Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.77	2	-0.28	2	-0.44	2	-0.15
Thickness of contaminated zone	1	0.97	1	0.89	1	0.95	1	0.94
R-SQUARE		0.95		0.95		0.91		0.91

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak All Pathways Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.75	2	-0.43	2	-0.48	2	-0.26
Thickness of contaminated zone	1	0.91	1	0.82	1	0.87	1	0.84
R-SQUARE		0.86		0.86		0.77		0.77

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak All Pathways Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.73	2	-0.28	2	-0.46	2	-0.16
Thickness of contaminated zone	1	0.96	1	0.91	1	0.95	1	0.95
R-SQUARE		0.93		0.93		0.91		0.91

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Coefficients for peak External Ground Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig Coeff		Sig Coeff		Sig Coeff		Sig Coeff	
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak External Ground Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak External Ground Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig Coeff		Sig Coeff		Sig Coeff		Sig Coeff	
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Inhalation Particles Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Inhalation Particles Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig Coeff		Sig Coeff		Sig Coeff		Sig Coeff	
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Inhalation Particles Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig Coeff		Sig Coeff		Sig Coeff		Sig Coeff	
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Radon (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Radon (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Radon (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Plant (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Plant (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Plant (WaterInd.) Dose

Coefficient =

Repetition =

PCC	SRC	PRCC	SRRC
3	3	3	3

Description of Probabilistic Variable

Sig Coeff	Sig Coeff	Sig Coeff	Sig Coeff
-----------	-----------	-----------	-----------

Thickness of Unsaturated zone 1

0	0.00	0	0.00	0	0.00	0	0.00
---	------	---	------	---	------	---	------

Thickness of contaminated zone

0	0.00	0	0.00	0	0.00	0	0.00
---	------	---	------	---	------	---	------

R-SQUARE

0.00	0.00	0.00	0.00
------	------	------	------

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Meat (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Meat (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig Coeff		Sig Coeff		Sig Coeff		Sig Coeff	
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Meat (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Milk (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Milk (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Milk (WaterInd.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Soil Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Soil Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Soil Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Coefficients for peak Water Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.80	2	-0.33	2	-0.45	2	-0.15
Thickness of contaminated zone	1	0.96	1	0.87	1	0.95	1	0.94
R-SQUARE		0.94		0.94		0.91		0.91

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_...RAD

Coefficients for peak Water Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.77	2	-0.47	2	-0.48	2	-0.26
Thickness of contaminated zone	1	0.89	1	0.78	1	0.87	1	0.84
R-SQUARE		0.85		0.85		0.77		0.77

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Water Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.76	2	-0.32	2	-0.46	2	-0.16
Thickness of contaminated zone	1	0.95	1	0.89	1	0.95	1	0.95
R-SQUARE		0.92		0.92		0.91		0.91

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Fish Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Fish Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig Coeff	Sig Coeff	Sig Coeff	Sig Coeff
Thickness of Unsaturated zone 1	0 0.00	0 0.00	0 0.00	0 0.00
Thickness of contaminated zone	0 0.00	0 0.00	0 0.00	0 0.00
R-SQUARE	0.00	0.00	0.00	0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Coefficients for peak Fish Ingestion Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_RAD

Coefficients for peak Radon (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Radon (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE	0.00		0.00		0.00		0.00	

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Radon (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable

Sig Coeff Sig Coeff Sig Coeff Sig Coeff

Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Plant (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable

	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Plant (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Plant (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Meat (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRR
Repetition =	1	1	1	1

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Meat (WaterDep.) Dose

Coefficient =
 Repetition =

PCC	SRC	PRCC	SRRC
2	2	2	2

Description of Probabilistic Variable

Sig Coeff Sig Coeff Sig Coeff Sig Coeff

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Meat (WaterDep.) Dose

Coefficient =
 Repetition =

PCC	SRC	PRCC	SRRC
3	3	3	3

Description of Probabilistic Variable

Sig Coeff Sig Coeff Sig Coeff Sig Coeff

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Milk (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Milk (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak Milk (WaterDep.) Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable

	PCC		SRC		PRCC		SRRC	
	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	0	0.00	0	0.00	0	0.00	0	0.00
Thickness of contaminated zone	0	0.00	0	0.00	0	0.00	0	0.00
R-SQUARE		0.00		0.00		0.00		0.00

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak C-14 Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable

Sig Coeff Sig Coeff Sig Coeff Sig Coeff

Thickness of Unsaturated zone 1	2	-0.78	2	-0.28	2	-0.42	2	-0.13
Thickness of contaminated zone	1	0.97	1	0.90	1	0.96	1	0.95
R-SQUARE		0.95		0.95		0.92		0.92

-Rank is set to zero if the dose is zero or the correlation matrix is singular.

-R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak C-14 Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.75	2	-0.42	2	-0.44	2	-0.24
Thickness of contaminated zone	1	0.91	1	0.82	1	0.87	1	0.85
R-SQUARE		0.86		0.86		0.77		0.77

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak C-14 Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable

	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	2	-0.75	2	-0.27	2	-0.42	2	-0.14
Thickness of contaminated zone	1	0.97	1	0.92	1	0.95	1	0.95
R-SQUARE		0.94		0.94		0.91		0.91

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak H-3 Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	1	1	1	1

Description of Probabilistic Variable

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	1	-0.73	1	-0.60	1	-0.92	1	-0.75
Thickness of contaminated zone	2	0.68	2	0.51	2	0.87	2	0.58
R-SQUARE		0.70		0.70		0.89		0.89

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak H-3 Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	2	2	2	2

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	1	-0.75	1	-0.63	1	-0.92	1	-0.79
Thickness of contaminated zone	2	0.69	2	0.53	2	0.85	2	0.53
R-SQUARE		0.68		0.68		0.89		0.89

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.

Title : RESRAD Default Parameters Industrial Worker Scenario

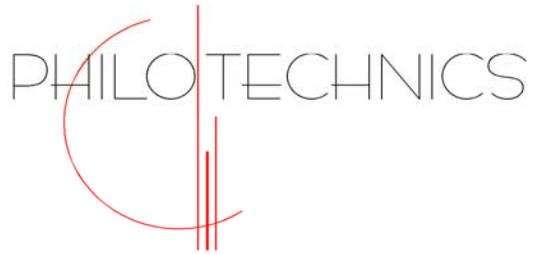
Input File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SIGMA_ALDRICH_IND_WORK_ACTUAL_H3_C14_.RAD

Coefficients for peak H-3 Dose

Coefficient =	PCC	SRC	PRCC	SRRC
Repetition =	3	3	3	3

Description of Probabilistic Variable	Sig	Coeff	Sig	Coeff	Sig	Coeff	Sig	Coeff
Thickness of Unsaturated zone 1	1	-0.63	1	-0.56	1	-0.92	1	-0.82
Thickness of contaminated zone	2	0.56	2	0.46	2	0.81	2	0.49
R-SQUARE		0.54		0.54		0.88		0.88

-Rank is set to zero if the dose is zero or the correlation matrix is singular.
 -R-SQUARE varies between 0 and 1 and is called the coefficient of determination; it provides a measure of the variation in the dependent variable (Dose) explained by regression on the independent variables.



Fort Mims Facility
Open Land Sampling and Analysis Report
Phase I

Sigma Aldrich Company
11542 Fort Mims Drive
Maryland Heights, Missouri

July 2009

Prepared by:

**Philotechnics, Ltd.
25 Mall Road, Suite 301.
Burlington, MA 01803**

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Attachments

- Attachment A – Survey Unit Maps
- Attachment B – Concentration Contour Maps and Analytical Results

1.0 Executive Summary

Philotechnics, Ltd. (Philotechnics) was retained by Sigma-Aldrich Company to obtain surface soil samples from open land areas to assess the current conditions at the site. The soil sampling was performed in compliance with the approved Fort Mims Facility Open Land Soil Sampling and Analysis Plan (Plan) dated October 20th, 2008.

A total of one hundred (100) discrete soil samples were obtained from two survey units to determine if carbon-14 (^{14}C) and/or tritium (^3H) were present in measurable quantities in the upper six (6) inches of soils adjacent to the structure. The sample results indicated ^{14}C concentrations ranging from non-detectible to 305 picocuries per gram (pCi/g) and ^3H concentrations ranging from non-detectible to 42.5 pCi/g. The concentrations found were generally higher adjacent to the building structure with decreasing concentrations further. Based on the sample results, additional samples will need to be obtained to fully characterize the extent of the radionuclides in soils at the site. This will require additional samples to bound the contamination. The approved Plan proposed to use the default screening values for soil surface contamination levels listed in Table B.2 of NUREG – 1757, Vol.1, Rev. 2 as the site DCGLs for ^{14}C and ^3H . These values are relevant for surface soils (<6 inches) and cannot be used on sites with concentrations of nuclides that are present in soils at a deeper depths.

We also believe that RESRAD site specific dose modeling be used to establish compliance with the 25 mrem/year dose requirement.

2.0 Plan Implementation

This section summarizes Philotechnics' implementation of the activities detailed in the approved Plan.

2.1 Radiological Release Screening Values

Based on historical data from the facility and the results of samples collected by Nuclear Regulatory Commission (NRC) inspectors in October 2007 and January 2008, the nuclides of concern (NOC) were determined to be ^{14}C and ^3H only. The default screening values listed in Table B.2 of NUREG – 1757, Vol.1, Rev. 2 were used as the site Derived Concentration Guideline Levels (DCGLs). These values were determined by the NRC using the DandD Version 2,1 modeling code using the Residential Farmer Scenario default parameters .

- $^3\text{H} = 110 \text{ pCi/g}$
- $^{14}\text{C} = 12 \text{ pCi/g}$

2.2 Area Classification and Establishment of Survey Units

The open land areas to the north and west were initially considered as potentially impacted. In accordance with the Plan, two survey units were established. Survey unit FMF-028 encompassed a large portion of the open land to the north of the FMF Building and was initially classified as Impacted – Class 2. Survey unit FMF-029 encompassed the area to the west of the FMF Building to the property boundaries and was classified as Impacted – Class 1.

2.3 Sampling Survey Design

In accordance with the Plan, the minimum number of samples required to characterize the soils was calculated using a combination of methodologies using the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and Visual Sampling Plan (VSP) v5.0. Because of the inability to perform direct scan measurements to detect the primary radionuclides of concern, VSP was used to calculate the number of samples required to detect a defined area of elevated activity. This is alternatively referred to as a hot spot analysis. The Singer and Wickman interval approach was used as the statistical method for determining the number of samples necessary to ensure that the area of study is properly characterized. The approach used an upper tolerance limit of 90%, and is based on an unknown distribution of contamination in the media. Using these parameters, there is a 90% probability of not missing a hot spot in excess of the DCGL within a radius of 2.29 meters (7.5 ft) of a sampling location.

A triangular grid pattern was established using a random start location with each side of the grid being approximately fifteen (15) feet in length. Between the two survey units, a total of one hundred (100) individual sample locations were designated for sampling. Overview maps depicting the soil sampling locations are provided in Attachment A.

Discrete soil samples were initially collected at a depth of 0 – 0.5 ft at each designated sampling location.

2.4 Soil Sampling Methodology

Sampling was performed in accordance with the approved Plan. Soils samples were collected using spoons or shovels for surface samples. The sampling equipment was decontaminated after each use to prevent cross-contamination of samples. A minimum of 500 grams of soils were collected from each location and depth interval. The sample was transferred into a stainless steel bowl and thoroughly homogenized. After homogenizing, the sample was transferred to the appropriate labeled container for off-site radiological analysis.

2.5 Sample ID

Each sample point was designated by a Sample ID, and identified as follows:

WWW: 3-character designation of facility (for example, "FMF")

XX: up to 3-character designation of survey unit (for example, "28")

YYY: 3-character designation of sample location (for example, "001")

For example, in the sample identification number, FMF-28-SOIL-001, "FMF" represents the facility, "28" represents the survey unit, and "001" represents the sample location. The sample ID number was recorded on the containers and chain-of-custody record at the time of sample collection.

2.6 Sample Shipment and Analysis

All samples were packaged and controlled in accordance with the Plan. The samples were controlled using chain-of custody procedures custody seals and the use of field logbooks during collection,

The soil samples were analyzed by Teledyne Brown Engineering, Inc. in Knoxville, Tennessee. ^{14}C and ^3H concentrations were determined by oxidation analysis. Teledyne is accredited by the National Environmental Laboratory Accreditation Program, and is licensed to receive and analyze radioactive material.

2.7 Sampling Quality Assurance

Quality assurance samples were collected for statistical analysis. For precision, one (1) field duplicate was obtained for every 20 samples collected. A field duplicate is a duplicate sample collected from the same sample point which has been thoroughly homogenized.

In addition to the field duplicates, Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples was performed by the analytical laboratory. MS/MSD samples are environmental samples that are spiked in the laboratory with a known concentration of a target analyte(s) to verify the efficiencies of the laboratory method.

3.0 Sample Results

The analytical results from the two survey units sampled indicated 57 sample locations had ¹⁴C concentrations exceeding the surface screening level of 12 pCi/g. No sample results for ³H were above the surface screening level of 110 pCi/g. ¹⁴C concentrations were highest adjacent to the building and tended to decrease with distance.

Table 1 and Table 2 identify the soil samples and analytical results for the surface soils for Survey Units FMF-028 and FMF-029 at the FMF Site. The concentration contour maps and analytical results for each survey unit are included in Attachment B.

<i>Table 1: Soil Sample Locations and Results</i>				
<i>Survey Unit –FMF-028</i>				
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)	DCGL Unity (1.0)
FMF-28-SOIL-001	0'-0.5'	<1.7	8.9	0.1
FMF-28-SOIL-002	0'-0.5'	11.4	17.9	1.1
FMF-28-SOIL-003	0'-0.5'	35.7	19.2	3.1
FMF-28-SOIL-004	0'-0.5'	23.2	6.8	2.0
FMF-28-SOIL-005	0'-0.5'	34.0	3.5	2.9
FMF-28-SOIL-006	0'-0.5'	35.5	1.2	3.0
FMF-28-SOIL-007	0'-0.5'	15.3	18.6	1.4
FMF-28-SOIL-008	0'-0.5'	23.8	21.0	2.2
FMF-28-SOIL-009	0'-0.5'	23.7	16.9	2.1
FMF-28-SOIL-010	0'-0.5'	4.2	5.7	0.4
FMF-28-SOIL-011	0'-0.5'	11.2	13.6	1.1
FMF-28-SOIL-012	0'-0.5'	4.0	4.9	0.4
FMF-28-SOIL-013	0'-0.5'	5.1	6.5	0.5
FMF-28-SOIL-014	0'-0.5'	10.5	11.2	1.0
FMF-28-SOIL-015	0'-0.5'	12.6	14.9	1.2
FMF-28-SOIL-016	0'-0.5'	13.9	5.4	1.2
FMF-28-SOIL-017	0'-0.5'	<2.0	4.7	0.0
FMF-28-SOIL-018	0'-0.5'	25.5	8.3	2.2
FMF-28-SOIL-019	0'-0.5'	30.0	15.8	2.6
FMF-28-SOIL-020	0'-0.5'	16.9	21.8	1.6
FMF-28-SOIL-021	0'-0.5'	8.1	9.3	0.8
FMF-28-SOIL-022	0'-0.5'	26.7	7.3	2.3
FMF-28-SOIL-023	0'-0.5'	8.9	5.5	0.8
FMF-28-SOIL-024	0'-0.5'	<1.9	2.1	0.0
FMF-28-SOIL-025	0'-0.5'	<2.2	3.1	0.0
FMF-28-SOIL-026	0'-0.5'	<1.6	2.8	0.0
FMF-28-SOIL-027	0'-0.5'	<2.1	2.7	0.0
FMF-28-SOIL-028	0'-0.5'	<1.8	4.2	0.0

<i>Table 1: Soil Sample Locations and Results</i>				
<i>Survey Unit –FMF-028</i>				
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)	DCGL Unity (1.0)
FMF-28-SOIL-029	0'-0.5'	<2.1	2.2	0.0
FMF-28-SOIL-030	0'-0.5'	5.6	3.1	0.5
FMF-28-SOIL-031	0'-0.5'	15.7	3.4	1.3
FMF-28-SOIL-032	0'-0.5'	29.3	4.6	2.5
FMF-28-SOIL-033	0'-0.5'	31.3	4.6	2.6
FMF-28-SOIL-034	0'-0.5'	9.0	6.5	0.8
FMF-28-SOIL-035	0'-0.5'	2.3	5.0	0.2
FMF-28-SOIL-036	0'-0.5'	2.0	3.4	0.2
FMF-28-SOIL-037	0'-0.5'	6.2	4.4	0.6
FMF-28-SOIL-038	0'-0.5'	1.6	1.7	0.2
FMF-28-SOIL-039	0'-0.5'	10.2	8.2	0.9
FMF-28-SOIL-040	0'-0.5'	10.8	6.3	1.0
FMF-28-SOIL-041	0'-0.5'	11.0	8.1	1.0
FMF-28-SOIL-042	0'-0.5'	4.8	14.2	0.5
FMF-28-SOIL-043	0'-0.5'	2.0	7.0	0.2
FMF-28-SOIL-044	0'-0.5'	<1.4	6.7	0.1
FMF-28-SOIL-045	0'-0.5'	5.1	9.9	0.5
FMF-28-SOIL-046	0'-0.5'	9.4	11.1	0.9
FMF-28-SOIL-047	0'-0.5'	42.5	28.2	3.8
FMF-28-SOIL-048	0'-0.5'	4.2	10.2	0.4
FMF-28-SOIL-049	0'-0.5'	3.7	10.7	0.4
FMF-28-SOIL-050	0'-0.5'	7.9	8.0	0.7
FMF-28-SOIL-051	0'-0.5'	3.8	3.9	0.4
FMF-28-SOIL-052	0'-0.5'	6.6	4.6	0.6
FMF-28-SOIL-053	0'-0.5'	2.6	9.6	0.3
FMF-28-SOIL-054	0'-0.5'	2.6	3.5	0.3
FMF-28-SOIL-055	0'-0.5'	4.3	13.1	0.5
FMF-28-SOIL-056	0'-0.5'	5.0	15.9	0.6
FMF-28-SOIL-057	0'-0.5'	6.7	15.4	0.7
FMF-28-SOIL-058	0'-0.5'	3.6	6.2	0.4
FMF-28-SOIL-059	0'-0.5'	19.5	4.0	1.7
FMF-28-SOIL-060	0'-0.5'	<1.9	6.4	0.1
Average		13.0	8.6	1.0
Maximum		42.5	28.2	3.8

<i>Table 2: Soil Sample Locations and Results</i>				
<i>Survey Unit - FMF- 029</i>				
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)	DCGL Unity (1.0)
FMF-29-SOIL-001	0'-0.5'	34.7	2.8	2.9
FMF-29-SOIL-002	0'-0.5'	41.9	6.8	3.6
FMF-29-SOIL-003	0'-0.5'	37.0	11.0	3.2
FMF-29-SOIL-004	0'-0.5'	38.0	9.6	3.3
FMF-29-SOIL-005	0'-0.5'	49.3	8.7	4.2
FMF-29-SOIL-006	0'-0.5'	28.8	3.3	2.4
FMF-29-SOIL-007	0'-0.5'	29.7	9.6	2.6
FMF-29-SOIL-008	0'-0.5'	27.3	5.3	2.3
FMF-29-SOIL-009	0'-0.5'	27.8	1.7	2.3
FMF-29-SOIL-010	0'-0.5'	93.8	14.0	7.9
FMF-29-SOIL-011	0'-0.5'	85.8	13.0	7.3
FMF-29-SOIL-012	0'-0.5'	104.0	9.9	8.8
FMF-29-SOIL-013	0'-0.5'	63.7	17.5	5.5
FMF-29-SOIL-014	0'-0.5'	43.7	2.9	3.7
FMF-29-SOIL-015	0'-0.5'	305.0	7.9	25.5
FMF-29-SOIL-016	0'-0.5'	109.0	5.6	9.1
FMF-29-SOIL-017	0'-0.5'	48.4	3.4	4.1
FMF-29-SOIL-018	0'-0.5'	57.4	9.1	4.9
FMF-29-SOIL-019	0'-0.5'	162.0	29.4	13.8
FMF-29-SOIL-020	0'-0.5'	59.9	5.8	5.0
FMF-29-SOIL-021	0'-0.5'	65.1	4.1	5.5
FMF-29-SOIL-022	0'-0.5'	200.0	6.9	16.7
FMF-29-SOIL-023	0'-0.5'	163.0	7.0	13.6
FMF-29-SOIL-024	0'-0.5'	125.0	6.6	10.5
FMF-29-SOIL-025	0'-0.5'	49.6	2.3	4.2
FMF-29-SOIL-026	0'-0.5'	95.8	22.3	8.2
FMF-29-SOIL-027	0'-0.5'	99.2	8.9	8.3
FMF-29-SOIL-028	0'-0.5'	40.3	5.2	3.4
FMF-29-SOIL-029	0'-0.5'	15.9	2.1	1.3
FMF-29-SOIL-030	0'-0.5'	257.0	4.0	21.5
FMF-29-SOIL-031	0'-0.5'	96.1	4.5	8.0
FMF-29-SOIL-032	0'-0.5'	81.4	5.3	6.8
FMF-29-SOIL-033	0'-0.5'	25.1	<1.5	2.1
FMF-29-SOIL-034	0'-0.5'	10.2	5.9	0.9
FMF-29-SOIL-035	0'-0.5'	27.5	3.1	2.3
FMF-29-SOIL-036	0'-0.5'	62.8	5.7	5.3
FMF-29-SOIL-037	0'-0.5'	191.0	10.6	16.0
FMF-29-SOIL-038	0'-0.5'	95.4	18.5	8.1

<i>Table 2: Soil Sample Locations and Results</i>				
<i>Survey Unit - FMF- 029</i>				
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)	DCGL Unity (1.0)
FMF-29-SOIL-039	0'-0.5'	30.2	7.4	2.6
FMF-29-SOIL-040	0'-0.5'	159.0	42.5	13.6
Average		83.4	9.0	7.0
Maximum		305.0	42.5	25.5

4.0 Conclusions

The surface soil sample results indicate that the levels ^3H are below the default screening value of 110 pCi/g. However, there are a significant amount of samples that contain levels of ^{14}C that exceed the ^{14}C default screening value of 12 pCi/g. A few more samples would fail to meet the release criteria following unity calculations when the ^3H results are added in. The sample results indicated ^{14}C concentrations ranging from non-detectible to 305 picocuries per gram (pCi/g) and ^3H concentrations ranging from non-detectible to 42.5 pCi/g. Survey Unit 028 had an average Unity value of 1.0 for the soils sampled. Survey Unit 029 had an average unity value of 7.0 for the soils sampled.

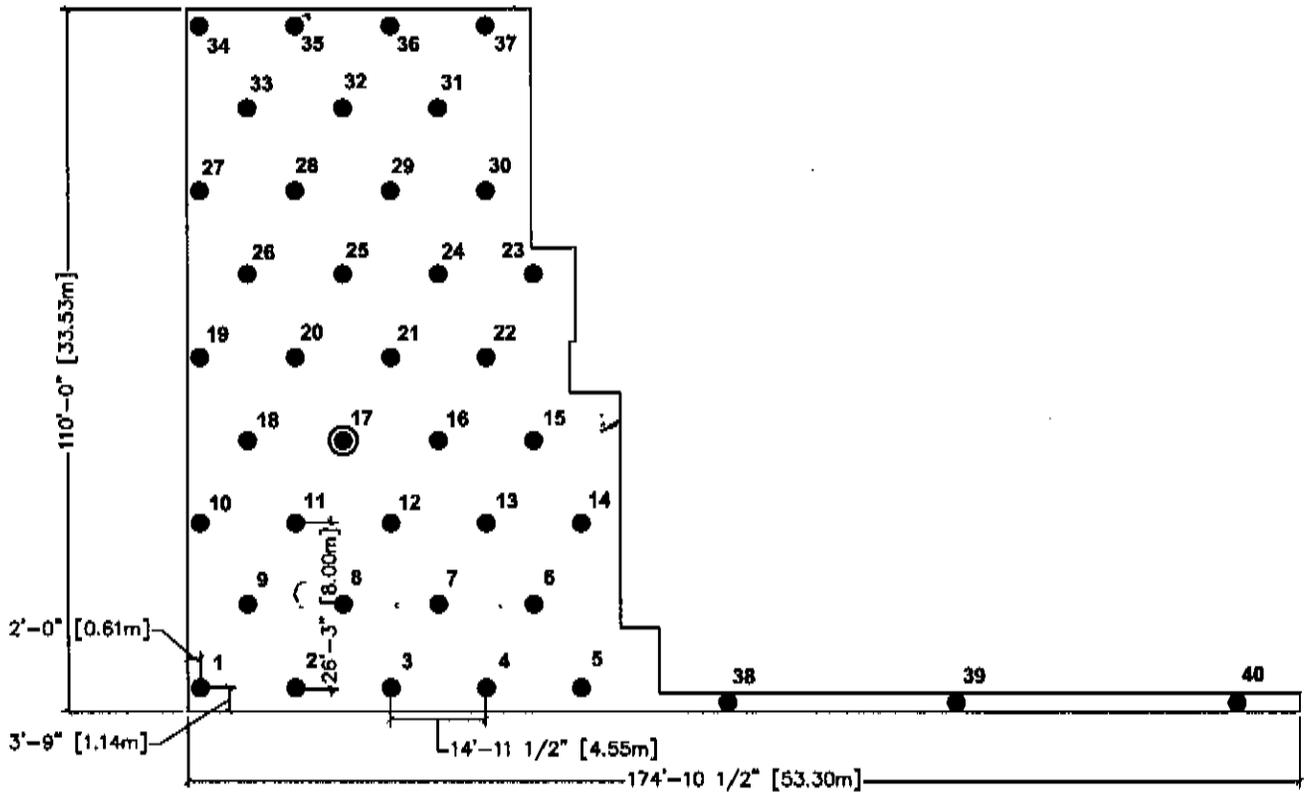
The results indicate the extents of the contamination have not been fully determined at the site. This will require the additional soil sampling to bound the soils contamination so that RESRAD dose modeling can be used to determine compliance with the 25 mrem/yr requirement.

Philotechnics Ltd.
July, 2009
Revision 0

Sigma-Aldrich Company
FMF Open Land Soil Sampling and Analysis Report
Phase I
Attachment A

Attachment A

Survey Unit Overview Maps



⊙ Random Start Location

● Sample Locations

Typical Spacing - 14' 11" or 4.55 m

SURVEY MAP

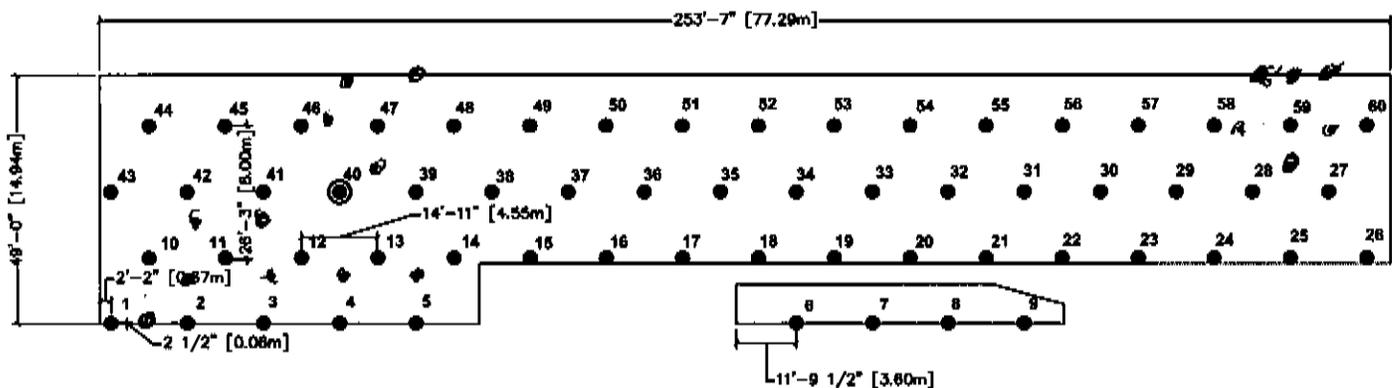
BUILDING: Sigma SURVEY UNIT NUMBER: 029 PAGE OF

SURVEY TYPE (CHECK ONE): Characterization Survey Final Status Survey

COMMENTS: _____

SURVEY COMPLETED BY: DATE COMPLETED:

RADIOLOGICAL CONTROLS SUPERVISOR REVIEW: DATE:



⊙ Random Start Location

● Sample Locations

Typical Spacing – 14' 11" or 4.55 m

SURVEY MAP

BUILDING: ICN

SURVEY UNIT NUMBER: 028

PAGE OF

SURVEY TYPE (CHECK ONE):

Characterization Survey

Final Status Survey

COMMENTS:

SURVEY COMPLETED BY:

DATE COMPLETED:

RADIOLOGICAL CONTROLS SUPERVISOR REVIEW:

DATE:

**Philotechnics Ltd.
July, 2009
Revision 0**

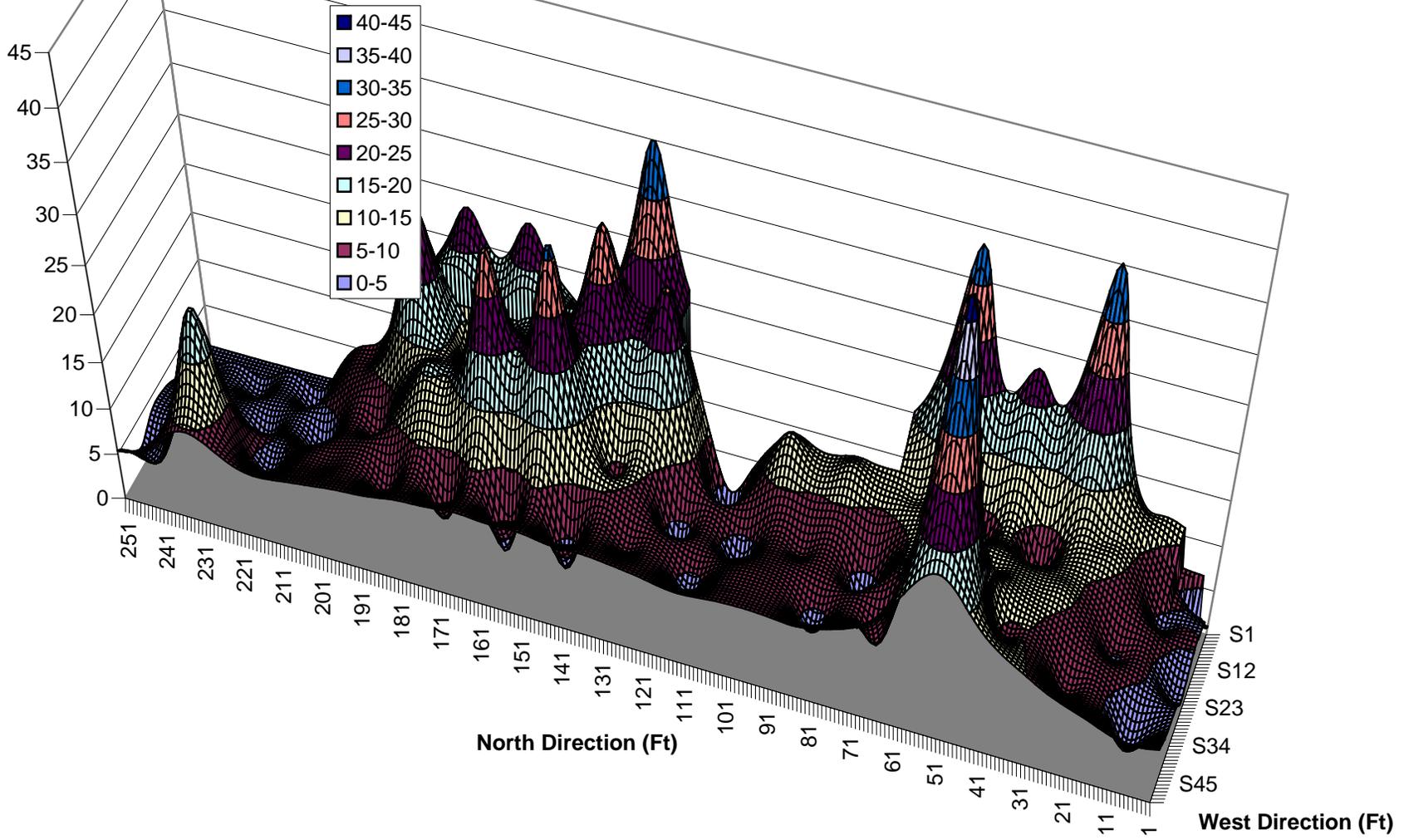
**Sigma-Aldrich Company
FMF Open Land Soil Sampling and Analysis Report
Phase I
Attachment B**

Attachment B

Concentration Contour Maps and Analytical Data

**FMF SU-028
Surface C-14**

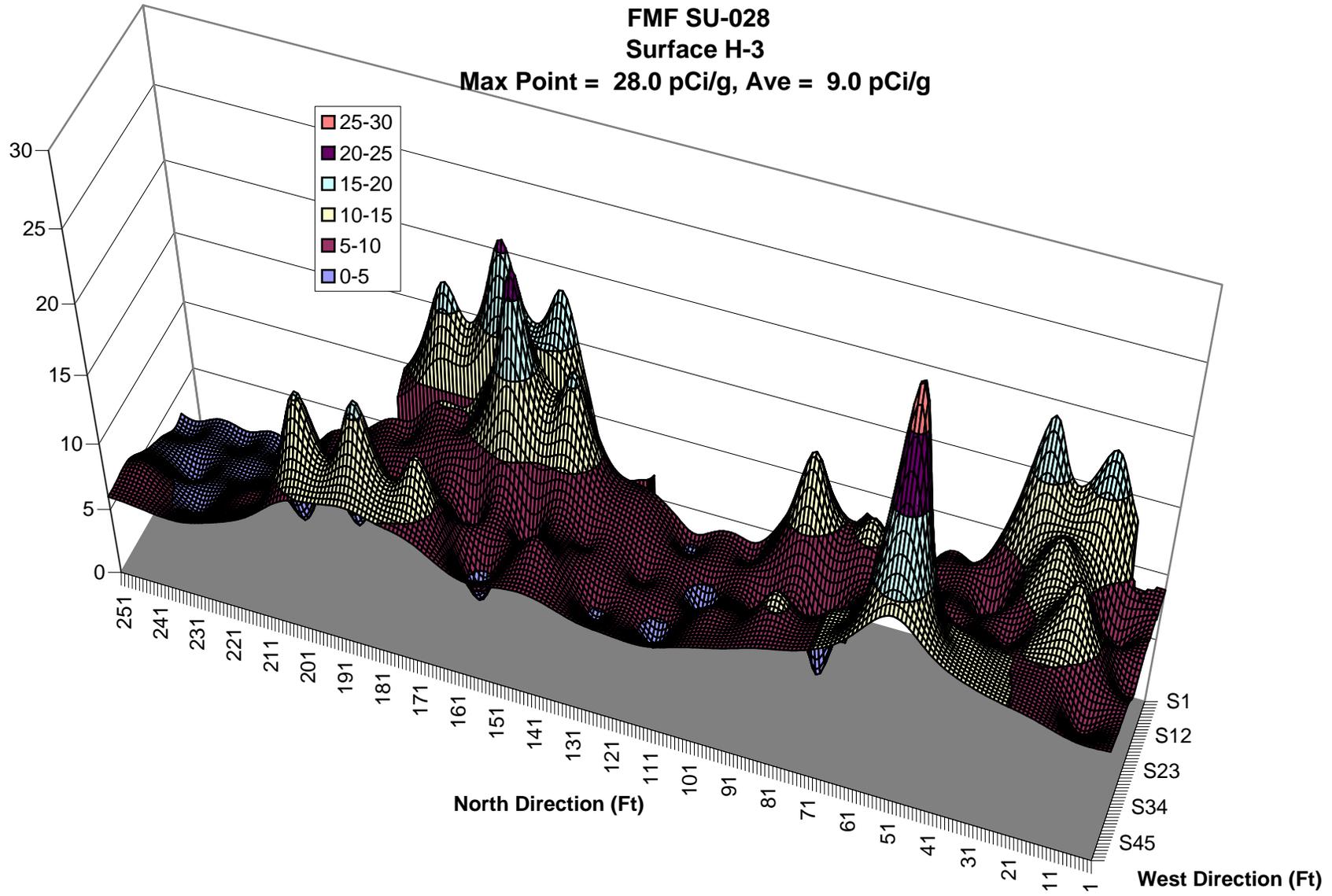
Max Point = 42.0 pCi/g, Ave = 11.2 pCi/g

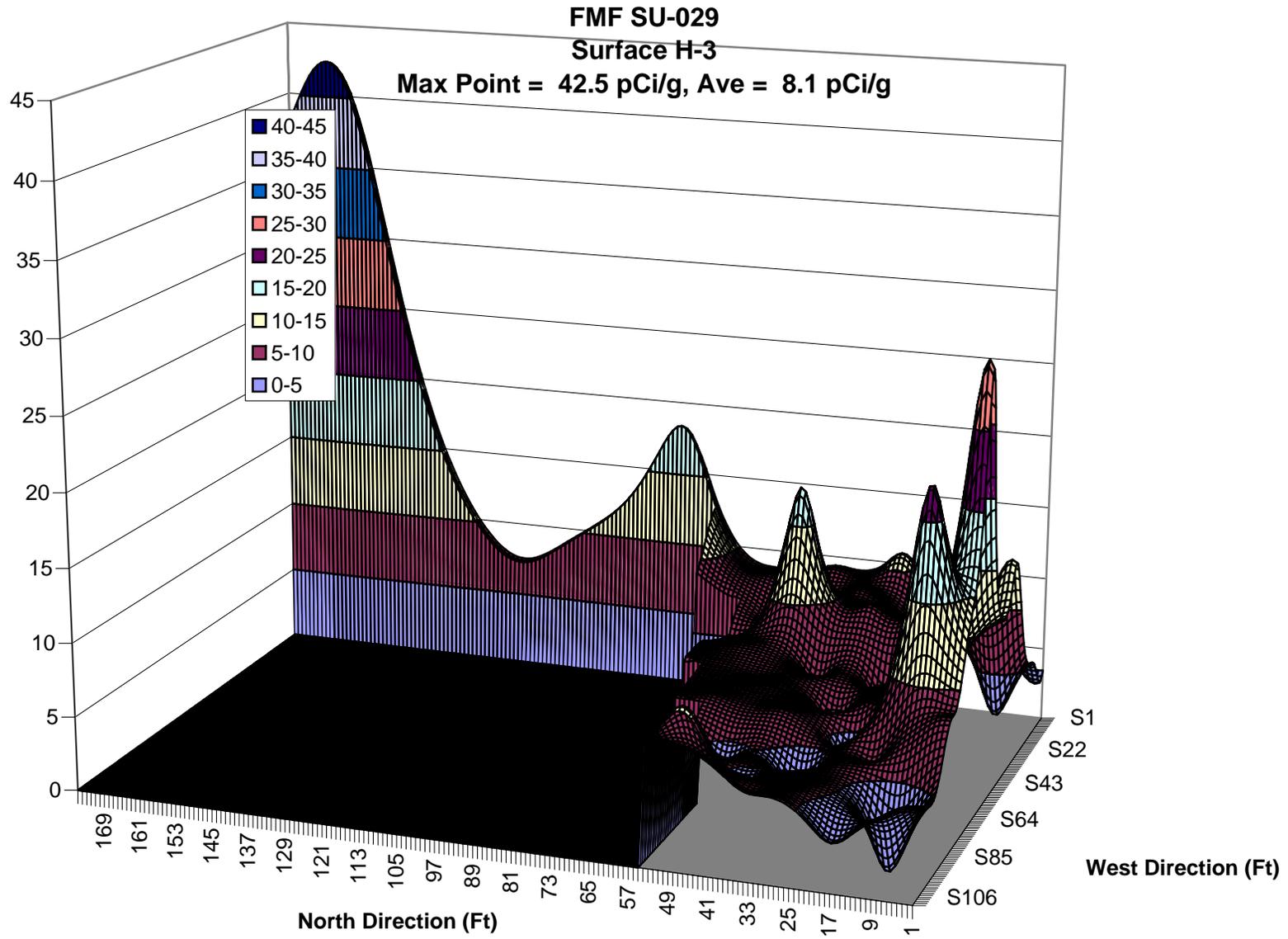


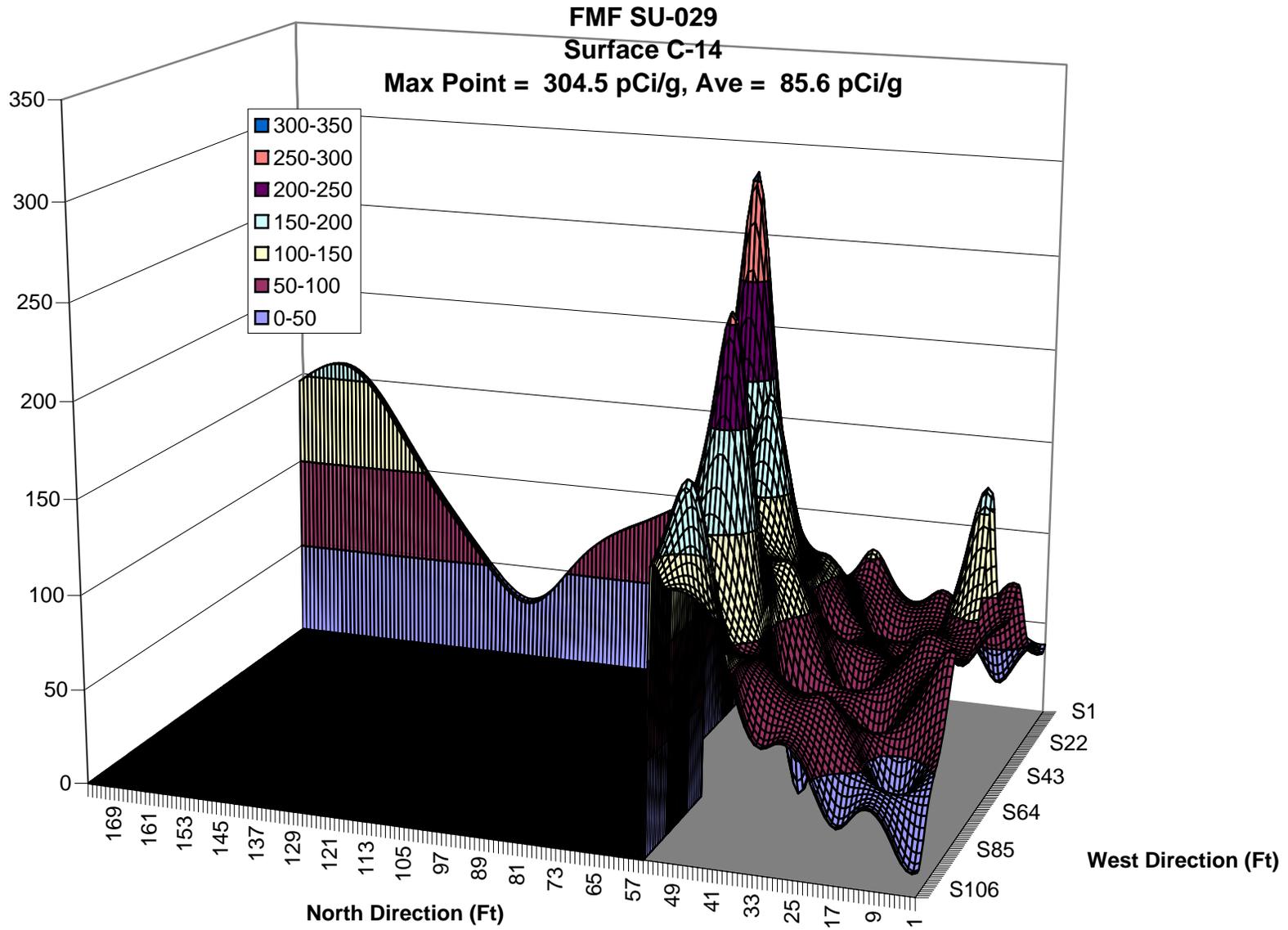
FMF SU-028

Surface H-3

Max Point = 28.0 pCi/g, Ave = 9.0 pCi/g









Matt Norton
Philotechnics
25 Mall Road Suite 301

Burlington, MA 01813

Report of Analysis/Certificate of Conformance

06/12/2009

LIMS #: L38478
Project ID# PH001-3EREGMA-06
Received: 05/08/2009
Delivery Date 06/07/2009
P.O.#: PER RECEIPT
Release #
SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-SOIL-001	L38478-1	
FMF-29-SOIL-002	L38478-2	
FMF-29-SOIL-003	L38478-3	
FMF-29-SOIL-004	L38478-4	
FMF-29-SOIL-005	L38478-5	
FMF-29-SOIL-006	L38478-6	
FMF-29-SOIL-007	L38478-7	
FMF-29-SOIL-008	L38478-8	



Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-SOIL-009	L38478-9	
FMF-29-SOIL-010	L38478-10	
FMF-29-SOIL-011	L38478-11	
FMF-29-SOIL-012	L38478-12	
FMF-29-SOIL-013	L38478-13	
FMF-29-SOIL-014	L38478-14	
FMF-29-SOIL-015	L38478-15	
FMF-29-SOIL-016	L38478-16	
FMF-29-SOIL-017	L38478-17	
FMF-29-SOIL-018	L38478-18	
FMF-29-SOIL-019	L38478-19	
FMF-29-SOIL-020	L38478-20	
FMF-29-SOIL-020 DUP	L38478-21	
FMF-29-SOIL-020 MS	L38478-22	
FMF-29-SOIL-021	L38478-23	
FMF-29-SOIL-022	L38478-24	
FMF-29-SOIL-023	L38478-25	
FMF-29-SOIL-024	L38478-26	
FMF-29-SOIL-025	L38478-27	
FMF-29-SOIL-026	L38478-28	
FMF-29-SOIL-027	L38478-29	
FMF-29-SOIL-028	L38478-30	
FMF-29-SOIL-029	L38478-31	
FMF-29-SOIL-030	L38478-32	
FMF-29-SOIL-031	L38478-33	
FMF-29-SOIL-032	L38478-34	
FMF-29-SOIL-033	L38478-35	
FMF-29-SOIL-034	L38478-36	
FMF-29-SOIL-035	L38478-37	
FMF-29-SOIL-036	L38478-38	
FMF-29-SOIL-037	L38478-39	
FMF-29-SOIL-038	L38478-40	
FMF-29-SOIL-039	L38478-41	
FMF-29-SOIL-040	L38478-42	
FMF-29-SOIL-040 DUP	L38478-43	
FMF-29-SOIL-040 MS	L38478-44	
FMF-29-SOIL-040 MSD	L38478-45	
FMF-29-SOIL-020 MSD	L38478-46	

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Report of Analysis

06/12/09 15:29

L38478

Philotechnics

PH001-3EREGMA-06

Sample ID: FMF-29-SOIL-001	Collect Start: 05/06/2009 11:11	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-1		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.47E+01	2.99E+00		pCi/g	R1	2.3	g wet		06/08/09	5	M	+
H-3	2003	2.78E+00	1.34E+00		pCi/g	R1	2.3	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-002	Collect Start: 05/06/2009 11:18	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-2		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.19E+01	2.90E+00		pCi/g	R1	2.79	g wet		06/08/09	5	M	+
H-3	2003	6.82E+00	1.63E+00		pCi/g	R1	2.79	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-003	Collect Start: 05/06/2009 11:21	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-3		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.70E+01	3.09E+00		pCi/g	R1	2.28	g wet		06/08/09	5	M	+
H-3	2003	1.10E+01	2.24E+00		pCi/g	R1	2.28	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/12/09 15:29

L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-004	Collect Start: 05/06/2009 11:26	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-4			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.80E+01	2.68E+00		pCi/g	R1	2.98	g wet		06/08/09	5	M	+
H-3	2003	9.55E+00	1.81E+00		pCi/g	R1	2.98	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-005	Collect Start: 05/06/2009 11:30	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-5			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.93E+01	3.20E+00		pCi/g	R1	2.65	g wet		06/08/09	5	M	+
H-3	2003	8.74E+00	1.86E+00		pCi/g	R1	2.65	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-006	Collect Start: 05/06/2009 11:32	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-6			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.88E+01	2.47E+00		pCi/g	R1	2.79	g wet		06/08/09	5	M	+
H-3	2003	3.32E+00	1.25E+00		pCi/g	R1	2.79	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/12/09 15:29

L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-007	Collect Start: 05/06/2009 11:36	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-7			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.97E+01	2.92E+00		pCi/g	R1	2.16	g wet		06/08/09	5	M	+
H-3	2003	9.57E+00	2.18E+00		pCi/g	R1	2.16	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-008	Collect Start: 05/06/2009 11:42	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-8			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.73E+01	2.52E+00		pCi/g	R1	2.61	g wet		06/08/09	5	M	+
H-3	2003	5.34E+00	1.54E+00		pCi/g	R1	2.61	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-009	Collect Start: 05/06/2009 11:47	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-9			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.78E+01	2.35E+00		pCi/g	R1	2.98	g wet		06/08/09	5	M	+
H-3	2003	1.70E+00	9.71E-01		pCi/g	R1	2.98	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/12/09 15:29

L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-010	Collect Start: 05/06/2009 11:50	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-10			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.38E+01	4.75E+00		pCi/g	R1	2.19	g wet		06/08/09	5	M	+
H-3	2003	1.40E+01	2.54E+00		pCi/g	R1	2.19	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-011	Collect Start: 05/06/2009 13:00	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-11			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	8.58E+01	4.27E+00		pCi/g	R1	2.48	g wet		06/08/09	5	M	+
H-3	2003	1.30E+01	2.29E+00		pCi/g	R1	2.48	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-012	Collect Start: 05/06/2009 13:03	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-12			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.04E+02	4.66E+00		pCi/g	R1	2.49	g wet		06/08/09	5	M	+
H-3	2003	9.88E+00	2.03E+00		pCi/g	R1	2.49	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/12/09 15:29

L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-013	Collect Start: 05/06/2009 13:07	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-13		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.37E+01	4.12E+00		pCi/g	R1	2.07	g wet		06/08/09	5	M	+
H-3	2003	1.75E+01	2.89E+00		pCi/g	R1	2.07	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-014	Collect Start: 05/06/2009 13:09	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-14		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.37E+01	3.32E+00		pCi/g	R1	2.27	g wet		06/08/09	5	M	+
H-3	2003	2.92E+00	1.38E+00		pCi/g	R1	2.27	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-015	Collect Start: 05/06/2009 13:12	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-15		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.05E+02	8.14E+00		pCi/g	R1	2.29	g wet		06/08/09	5	M	+
H-3	2003	7.91E+00	1.95E+00		pCi/g	R1	2.29	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

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L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-016	Collect Start: 05/06/2009 13:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-16			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.09E+02	5.01E+00		pCi/g	R1	2.25	g wet		06/08/09	5	M	+
H-3	2003	5.60E+00	1.72E+00		pCi/g	R1	2.25	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-017	Collect Start: 05/06/2009 13:16	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-17			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.84E+01	3.17E+00		pCi/g	R1	2.66	g wet		06/08/09	5	M	+
H-3	2003	3.42E+00	1.30E+00		pCi/g	R1	2.66	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-018	Collect Start: 05/06/2009 13:19	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-18			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.74E+01	3.76E+00		pCi/g	R1	2.24	g wet		06/08/09	5	M	+
H-3	2003	9.06E+00	2.08E+00		pCi/g	R1	2.24	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

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Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-019	Collect Start: 05/06/2009 13:22	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-19			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.62E+02	6.30E+00		pCi/g	R1	2.09	g wet		06/08/09	5	M	+
H-3	2003	2.94E+01	3.65E+00		pCi/g	R1	2.09	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-020	Collect Start: 05/06/2009 13:25	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-20			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.99E+01	3.85E+00		pCi/g	R1	2.22	g wet		06/08/09	5	M	+
H-3	2003	5.83E+00	1.76E+00		pCi/g	R1	2.22	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-020 DUP	Collect Start: 05/06/2009 13:25	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-21			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.05E+01	3.22E+00		pCi/g	R1	2.26	g wet		06/08/09	5	M	+
H-3	2003	3.76E+00	1.49E+00		pCi/g	R1	2.26	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

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Report of Analysis

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PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-020 MS	Collect Start: 05/06/2009 13:25	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-22			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.28E+02	8.36E+00		pCi/g	R1	2.33	g wet		06/08/09	5	M	+
H-3	2003	9.30E+01	5.76E+00		pCi/g	R1	2.52	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-021	Collect Start: 05/06/2009 13:27	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-23			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.51E+01	3.42E+00		pCi/g	R1	2.95	g wet		06/08/09	5	M	+
H-3	2003	4.13E+00	1.30E+00		pCi/g	R1	2.95	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-022	Collect Start: 05/06/2009 13:29	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-24			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.00E+02	5.85E+00		pCi/g	R1	2.92	g wet		06/08/09	5	M	+
H-3	2003	6.88E+00	1.59E+00		pCi/g	R1	2.92	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

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Report of Analysis

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PH001-3EREGMA-06

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Sample ID: FMF-29-SOIL-023	Collect Start: 05/06/2009 13:32	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-25			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.63E+02	6.15E+00		pCi/g	R1	2.2	g wet		06/08/09	5	M	+
H-3	2003	7.02E+00	1.90E+00		pCi/g	R1	2.2	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-024	Collect Start: 05/06/2009 13:35	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-26			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.25E+02	5.50E+00		pCi/g	R1	2.14	g wet		06/08/09	5	M	+
H-3	2003	6.58E+00	1.89E+00		pCi/g	R1	2.14	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-025	Collect Start: 05/06/2009 13:37	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-27			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.96E+01	3.51E+00		pCi/g	R1	2.27	g wet		06/08/09	5	M	+
H-3	2003	2.62E+00	1.33E+00		pCi/g	R1	2.27	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

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PH001-3EREGMA-06

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Sample ID: FMF-29-SOIL-026	Collect Start: 05/06/2009 13:39	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-28		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.58E+01	4.40E+00		pCi/g	R1	2.57	g wet		06/08/09	5	M	+
H-3	2003	2.23E+01	2.87E+00		pCi/g	R1	2.57	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-027	Collect Start: 05/06/2009 13:42	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-29		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.92E+01	4.91E+00		pCi/g	R1	2.16	g wet		06/08/09	5	M	+
H-3	2003	8.88E+00	2.11E+00		pCi/g	R1	2.16	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-028	Collect Start: 05/06/2009 13:45	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-30		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.03E+01	2.79E+00		pCi/g	R1	2.89	g wet		06/08/09	5	M	+
H-3	2003	5.24E+00	1.44E+00		pCi/g	R1	2.89	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

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PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-029	Collect Start: 05/06/2009 13:48	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-31			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.59E+01	2.01E+00		pCi/g	R1	2.7	g wet		06/08/09	5	M	+
H-3	2003	2.14E+00	1.11E+00		pCi/g	R1	2.7	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-030	Collect Start: 05/06/2009 13:51	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-32			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.57E+02	7.58E+00		pCi/g	R1	2.24	g wet		06/08/09	5	M	+
H-3	2003	4.01E+00	1.53E+00		pCi/g	R1	2.24	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-031	Collect Start: 05/06/2009 13:55	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-33			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.61E+01	4.74E+00		pCi/g	R1	2.25	g wet		06/08/09	5	M	+
H-3	2003	4.46E+00	1.59E+00		pCi/g	R1	2.25	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

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Report of Analysis

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PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-032	Collect Start: 05/06/2009 14:01	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-34		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	8.14E+01	3.98E+00		pCi/g	R1	2.7	g wet		06/08/09	5	M	+
H-3	2003	5.28E+00	1.50E+00		pCi/g	R1	2.7	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-033	Collect Start: 05/06/2009 14:10	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-35		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.51E+01	2.72E+00		pCi/g	R1	2.18	g wet		06/08/09	5	M	+
H-3	2003	<		1.49E+00	pCi/g	R1	2.18	g wet		06/09/09	5	M	U

Sample ID: FMF-29-SOIL-034	Collect Start: 05/06/2009 14:13	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-36		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.02E+01	1.79E+00		pCi/g	R1	2.58	g wet		06/08/09	5	M	+
H-3	2003	5.90E+00	1.61E+00		pCi/g	R1	2.58	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

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Report of Analysis

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PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-035	Collect Start: 05/06/2009 14:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-37			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.75E+01	2.58E+00		pCi/g	R1	2.53	g wet		06/08/09	5	M	+
H-3	2003	3.13E+00	1.30E+00		pCi/g	R1	2.53	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-036	Collect Start: 05/06/2009 14:18	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-38			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.28E+01	3.95E+00		pCi/g	R1	2.2	g wet		06/09/09	5	M	+
H-3	2003	5.65E+00	1.75E+00		pCi/g	R1	2.2	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-037	Collect Start: 05/06/2009 14:20	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-39			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.91E+02	6.39E+00		pCi/g	R1	2.36	g wet		06/09/09	5	M	+
H-3	2003	1.06E+01	2.16E+00		pCi/g	R1	2.36	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

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Report of Analysis

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PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-038	Collect Start: 05/06/2009 14:24	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-40			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.54E+01	4.46E+00		pCi/g	R1	2.5	g wet		06/09/09	5	M	+
H-3	2003	1.85E+01	2.67E+00		pCi/g	R1	2.5	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-039	Collect Start: 05/06/2009 14:28	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-41			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.02E+01	2.42E+00		pCi/g	R1	3	g wet		06/09/09	5	M	+
H-3	2003	7.35E+00	1.61E+00		pCi/g	R1	3	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-040	Collect Start: 05/06/2009 14:32	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-42			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.59E+02	6.18E+00		pCi/g	R2	2.48	g wet		06/12/09	5	M	+
H-3	2003	4.25E+01	4.00E+00		pCi/g	R1	2.44	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/12/09 15:29



L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-040 DUP	Collect Start: 05/06/2009 14:32	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-43		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.31E+02	5.67E+00		pCi/g	R2	2.44	g wet		06/12/09	5	M	+
H-3	2003	6.73E+01	5.45E+00		pCi/g	R1	2.06	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-040 MS	Collect Start: 05/06/2009 14:32	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-44		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.60E+03	2.12E+01		pCi/g	R2	2.08	g wet		06/12/09	5	M	+
H-3	2003	1.37E+02	7.14E+00		pCi/g	R1	2.4	g wet		06/09/09	5	M	+

Sample ID: FMF-29-SOIL-040 MSD	Collect Start: 05/06/2009 14:32	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/08/2009	% Moisture:
LIMS Number: L38478-45		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.56E+03	2.12E+01		pCi/g	R2	2.02	g wet		06/12/09	5	M	+
H-3	2003	1.67E+02	8.17E+00		pCi/g	R1	2.24	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/12/09 15:29

L38478

Philotechnics

PH001-3EREGMA-06

Matt Norton

Sample ID: FMF-29-SOIL-020 MSD	Collect Start: 05/06/2009 13:25	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/08/2009	% Moisture:	
LIMS Number: L38478-46			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.25E+02	8.28E+00		pCi/g	R1	2.36	g wet		06/09/09	5	M	+
H-3	2003	1.02E+02	6.05E+00		pCi/g	R1	2.5	g wet		06/09/09	5	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum
- **** Results are reported on an as received basis unless otherwise noted

MDC - Minimum Detectable Concentration

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

C-14

Method Blank Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Blank Result</u>	<u>Units</u>	<u>Qualifier</u>	<u>P/F</u>
WG8063-1	C-14	WO	06/08/2009 19:32	< 4.830E+00	pCi/Total	U	P
WG8065-1	C-14	WO	06/08/2009 19:45	< 4.830E+00	pCi/Total	U	P
WG8082-1	C-14	WO	06/12/2009 11:44	< 6.600E+00	pCi/Total	U	P

LCS Sample Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Spike Value</u>	<u>LCS Result</u>	<u>Units</u>	<u>Spike Recovery</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
WG8063-2	C-14	WO	06/08/2009 19:39	5.87E+02	6.890E+02	pCi/Total	117.4	70-130	+	P
Spike ID: 14C-110295 Spike Conc: 5.87E+03 Spike Vol: 1.00E-01										
WG8065-2	C-14	WO	06/08/2009 19:52	5.87E+02	6.590E+02	pCi/Total	112.3	70-130	+	P
Spike ID: 14C-110295 Spike Conc: 5.87E+03 Spike Vol: 1.00E-01										
WG8082-2	C-14	WO	06/12/2009 11:51	5.87E+02	5.750E+02	pCi/Total	98.0	70-130	+	P
Spike ID: 14C-110295 Spike Conc: 5.87E+03 Spike Vol: 1.00E-01										

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

C-14

Duplicate Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Original Result</u>	<u>DUP Result</u>	<u>Units</u>	<u>RPD</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
L38478-21R1 L38478-20R1	C-14	S	06/08/2009 22:11	5.990E+01	4.050E+01	pCi/g Wet	38.7	<50	+	P
L38478-43R2 L38478-42R2	C-14	S	06/12/2009 14:25	1.590E+02	1.310E+02	pCi/g Wet	19.3	<50	+	P
WG8082-3 L38466-1	C-14	S	06/12/2009 11:54	< 1.610E+00	< 1.670E+00	pCi/g Wet		<50	**	NE

Matrix Spike Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Decay Corrected</u>			<u>Units</u>	<u>Spike Recovery</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
				<u>Spike Value</u>	<u>Original Result</u>	<u>MS Result</u>					
L38478-22R1 L38478-20R1	C-14	S	06/08/2009 22:18	2.51E+02	5.990E+01	3.280E+02	pCi/g Wet	106.7	60-140	+	P
Spike ID: 14C-110295											
Spike Conc: 5.87E+03											
Spike Vol: 1.00E-01											
L38478-44R2 L38478-42R2	C-14	S	06/12/2009 14:29	1.51E+03	1.590E+02	1.600E+03	pCi/g Wet	95.5	60-140	+	P
Spike ID: 14C-071905											
Spike Conc: 6.29E+04											
Spike Vol: 5.00E-02											

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

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Matrix Spike Duplicate Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Decay Corrected</u>		<u>MSD Recovery</u>	<u>Units</u>	<u>RPD</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
				<u>Spike Value</u>	<u>MSD Result</u>						
L38478-45R2 L38478-44R2	C-14	S	06/12/2009 14:18	1.55E+03	1.560E+03	90.1	pCi/g Wet	5.7	<50	+	P
Spike ID: 14C-071905											
Spike Conc: 6.29E+04											
Spike Vol: 5.00E-02											
L38478-46R1 L38478-22R1	C-14	S	06/09/2009 00:57	2.48E+02	3.250E+02	106.9	pCi/g Wet	0.2	<50	+	P
Spike ID: 14C-110295											
Spike Conc: 5.87E+03											
Spike Vol: 1.00E-01											

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

C-14

C-14

Associated Samples for

WG8063

<u>Sample #</u>	<u>Client ID</u>
L38478-1R1	FMF-29-SOIL-001
L38478-2R1	FMF-29-SOIL-002
L38478-3R1	FMF-29-SOIL-003
L38478-4R1	FMF-29-SOIL-004
L38478-5R1	FMF-29-SOIL-005
L38478-6R1	FMF-29-SOIL-006
L38478-7R1	FMF-29-SOIL-007
L38478-8R1	FMF-29-SOIL-008
L38478-9R1	FMF-29-SOIL-009
L38478-10R1	FMF-29-SOIL-010
L38478-11R1	FMF-29-SOIL-011
L38478-12R1	FMF-29-SOIL-012
L38478-13R1	FMF-29-SOIL-013
L38478-14R1	FMF-29-SOIL-014
L38478-15R1	FMF-29-SOIL-015
L38478-16R1	FMF-29-SOIL-016
L38478-17R1	FMF-29-SOIL-017
L38478-18R1	FMF-29-SOIL-018
L38478-19R1	FMF-29-SOIL-019
L38478-20R1	FMF-29-SOIL-020
L38478-21R1	FMF-29-SOIL-020 DUP
L38478-22R1	FMF-29-SOIL-020 MS
L38478-46R1	FMF-29-SOIL-020 MSD

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

C-14

C-14

Associated Samples for

WG8065

<u>Sample #</u>	<u>Client ID</u>
L38478-23R1	FMF-29-SOIL-021
L38478-24R1	FMF-29-SOIL-022
L38478-25R1	FMF-29-SOIL-023
L38478-26R1	FMF-29-SOIL-024
L38478-27R1	FMF-29-SOIL-025
L38478-28R1	FMF-29-SOIL-026
L38478-29R1	FMF-29-SOIL-027
L38478-30R1	FMF-29-SOIL-028
L38478-31R1	FMF-29-SOIL-029
L38478-32R1	FMF-29-SOIL-030
L38478-33R1	FMF-29-SOIL-031
L38478-34R1	FMF-29-SOIL-032
L38478-35R1	FMF-29-SOIL-033
L38478-36R1	FMF-29-SOIL-034
L38478-37R1	FMF-29-SOIL-035
L38478-38R1	FMF-29-SOIL-036
L38478-39R1	FMF-29-SOIL-037
L38478-40R1	FMF-29-SOIL-038
L38478-41R1	FMF-29-SOIL-039

C-14

Associated Samples for

WG8082

<u>Sample #</u>	<u>Client ID</u>
L38478-42R2	FMF-29-SOIL-040
L38478-43R2	FMF-29-SOIL-040 DUP
L38478-44R2	FMF-29-SOIL-040 MS
L38478-45R2	FMF-29-SOIL-040 MSD

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

H-3

Method Blank Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Blank Result</u>	<u>Units</u>	<u>Qualifier</u>	<u>P/F</u>
WG7997-1	H-3	WO	05/30/2009 02:00	< 5.220E+00	pCi/Total	U	P
WG8062-1	H-3	WO	06/09/2009 01:35	< 3.230E+00	pCi/Total	U	P
WG8064-1	H-3	WO	06/09/2009 01:51	< 3.230E+00	pCi/Total	U	P

LCS Sample Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Spike Value</u>	<u>LCS Result</u>	<u>Units</u>	<u>Spike Recovery</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
WG7997-2	H-3	WO	05/30/2009 02:08	2.52E+02	2.930E+02	pCi/Total	116.1	70-130	+	P
Spike ID: 3H-041706-1 Spike Conc: 5.05E+02 Spike Vol: 5.00E-01										
WG8062-2	H-3	WO	06/09/2009 01:43	2.52E+02	2.680E+02	pCi/Total	106.2	70-130	+	P
Spike ID: 3H-041706-1 Spike Conc: 5.05E+02 Spike Vol: 5.00E-01										
WG8064-2	H-3	WO	06/09/2009 01:59	2.52E+02	2.570E+02	pCi/Total	101.8	70-130	+	P
Spike ID: 3H-041706-1 Spike Conc: 5.05E+02 Spike Vol: 5.00E-01										

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

H-3

Duplicate Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Original Result</u>	<u>DUP Result</u>	<u>Units</u>	<u>RPD</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
L38478-21R1 L38478-20R1	H-3	S	06/09/2009 04:51	5.830E+00	3.760E+00	pCi/g Wet		<50	*	NE
L38478-43R1 L38478-42R1	H-3	S	06/09/2009 08:18	4.250E+01	6.730E+01	pCi/g Wet	45.2	<50	+	P

Matrix Spike Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Decay Corrected</u>			<u>Units</u>	<u>Spike Recovery</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
				<u>Spike Value</u>	<u>Original Result</u>	<u>MS Result</u>					
L38478-22R1 L38478-20R1	H-3	S	06/09/2009 05:00	8.42E+01	5.830E+00	9.300E+01	pCi/g Wet	103.5	60-140	+	P
Spike ID: 3H-041706-1											
Spike Conc: 5.05E+02											
Spike Vol: 5.00E-01											
L38478-44R1 L38478-42R1	H-3	S	06/09/2009 08:29	8.84E+01	4.250E+01	1.370E+02	pCi/g Wet	106.9	60-140	+	P
Spike ID: 3H-041706-1											
Spike Conc: 5.05E+02											
Spike Vol: 5.00E-01											

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

H-3

Matrix Spike Duplicate Summary

<u>TBE Sample ID</u>	<u>Radionuclide</u>	<u>Matrix</u>	<u>Count Date/Time</u>	<u>Decay Corrected</u>		<u>MSD Recovery</u>	<u>Units</u>	<u>RPD</u>	<u>Range</u>	<u>Qualifier</u>	<u>P/F</u>
				<u>Spike Value</u>	<u>MSD Result</u>						
L38478-45R1 L38478-44R1	H-3	S	06/09/2009 08:41	9.47E+01	1.670E+02	131.4	pCi/g Wet	20.6	<50	+	P
Spike ID: 3H-041706-1											
Spike Conc: 5.05E+02											
Spike Vol: 5.00E-01											
L38478-46R1 L38478-22R1	H-3	S	06/09/2009 08:52	8.49E+01	1.020E+02	113.3	pCi/g Wet	9.0	<50	+	P
Spike ID: 3H-041706-1											
Spike Conc: 5.05E+02											
Spike Vol: 5.00E-01											

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

H-3

H-3

Associated Samples for

WG8062

<u>Sample #</u>	<u>Client ID</u>
L38478-1R1	FMF-29-SOIL-001
L38478-2R1	FMF-29-SOIL-002
L38478-3R1	FMF-29-SOIL-003
L38478-4R1	FMF-29-SOIL-004
L38478-5R1	FMF-29-SOIL-005
L38478-6R1	FMF-29-SOIL-006
L38478-7R1	FMF-29-SOIL-007
L38478-8R1	FMF-29-SOIL-008
L38478-9R1	FMF-29-SOIL-009
L38478-10R1	FMF-29-SOIL-010
L38478-11R1	FMF-29-SOIL-011
L38478-12R1	FMF-29-SOIL-012
L38478-13R1	FMF-29-SOIL-013
L38478-14R1	FMF-29-SOIL-014
L38478-15R1	FMF-29-SOIL-015
L38478-16R1	FMF-29-SOIL-016
L38478-17R1	FMF-29-SOIL-017
L38478-18R1	FMF-29-SOIL-018
L38478-19R1	FMF-29-SOIL-019
L38478-20R1	FMF-29-SOIL-020
L38478-21R1	FMF-29-SOIL-020 DUP
L38478-22R1	FMF-29-SOIL-020 MS
L38478-46R1	FMF-29-SOIL-020 MSD

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

QC Summary Report for L38478

PH001-3EREGMA-06

06/12/2009 16:00

H-3

H-3

Associated Samples for

WG8064

<u>Sample #</u>	<u>Client ID</u>
L38478-23R1	FMF-29-SOIL-021
L38478-24R1	FMF-29-SOIL-022
L38478-25R1	FMF-29-SOIL-023
L38478-26R1	FMF-29-SOIL-024
L38478-27R1	FMF-29-SOIL-025
L38478-28R1	FMF-29-SOIL-026
L38478-29R1	FMF-29-SOIL-027
L38478-30R1	FMF-29-SOIL-028
L38478-31R1	FMF-29-SOIL-029
L38478-32R1	FMF-29-SOIL-030
L38478-33R1	FMF-29-SOIL-031
L38478-34R1	FMF-29-SOIL-032
L38478-35R1	FMF-29-SOIL-033
L38478-36R1	FMF-29-SOIL-034
L38478-37R1	FMF-29-SOIL-035
L38478-38R1	FMF-29-SOIL-036
L38478-39R1	FMF-29-SOIL-037
L38478-40R1	FMF-29-SOIL-038
L38478-41R1	FMF-29-SOIL-039
L38478-42R1	FMF-29-SOIL-040
L38478-43R1	FMF-29-SOIL-040 DUP
L38478-44R1	FMF-29-SOIL-040 MS
L38478-45R1	FMF-29-SOIL-040 MSD

- + Positive Result
- U Compound/analyte was analyzed, peak not identified and/or not detected above MDC
- * < 5 times the MDC are not evaluated
- ** Nuclide not detected
- *** Spiking level < 5 times activity
- P Pass
- F Fail
- NE Not evaluated

BLUE COOLER (44 samples)



Analysis Request Chain of Custody

D6A

E - Environmental: X
 P - 10CFR61, 10CFR50, Other high level: _____
 Turn-around-time: 30 days
 Purchase order: _____

LIMS #: 38478
 Variance Report: _____

Project Number: 5614 N.B.

Client name: Philotechnics, Ltd.
 Client address: 25 Mall Road
 Suite 301
 Burlington, Ma 01803
 Phone Number: 781-222-5047
 Fax Number: 781-229-0732
 Contact: Matthew Norton CIH, CSP

T.I. Number (for lab use)	Client Sample ID	Description	Station	Collection Date/Time	Volume	Units	Matrix or type	Analysis Request
				Start				
	FMF-29-SOIL-001	SOIL		5/6/09 1111	601	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-002	SOIL		5/6/09 1118	619	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-003	SOIL		5/6/09 1121	440	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-004	SOIL		5/6/09 1126	537	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-005	SOIL		5/6/09 1130	562	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-006	SOIL		5/6/09 1132	489	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-007	SOIL		5/6/09 1136	354	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-008	SOIL		5/6/09 1142	544	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-009	SOIL		5/6/09 1147	427	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-010	SOIL		5/6/09 1150	359	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-011	SOIL		5/6/09 1300	375	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-012	SOIL		5/6/09 1303	461	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-013	SOIL		5/6/09 1307	426	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-014	SOIL		5/6/09 1309	568	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-015	SOIL		5/6/09 1312	411	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-016	SOIL		5/6/09 1315	455	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-017	SOIL		5/6/09 1316	427	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-018	SOIL		5/6/09 1319	335	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-019	SOIL		5/6/09 1322	298	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-020	SOIL		5/6/09 1325	457	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-020 DUP	SOIL		5/6/09 1325	292	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-020 MS/MSD	SOIL		5/6/09 1325	274	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-021	SOIL		5/6/09 1327	548	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-022	SOIL		5/6/09 1329	340	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-023	SOIL		5/6/09 1332	332	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS

Special Instructions: _____

Relinquished by: Tracie M. Clemons Date: 5/6/09 | Relinquished by: _____ Date: _____ | Relinquished by: _____ Date: _____
 Received by: Jonathan Date: 5/8/09 | Received by: _____ Date: _____ | Received by: _____ Date: _____



Analysis Request Chain of Custody

E - Environmental: X
 P - 10CFR61, 10CFR50, Other high level: _____
 Turn-around-time: 30 days
 Purchase order: _____

LIMS #: _____
Variance Report: _____

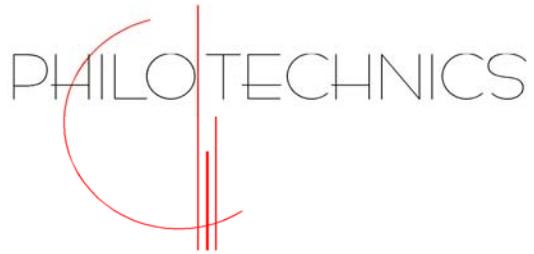
Project Number: 5614 N.B.

Client name: <u> Philotechnics, Ltd. </u>
Client address: <u> 25 Mall Road </u>
<u> Suite 301 </u>
<u> Burlington, Ma 01803 </u>
Phone Number: <u> 781-222-5047 </u>
Fax Number: <u> 781-229-0732 </u>
Contact: <u> Matthew Norton CIH, CSP </u>

T.I. Number (for lab use)	Client Sample ID	Description	Station	Collection Date/Time	Volume	Units	Matrix or type	Analysis Request
				Start				
	FMF-29-SOIL-024	SOIL		5/6/09 1335	305	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-025	SOIL		5/6/09 1337	399	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-026	SOIL		5/6/09 1339	438	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-027	SOIL		5/6/09 1342	453	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-028	SOIL		5/6/09 1345	278	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-029	SOIL		5/6/09 1348	394	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-030	SOIL		5/6/09 1351	481	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-031	SOIL		5/6/09 1355	255	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-032	SOIL		5/6/09 1401	398	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-033	SOIL		5/6/09 1410	382	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-034	SOIL		5/6/09 1413	427	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-035	SOIL		5/6/09 1415	369	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-036	SOIL		5/6/09 1418	482	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-037	SOIL		5/6/09 1420	478	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-038	SOIL		5/6/09 1424	441	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-039	SOIL		5/6/09 1428	770	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-040	SOIL		5/6/09 1432	334	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-040 DUP	SOIL		5/6/09 1432	162	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS
	FMF-29-SOIL-040 MS/MSD	SOIL		5/6/09 1432	134	GRAMS	SOIL	H-3 AND C-14 OXIDATION ANALYSIS

Special Instructions: _____

Relinquished by: <u> Terence M. Clemens </u>	Date: <u> 5/6/09 </u>	Relinquished by: _____	Date: _____	Relinquished by: _____	Date: _____
Received by: <u> Jonathan </u>	Date: <u> 5/8/09 </u>	Received by: _____	Date: _____	Received by: _____	Date: _____



Fort Mims Facility
Open Land Sampling and Analysis Report
Phase II

Sigma Aldrich Company
11542 Fort Mims Drive
Maryland Heights, Missouri

January 2010

Prepared by:

**Philotechnics, Ltd.
25 Mall Road, Suite 301.
Burlington, MA 01803**

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Attachments

Attachment A	–	Survey Unit Map
Attachment B	–	Analytical Results
Attachment C	–	Geophysical Survey Report

1.0 Executive Summary

Philotechnics, Ltd. (Philotechnics) was retained by Sigma-Aldrich Company to obtain surface and subsurface soil samples from open land areas to assess the current radiological conditions at the site and identify paths forward toward ultimate release of the property for unrestricted use. The soil sampling was performed in compliance with the approved Fort Mims Facility Open Land Soil Sampling and Analysis Plan (Plan) dated October 20th, 2008.

This sampling phase was designed to provide additional data to bound contamination within soils at the site. Samples were obtained from a number of original sampling locations at greater depths to bound the vertical extent of soils contamination and from new adjacent locations to bound the lateral extent of contamination. A geophysical survey was performed under this scope of work to attempt to identify underground structures which potentially could have contributed to soils contamination at the site. The survey used both Ground Penetrating Radar (GPR) and Electromagnetic (EM) Survey technology to scan the entire site to identify septic tanks, leachate fields, disturbed soils areas and large buried anomalies. Based on the results of these surveys no areas were identified that would require further investigation.

On November 4 – 5, 2009, a total of fifty-nine (59) discrete soil samples were obtained from survey unit 29 to determine if carbon-14 (^{14}C) and/or tritium (^3H) were present in measurable quantities in the upper two (2) meters of soils adjacent to the structure. The sample results indicated ^{14}C concentrations ranging from non-detectible to 1290 picocuries per gram (pCi/g) and ^3H concentrations ranging from non-detectible to 11.6 pCi/g. Contamination was detected at the maximum depth sampled and at several locations; therefore the full extent of the soil contamination at the site could not be determined.

2.0 Plan Implementation

2.1 Soil Sampling Methodology

Sampling was performed in accordance with the approved Plan. Soils samples were collected using spoons or shovels for surface samples. The sampling equipment was decontaminated after each use to prevent cross-contamination of samples. A minimum of 500 grams of soils were collected from each location and depth interval. The sample was transferred into a stainless steel bowl and thoroughly homogenized, then transferred to the appropriate labeled container for off-site radiological analysis.

2.2 Sample ID

Each sample point was designated by a Sample ID, and identified as follows:

- WWW: 3-character designation of facility (for example, "FMF")
- XX: -character designation of survey unit (for example, "29")
- Y: 23-character designation of sample location (for example, "01")
- Z: 1-character designation indicating sample depth, in meters, from the surface.

For example, in the sample identification number, FMF-29-42-.2, “FMF” represents the facility, “29” represents the survey unit, and “42” represents the sample location, and “.2” indicates a depth of 0.2 meters. The sample ID number was recorded on the containers and chain-of-custody record at the time of sample collection.

2.3 Sample Shipment and Analysis

All samples were packaged and controlled in accordance with the Plan. The samples were controlled using chain-of custody procedures custody seals and the use of field logbooks during collection,

The soil samples were analyzed by Teledyne Brown Engineering, Inc. in Knoxville, Tennessee. Samples were oxidized in preparation for liquid scintillation analysis in order to remove any interfering chemical luminescence. Teledyne Brown is accredited by the National Environmental Laboratory Accreditation Program, and is licensed to receive and analyze radioactive material.

2.4 Sampling Quality Assurance

Quality assurance samples were collected for statistical analysis. For precision, one (1) field duplicate was obtained for every 20 samples collected. A field duplicate is a duplicate sample collected from the same sample point which has been thoroughly homogenized.

In addition to the field duplicates, Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples was performed by the analytical laboratory. MS/MSD samples are environmental samples that are spiked in the laboratory with a known concentration of a target analyte(s) to verify the efficiencies of the laboratory method.

3.0 Sample Results

Table 1 identifies the soil samples and analytical results for the surface soils for Survey Unit FMF-029 at the FMF Site.

<i>Table 1: Soil Sample Locations and Results Survey Unit –FMF-29</i>			
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)
FMF-29-10-1	0.5m-1.0m	3.5	2.39
FMF-29-11-1	0.5m-1.0m	17.2	2.0
FMF-29-12-1	0.5m-1.0m	<1.51	4.19
FMF-29-13-1	0.5m-1.0m	4.38	<1.11
FMF-29-15-1	0.5m-1.0m	4.14	1.61
FMF-29-15-2	1.5m-2.0m	175.0	3.52
FMF-29-16-1	0.5m-1.0m	<1.32	1.86
FMF-29-19-1	0.5m-1.0m	N/A	N/A
FMF-29-19-2	1.5m-2.0m	N/A	N/A
FMF-29-20-1	0.5m-1.0m	<1.45	<1.02
FMF-29-21-1	0.5m-1.0m	3.86	1.75
FMF-29-22-1	0.5m-1.0m	59.9	3.06
FMF-29-22-2	1.5m-2.0m	6.07	<0.876
FMF-29-23-1	0.5m-1.0m	38.2	2.23
FMF-29-23-2	1.5m-2.0m	8.75	<1.04
FMF-29-24-1	0.5m-1.0m	1.92	<0.946
FMF-29-24-2	1.5m-2.0m	1.85	<1.07
FMF-29-26-1	0.5m-1.0m	9.71	1.54
FMF-29-27-1	0.5m-1.0m	25.2	2.21
FMF-29-30-1	0.5m-1.0m	9.74	1.74
FMF-29-30-2	1.5m-2.0m	6.78	1.56
FMF-29-31-1	0.5m-1.0m	6.31	1.99
FMF-29-32-1	0.5m-1.0m	<1.59	<1.12
FMF-29-36-1	0.5m-1.0m	<1.59	<1.12
FMF-29-37-1	0.5m-1.0m	2.94	1.72
FMF-29-37-2	1.5m-2.0m	2.44	<0.985
FMF-29-38-1	0.5m-1.0m	3.01	2.33
FMF-29-40-1	0.5m-1.0m	120.0	3.32
FMF-29-40-2	1.5m-2.0m	27.5	3.61
FMF-29-41-.2	0m-0.5m	<1.65	<1.16
FMF-29-41-1	0.5m-1.0m	<1.56	2.48
FMF-29-41-2	1.5m-2.0m	2.32	1.64
FMF-29-42-.2	0m-0.5m	17.5	3.13
FMF-29-42-1	0.5m-1.0m	8.39	1.71
FMF-29-42-2	1.5m-2.0m	1.33	1.33

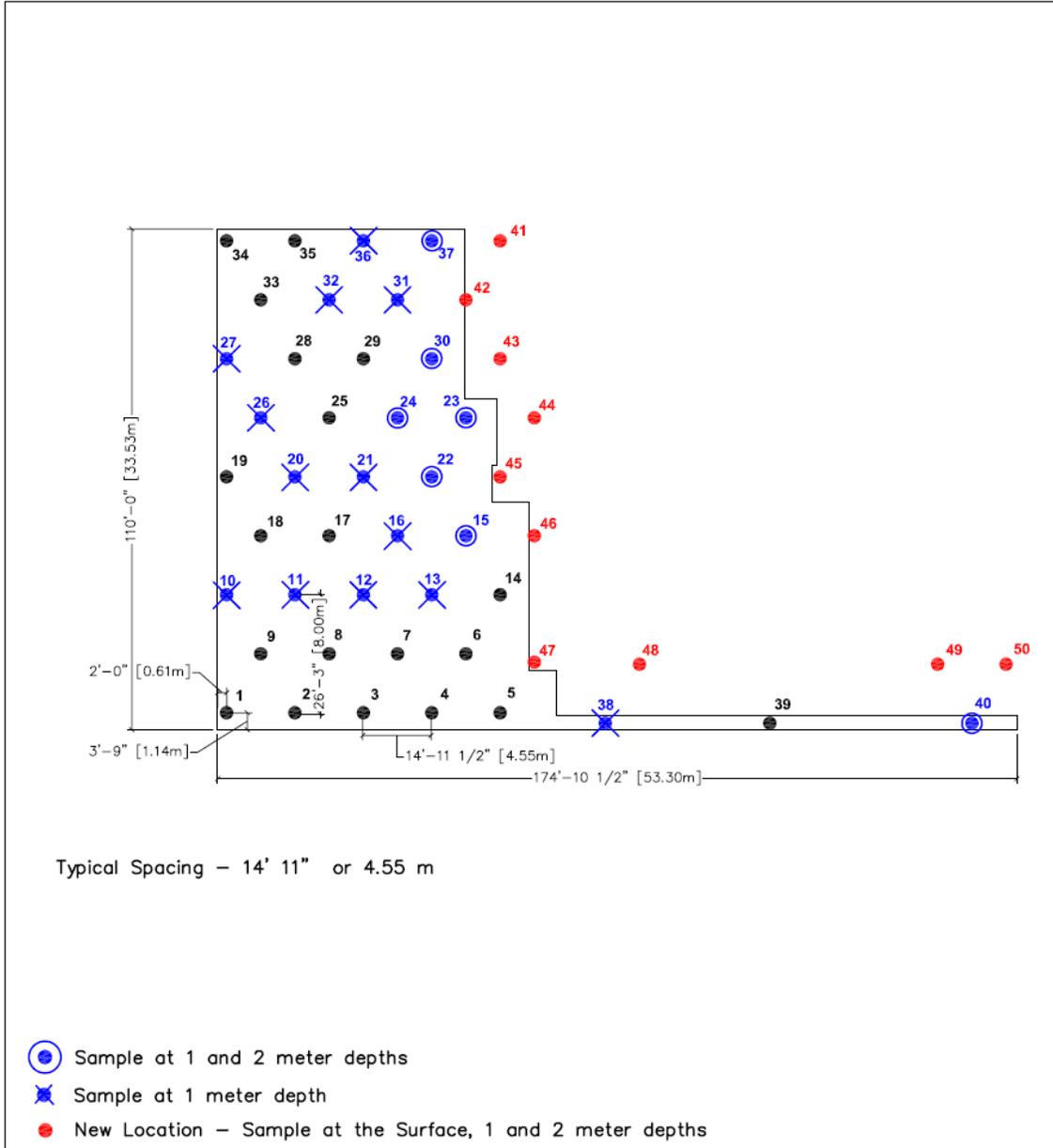
<i>Table 1: Soil Sample Locations and Results</i>			
<i>Survey Unit – FMF-29</i>			
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)
FMF-29-43-.2	0m-0.5m	7.61	<1.18
FMF-29-43-1	0.5m-1.0m	<1.57	<1.10
FMF-29-43-2	1.5m-2.0m	5.8	<1.04
FMF-29-44-.2	0m-0.5m	43.2	<1.09
FMF-29-44-1	0.5m-1.0m	31.7	<0.839
FMF-29-44-2	1.5m-2.0m	1.96	<0.954
FMF-29-45-.2	0m-0.5m	1290.0	10.50
FMF-29-45-1	0.5m-1.0m	N/A	N/A
FMF-29-45-2	1.5m-2.0m	N/A	N/A
FMF-29-46-.2	0m-0.5m	36.6	<1.04
FMF-29-46-1	0.5m-1.0m	11.8	<1.10
FMF-29-46-2	1.5m-2.0m	1.80	<0.846
FMF-29-47-.2	0m-0.5m	12.1	<1.19
FMF-29-47-1	0.5m-1.0m	26.5	<0.902
FMF-29-47-2	1.5m-2.0m	30.8	6.92
FMF-29-48-.2	0m-0.5m	71.8	2.27
FMF-29-48-1	0.5m-1.0m	96.9	3.60
FMF-29-48-2	1.5m-2.0m	N/A	N/A
FMF-29-49-.2	0m-0.5m	38.4	13.0
FMF-29-49-1	0.5m-1.0m	987.0	11.6
FMF-29-49-2	1.5m-2.0m	109	4.51
FMF-29-50-.2	0m-0.5m	122.0	<1.13
FMF-29-50-1	0.5m-1.0m	5.35	<1.18
FMF-29-50-2	1.5m-2.0m	14.6	<1.17
Average		64.9	2.37
Maximum		1290	11.6

4.0 Conclusions

Phase II soil sample results indicate ³H contamination is not a significant contributor to the potential dose to the public. Sample results for ¹⁴C ranged from non-detectable to 1,290 pCi/g with an average of 64.9 pCi/g for Phase II sampling. Analytical results are included as Attachment B.

The results from the GPR/EM survey performed by Hager-Richter did not identify a septic tank or leachate area at the subject property. The full geophysical survey report is included as Attachment C.

Attachment A Survey Unit Overview Maps



SURVEY MAP		
BUILDING: Sigma	SURVEY UNIT NUMBER: 029	PAGE OF
SURVEY TYPE (CHECK ONE): <input type="checkbox"/> Characterization Survey <input checked="" type="checkbox"/> Final Status Survey		
COMMENTS: _____ _____		
SURVEY COMPLETED BY:		DATE COMPLETED:
RADIOLOGICAL CONTROLS SUPERVISOR REVIEW:		DATE:

Attachment B

Analytical Results



Glen Marshall, CHP
Philotechnics
201 Renovare Blvd

Oak Ridge, TN 37831-4489

Report of Analysis/Certificate of Conformance

12/22/2009

LIMS #: L40441
Project ID#: PH001-3EREGGM-06
Received: 11/10/2009
Delivery Date: 12/10/2009
P.O.#: PO-0000881
Release #:
SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.

Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-42-.2	L40441-1	FMF-29-42-.2
FMF-29-42-1	L40441-2	FMF-29-42-1
FMF-29-42-2	L40441-3	FMF-29-42-2
FMF-29-46-.2	L40441-4	FMF-29-46-.2
FMF-29-46-1	L40441-5	FMF-29-46-1
FMF-29-46-2	L40441-6	FMF-29-46-2
FMF-29-47-.2	L40441-7	FMF-29-47-.2
FMF-29-47-1	L40441-8	FMF-29-47-1



Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-47-2	L40441-9	FMF-29-47-2
FMF-29-49-.2	L40441-10	FMF-29-49-.2
FMF-29-49-1	L40441-11	FMF-29-49-1
FMF-29-49-2	L40441-12	FMF-29-49-2
FMF-29-50-.2	L40441-13	FMF-29-50-.2
FMF-29-50-1	L40441-14	FMF-29-50-1
FMF-29-50-2	L40441-15	FMF-29-50-2

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Report of Analysis

12/22/09 14:54

L40441

Philotechnics

PH001-3EREGGM-06

Sample ID: FMF-29-42-.2	Collect Start: 11/05/2009 15:40	Matrix: Soil (S)
Station: FMF-29-42-.2	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-1		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.75E+01	1.34E+00		pCi/g		2.31	g wet		12/22/09	15	M	+
H-3	2003	3.13E+00	1.08E+00		pCi/g		2.31	g wet		12/22/09	7	M	+

Sample ID: FMF-29-42-1	Collect Start: 11/05/2009 15:56	Matrix: Soil (S)
Station: FMF-29-42-1	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-2		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	8.39E+00	1.11E+00		pCi/g		2.44	g wet		12/22/09	15	M	+
H-3	2003	1.71E+00	8.67E-01		pCi/g		2.44	g wet		12/22/09	7	M	+

Sample ID: FMF-29-42-2	Collect Start: 11/05/2009 16:03	Matrix: Soil (S)
Station: FMF-29-42-2	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-3		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.33E+00	8.06E-01		pCi/g		2.7	g wet		12/22/09	15	M	+
H-3	2003	1.33E+00	7.54E-01		pCi/g		2.7	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 14:54

L40441

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-46-2	Collect Start: 11/05/2009 16:26	Matrix: Soil (S)
Station: FMF-29-46-2	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-4		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.66E+01	1.80E+00		pCi/g		2.27	g wet		12/22/09	15	M	+
H-3	2003	<		1.04E+00	pCi/g		2.27	g wet		12/22/09	7	M	U

Sample ID: FMF-29-46-1	Collect Start: 11/05/2009 16:36	Matrix: Soil (S)
Station: FMF-29-46-1	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-5		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.18E+01	1.32E+00		pCi/g		2.15	g wet		12/22/09	15	M	+
H-3	2003	<		1.10E+00	pCi/g		2.15	g wet		12/22/09	7	M	U

Sample ID: FMF-29-46-2	Collect Start: 11/05/2009 17:35	Matrix: Soil (S)
Station: FMF-29-46-2	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-6		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.80E+00	7.64E-01		pCi/g		2.92	g wet		12/22/09	15	M	+
H-3	2003	<		8.46E-01	pCi/g		2.92	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 14:54

L40441

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-47-2	Collect Start: 11/05/2009 17:36	Matrix: Soil (S)
Station: FMF-29-47-.2	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-7		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.21E+01	1.36E+00		pCi/g		2.08	g wet		12/22/09	15	M	+
H-3	2003	<		1.19E+00	pCi/g		2.08	g wet		12/22/09	7	M	U

Sample ID: FMF-29-47-1	Collect Start: 11/05/2009 17:45	Matrix: Soil (S)
Station: FMF-29-47-1	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-8		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.65E+01	1.42E+00		pCi/g		2.74	g wet		12/22/09	15	M	+
H-3	2003	<		9.02E-01	pCi/g		2.74	g wet		12/22/09	7	M	U

Sample ID: FMF-29-47-2	Collect Start: 11/05/2009 17:55	Matrix: Soil (S)
Station: FMF-29-47-2	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40441-9		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.08E+01	1.71E+00		pCi/g		2.23	g wet		12/22/09	15	M	+
H-3	2003	6.92E+00	1.50E+00		pCi/g		2.23	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- High = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- Spec = Activity concentration exceeds customer reporting value
- L = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 14:54

L40441

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-49-2	Collect Start: 11/05/2009 18:01	Matrix: Soil	(S)
Station: FMF-29-49-.2	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40441-10			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.84E+01	1.71E+00		pCi/g		2.55	g wet		12/22/09	15	M	+
H-3	2003	1.30E+01	1.82E+00		pCi/g		2.55	g wet		12/22/09	7	M	+

Sample ID: FMF-29-49-1	Collect Start: 11/05/2009 18:10	Matrix: Soil	(S)
Station: FMF-29-49-1	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40441-11			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.87E+02	1.99E+01		pCi/g		2.16	g wet		12/22/09	2.64	M	+
H-3	2003	1.16E+01	1.89E+00		pCi/g		2.16	g wet		12/22/09	7	M	+

Sample ID: FMF-29-49-2	Collect Start: 11/05/2009 18:20	Matrix: Soil	(S)
Station: FMF-29-49-2	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40441-12			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.09E+02	2.69E+00		pCi/g		2.5	g wet		12/22/09	15	M	+
H-3	2003	4.51E+00	1.19E+00		pCi/g		2.5	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 14:54



L40441

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-50-2	Collect Start: 11/05/2009 18:25	Matrix: Soil	(S)
Station: FMF-29-50-.2	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40441-13			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.22E+02	3.05E+00		pCi/g		2.19	g wet		12/22/09	15	M	+
H-3	2003	<		1.13E+00	pCi/g		2.19	g wet		12/22/09	7	M	U

Sample ID: FMF-29-50-1	Collect Start: 11/05/2009 18:35	Matrix: Soil	(S)
Station: FMF-29-50-1	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40441-14			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.35E+00	1.16E+00		pCi/g		2.09	g wet		12/22/09	15	M	+
H-3	2003	<		1.18E+00	pCi/g		2.09	g wet		12/22/09	7	M	U

Sample ID: FMF-29-50-2	Collect Start: 11/05/2009 18:45	Matrix: Soil	(S)
Station: FMF-29-50-2	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40441-15			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.46E+01	1.40E+00		pCi/g		2.12	g wet		12/22/09	15	M	+
H-3	2003	<		1.17E+00	pCi/g		2.12	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

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- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration



Analysis Request Chain of Custody

L 40441
E3A

E - Environmental: _____
 P - 10CFR61, 10CFR50, Other high level: _____
 Turn-around-time: 30 days
 Purchase order: _____

LIMS #: _____
 Variance Report: _____
 (for lab use)

Project Number: _____

Client name: **Philotechnics**
 Client address: **201 Renovare Blvd**
Oak Ridge, TN 37830
 Phone Number **865-285-3018**
 Fax Number: **865-220-0686**
 Contact: **Glenn Marshall**

T.I. Number (for lab use)	Client Sample ID	Description	Station	Collection Date/Time		Volume	Units	Matrix or type	Analysis Request
				Start	Stop				
	FME-29-42-.2			11/5/09	1540 ✓	500	GRAMS	SOIL	¹⁴ C and ³ H Oxidation Analysis
	FME-29-42-1				1556 ✓				
	FME-29-42-2				1603 ✓				
	FME-29-46-.2				1626 ✓				
	FME-29-46-1			*	1636 ✓				
	FME-29-46-2				1735 ✓				
	FME-29-47-.2				1736 ✓				
	FME-29-47-1				1745 ✓				
	FME-29-47-2				1755 ✓				
	FME-29-49-.2				1801 ✓				
	FME-29-49-1				1810 ✓				
	FME-29-49-2				1820 ✓				
	FME-29-50-.2				1825 ✓				
	FME-29-50-1				1835 ✓				
	FME-29-50-2				1845 ✓				

Special Instructions: _____

Relinquished by: Date: 11/6/09 Relinquished by: Date: 11/10/09 Relinquished by: _____ Date: _____
 Received by: _____ Date: _____ Received by: _____ Date: _____

10:00

C-14 Rad
H-3 Rad



Glen Marshall, CHP
Philotechnics
201 Renovare Blvd

Oak Ridge, TN 37831-4489

Report of Analysis/Certificate of Conformance

12/22/2009

LIMS #: L40471
Project ID#: PH001-3EREGGM-06
Received: 11/10/2009
Delivery Date: 12/10/2009
P.O.#: PO-0000881
Release #:
SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-10-1	L40471-1	
FMF-29-11-1	L40471-2	
FMF-29-12-1	L40471-3	
FMF-29-13-1	L40471-4	
FMF-29-16-1	L40471-5	
FMF-29-20-1	L40471-6	
FMF-29-21-1	L40471-7	
FMF-29-26-1	L40471-8	



Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-27-1	L40471-9	
FMF-29-31-1	L40471-10	
FMF-29-32-1	L40471-11	
FMF-29-36-1	L40471-12	
FMF-29-38-1	L40471-13	
FMF-29-15-1	L40471-14	
FMF-29-15-2	L40471-15	
FMF-29-22-1	L40471-16	
FMF-29-22-2	L40471-17	
FMF-29-23-1	L40471-18	
FMF-29-23-2	L40471-19	
FMF-29-24-1	L40471-20	
FMF-29-24-2	L40471-21	
FMF-29-30-1	L40471-22	
FMF-29-30-2	L40471-23	
FMF-29-37-1	L40471-24	
FMF-29-37-2	L40471-25	
FMF-29-40-1	L40471-26	
FMF-29-40-2	L40471-27	
FMF-29-41-1	L40471-28	
FMF-29-41-2	L40471-29	
FMF-29-41-.2	L40471-30	
FMF-29-48-.2	L40471-31	
FMF-29-48-1	L40471-32	
FMF-29-44-.2	L40471-33	
FMF-29-44-1	L40471-34	
FMF-29-44-2	L40471-35	
FMF-29-43-.2	L40471-36	
FMF-29-43-1	L40471-37	
FMF-29-43-2	L40471-38	
FMF-29-45-.2	L40471-39	

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Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Sample ID: FMF-29-10-1	Collect Start: 11/04/2009 12:13	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-1		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.55E+00	8.91E-01		pCi/g		2.66	g wet		12/21/09	15	M	+
H-3	2003	2.39E+00	9.01E-01		pCi/g		2.66	g wet		12/22/09	7	M	+

Sample ID: FMF-29-11-1	Collect Start: 11/04/2009 12:40	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-2		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.72E+01	1.27E+00		pCi/g		2.59	g wet		12/21/09	15	M	+
H-3	2003	2.00E+00	8.69E-01		pCi/g		2.59	g wet		12/22/09	7	M	+

Sample ID: FMF-29-12-1	Collect Start: 11/04/2009 02:25	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-3		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.51E+00	pCi/g		2.24	g wet		12/21/09	15	M	U
H-3	2003	4.19E+00	1.22E+00		pCi/g		2.24	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected, Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-13-1	Collect Start: 11/04/2009 02:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-4			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.38E+00	1.11E+00		pCi/g		2.13	g wet		12/21/09	15	M	+
H-3	2003	<		1.11E+00	pCi/g		2.13	g wet		12/22/09	7	M	U

Sample ID: FMF-29-16-1	Collect Start: 11/04/2009 02:05	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-5			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.32E+00	pCi/g		2.56	g wet		12/21/09	15	M	U
H-3	2003	1.86E+00	8.57E-01		pCi/g		2.56	g wet		12/22/09	7	M	+

Sample ID: FMF-29-20-1	Collect Start: 11/04/2009 15:22	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-6			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.45E+00	pCi/g		2.33	g wet		12/21/09	15	M	U
H-3	2003	<		1.02E+00	pCi/g		2.33	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- High = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- Spec = Activity concentration exceeds customer reporting value
- L = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

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- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-21-1	Collect Start: 11/04/2009 15:29	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-7		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.86E+00	9.25E-01		pCi/g		2.58	g wet		12/21/09	15	M	+
H-3	2003	1.75E+00	8.39E-01		pCi/g		2.58	g wet		12/22/09	7	M	+

Sample ID: FMF-29-26-1	Collect Start: 11/04/2009 15:38	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-8		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.71E+00	1.18E+00		pCi/g		2.33	g wet		12/21/09	15	M	+
H-3	2003	1.54E+00	8.74E-01		pCi/g		2.33	g wet		12/22/09	7	M	+

Sample ID: FMF-29-27-1	Collect Start: 11/04/2009 15:46	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-9		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.52E+01	1.33E+00		pCi/g		2.96	g wet		12/21/09	15	M	+
H-3	2003	2.21E+00	8.17E-01		pCi/g		2.96	g wet		12/22/09	7	M	+

Flag Values

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- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
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- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

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- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-31-1	Collect Start: 11/04/2009 15:58	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-10		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.31E+00	9.90E-01		pCi/g		2.61	g wet		12/21/09	15	M	+
H-3	2003	1.99E+00	8.63E-01		pCi/g		2.61	g wet		12/22/09	7	M	+

Sample ID: FMF-29-32-1	Collect Start: 11/04/2009 16:10	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-11		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.59E+00	pCi/g		2.12	g wet		12/21/09	15	M	U
H-3	2003	<		1.12E+00	pCi/g		2.12	g wet		12/22/09	7	M	U

Sample ID: FMF-29-36-1	Collect Start: 11/04/2009 16:32	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-12		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.59E+00	pCi/g		2.12	g wet		12/21/09	15	M	U
H-3	2003	<		1.12E+00	pCi/g		2.12	g wet		12/22/09	7	M	U

Flag Values

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- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
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- Spec = MDC exceeds customer technical specification
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- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-38-1	Collect Start: 11/05/2009 07:39	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-13			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.01E+00	9.54E-01		pCi/g		2.41	g wet		12/21/09	15	M	+
H-3	2003	2.33E+00	9.57E-01		pCi/g		2.41	g wet		12/22/09	7	M	+

Sample ID: FMF-29-15-1	Collect Start: 11/05/2009 07:55	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-14			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.14E+00	1.09E+00		pCi/g		2.16	g wet		12/21/09	15	M	+
H-3	2003	1.61E+00	9.35E-01		pCi/g		2.16	g wet		12/22/09	7	M	+

Sample ID: FMF-29-15-2	Collect Start: 11/05/2009 08:40	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-15			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.75E+02	3.73E+00		pCi/g		2.05	g wet		12/21/09	15	M	+
H-3	2003	3.52E+00	1.22E+00		pCi/g		2.05	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-22-1	Collect Start: 11/05/2009 09:35	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-16		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.99E+01	2.28E+00		pCi/g		2.12	g wet		12/21/09	15	M	+
H-3	2003	3.06E+00	1.14E+00		pCi/g		2.12	g wet		12/22/09	7	M	+

Sample ID: FMF-29-22-2	Collect Start: 11/05/2009 10:03	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-17		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.07E+00	9.56E-01		pCi/g		2.7	g wet		12/22/09	15	M	+
H-3	2003	<		8.76E-01	pCi/g		2.7	g wet		12/22/09	7	M	U

Sample ID: FMF-29-23-1	Collect Start: 11/05/2009 10:18	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 11/10/2009	% Moisture:
LIMS Number: L40471-18		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.82E+01	1.80E+00		pCi/g		2.33	g wet		12/22/09	15	M	+
H-3	2003	2.23E+00	9.66E-01		pCi/g		2.33	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-23-2	Collect Start: 11/05/2009 10:40	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-19			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	8.75E+00	1.18E+00		pCi/g		2.28	g wet		12/22/09	15	M	+
H-3	2003	<		1.04E+00	pCi/g		2.28	g wet		12/22/09	7	M	U

Sample ID: FMF-29-24-1	Collect Start: 11/05/2009 11:10	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-20			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.92E+00	8.87E-01		pCi/g		2.5	g wet		12/22/09	15	M	+
H-3	2003	<		9.46E-01	pCi/g		2.5	g wet		12/22/09	7	M	U

Sample ID: FMF-29-24-2	Collect Start: 11/05/2009 11:38	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-21			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.85E+00	9.92E-01		pCi/g		2.21	g wet		12/22/09	15	M	+
H-3	2003	<		1.07E+00	pCi/g		2.21	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-30-1	Collect Start: 11/05/2009 11:54	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-22			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.74E+00	1.15E+00		pCi/g		2.42	g wet		12/22/09	15	M	+
H-3	2003	1.74E+00	8.76E-01		pCi/g		2.42	g wet		12/22/09	7	M	+

Sample ID: FMF-29-30-2	Collect Start: 11/05/2009 12:20	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-23			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.78E+00	1.06E+00		pCi/g		2.44	g wet		12/22/09	15	M	+
H-3	2003	1.56E+00	8.47E-01		pCi/g		2.44	g wet		12/22/09	7	M	+

Sample ID: FMF-29-37-1	Collect Start: 11/05/2009 13:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-24			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.94E+00	9.85E-01		pCi/g		2.32	g wet		12/22/09	15	M	+
H-3	2003	1.72E+00	9.02E-01		pCi/g		2.32	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected, Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

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PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-37-2	Collect Start: 11/05/2009 13:30	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-25			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.44E+00	9.38E-01		pCi/g		2.4	g wet		12/22/09	15	M	+
H-3	2003	<		9.85E-01	pCi/g		2.4	g wet		12/22/09	7	M	U

Sample ID: FMF-29-40-1	Collect Start: 11/05/2009 15:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-26			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.20E+02	2.71E+00		pCi/g		2.67	g wet		12/22/09	15	M	+
H-3	2003	3.32E+00	1.00E+00		pCi/g		2.67	g wet		12/22/09	7	M	+

Sample ID: FMF-29-40-2	Collect Start: 11/05/2009 15:34	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-27			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.75E+01	1.58E+00		pCi/g		2.37	g wet		12/22/09	15	M	+
H-3	2003	3.61E+00	1.12E+00		pCi/g		2.37	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-41-1	Collect Start: 11/05/2009 14:02	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-28			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.56E+00	pCi/g		2.16	g wet		12/22/09	15	M	U
H-3	2003	2.48E+00	1.05E+00		pCi/g		2.16	g wet		12/22/09	7	M	+

Sample ID: FMF-29-41-2	Collect Start: 11/05/2009 14:16	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-29			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.32E+00	9.79E-01		pCi/g		2.28	g wet		12/22/09	15	M	+
H-3	2003	1.64E+00	9.02E-01		pCi/g		2.28	g wet		12/22/09	7	M	+

Sample ID: FMF-29-41-2	Collect Start: 11/05/2009 13:41	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-30			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.65E+00	pCi/g		2.04	g wet		12/22/09	15	M	U
H-3	2003	<		1.16E+00	pCi/g		2.04	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-48-2	Collect Start: 11/05/2009 11:26	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-31			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	7.18E+01	2.41E+00		pCi/g		2.2	g wet		12/22/09	15	M	+
H-3	2003	2.27E+00	1.01E+00		pCi/g		2.2	g wet		12/22/09	7	M	+

Sample ID: FMF-29-48-1	Collect Start: 11/05/2009 06:10	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-32			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.69E+01	2.78E+00		pCi/g		2.15	g wet		12/22/09	15	M	+
H-3	2003	3.60E+00	1.19E+00		pCi/g		2.15	g wet		12/22/09	7	M	+

Sample ID: FMF-29-44-2	Collect Start: 11/05/2009 16:05	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-33			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.32E+01	1.98E+00		pCi/g		2.16	g wet		12/22/09	15	M	+
H-3	2003	<		1.09E+00	pCi/g		2.16	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- High = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- Spec = Activity concentration exceeds customer reporting value
- L = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-44-1	Collect Start: 11/05/2009 16:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-34			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.17E+01	1.49E+00		pCi/g		2.82	g wet		12/22/09	15	M	+
H-3	2003	<		8.39E-01	pCi/g		2.82	g wet		12/22/09	7	M	U

Sample ID: FMF-29-44-2	Collect Start: 11/05/2009 16:20	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-35			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.96E+00	8.95E-01		pCi/g		2.48	g wet		12/22/09	15	M	+
H-3	2003	<		9.54E-01	pCi/g		2.48	g wet		12/22/09	7	M	U

Sample ID: FMF-29-43-2	Collect Start: 11/05/2009 14:20	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-36			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	7.61E+00	1.27E+00		pCi/g		2.01	g wet		12/22/09	15	M	+
H-3	2003	<		1.18E+00	pCi/g		2.01	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

12/22/09 12:51

L40471

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-43-1	Collect Start: 11/05/2009 14:37	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-37			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.57E+00	pCi/g		2.15	g wet		12/22/09	15	M	U
H-3	2003	<		1.10E+00	pCi/g		2.15	g wet		12/22/09	7	M	U

Sample ID: FMF-29-43-2	Collect Start: 11/05/2009 14:47	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-38			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.80E+00	1.10E+00		pCi/g		2.27	g wet		12/22/09	15	M	+
H-3	2003	<		1.04E+00	pCi/g		2.27	g wet		12/22/09	7	M	U

Sample ID: FMF-29-45-2	Collect Start: 11/05/2009 14:53	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/10/2009	% Moisture:	
LIMS Number: L40471-39			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.29E+03	2.60E+01		pCi/g		2.27	g wet		12/22/09	1.92	M	+
H-3	2003	1.05E+01	1.75E+00		pCi/g		2.27	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration



Analysis Request Chain of Custody

L 40471
E3A

E - Environmental: _____
 P - 10CFR61, 10CFR50, Other high level: _____
 Turn-around-time: 30 days
 Purchase order: _____

LIMS #: _____
 Variance Report: _____
 (for lab use)

Client name: **Philotechnics**
 Client address: **201 Renovare Blvd**
Oak Ridge, TN 37830
 Phone Number **865-285-3018**
 Fax Number: **865-220-0686**
 Contact: **Glenn Marshall**

Project Number: _____

T.I. Number (for lab use)	Client Sample ID	Description	Station	Collection Date/Time		Volume	Units	Matrix or type	Analysis Request
				Start	Stop				
	FME-29-10-1 ✓			11/4/09	12:13	500g	grams	SO:6	14C and 3H Oxidation analysis
	FME-29-11-1 ✓				12:40	500g	grams		
	FME-29-12-1 ✓				2:25				
*	FME-29-13-1 ✓			2:58	2:15 *				
*	FME-29-16-1 ✓			1:50	2:05 *				
	FME-29-20-1 ✓				15:22				
	FME-29-21-1 ✓				15:29				
	FME-29-26-1 ✓				15:38				
	FME-29-27-1 ✓				15:46				
	FME-29-31-1 ✓				15:58				
	FME-29-32-1 ✓				16:10				
	FME-29-36-1 ✓				16:32				
*	FME-29-38-1 ✓			11/5/09 1:10	7:39 *				
	FME-29-15-1 ✓				2:55				
	FME-29-19-2 ✓				2:40				
	FME-29-22-1 ✓				2:00				
	FME-29-22-2 ✓				10:03				
	FME-29-23-1 ✓				10:18				

Special Instructions: _____

Relinquished by: [Signature] Date: 11/6/09 Relinquished by: [Signature] Date: 11/10/09 Relinquished by: _____ Date: _____
 Received by: _____ Date: _____ Received by: [Signature] Date: 11/10/09 Received by: _____ Date: _____

11/17/09
JMS
10:00



Analysis Request Chain of Custody

E - Environmental: _____
 P - 10CFR61, 10CFR50, Other high level: _____
 Turn-around-time 30 days
 Purchase order: _____

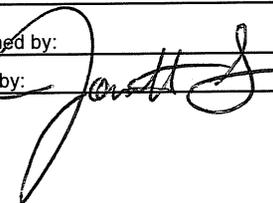
LIMS #: _____
 Variance Report: _____
 (for lab use)

Project Number: _____

Client name: **Philotechnics**
 Client address: **201 Renovare Blvd**
Oak Ridge, TN 37830
 Phone Number **865-285-3018**
 Fax Number: **865-220-0686**
 Contact: **Glenn Marshall**

T.I. Number (for lab use)	Client Sample ID	Description	Station	Collection Date/Time		Volume	Units	Matrix or type	Analysis Request
				Start	Stop				
	FME-29-23-2 ✓			11/5/09	10:40	500	grams	Soil	¹⁴ C and ³ H Radiation Analyzers
	FME-29-24-1 ✓				11:10				
	FME-29-24-2 ✓				11:30				
*	FME-29-30-1 ✓			11:59	11:54 *				
	FME-29-30-2 ✓				12:20 *				
	FME-29-37-1 ✓				13:15				
	FME-29-37-2 ✓				13:30				
	FME-29-40-1 ✓				15:15				
	FME-29-40-2 ✓				15:34				
	FME-29-41-1 ✓				14:02				
	FME-29-41-2 ✓				14:16				
	FME-29-41-02 ✓				13:41				
	FME-29-48-02 ✓				11:28				
	FME-29-48-1 ✓				6:10 pm				
	FME-29-44-02 ✓				16:05				
	FME-29-44-02 ✓				16:15				
	FME-29-44-2 ✓				16:20				
	FME-29-43-02 ✓				14:20				

Special Instructions: _____

Relinquished by:  Date: 11/6/09 Relinquished by:  Date: 11/10/09 Relinquished by: _____ Date: _____
 Received by:  Date: _____ Received by:  Date: 11/10/09 Received by: _____ Date: _____
 10:00

11/18/09 10:31

Teledyne Brown Engineering
Sample Receipt Verification/Variance Report

SR #: SR22352

Client: Philotechnics

Project #: PH001-3EREGGM-06

LIMS #: L40471

Initiated By: JSIMMONS

Init Date: 11/18/09

Receive Date: 11/18/09

Notification of Variance

Person Notified:

Contacted By:

Notify Date:

Notify Method:

Notify Comment:

Client Response

Person Responding:

Response Date:

Response Method:

Response Comment

Criteria	Yes	No	NA	Comment
1 Shipping container custody seals present and intact.			NA	
2 Sample container custody seals present and intact.			NA	
3 Sample containers received in good condition		Y		
4 Chain of custody received with samples		Y		
5 All samples listed on chain of custody received		Y		
6 Sample container labels present and legible.			N	Sample ID's were present but some were very difficult to read.
7 Information on container labels correspond with chain of custody			N	
30-1				Time on coc says 11:54 but 11:59 on sample
16-1				Time on coc says 2:05 but 1:50 on sample
13-1				Time on coc says 2:15 but 2:58 on sample
38-1				Time on coc says 7:39 but 7:40 on sample
8 Sample(s) properly preserved and in appropriate container(s)			NA	
9 Other (Describe)			NA	

use coc - per Matt Norton 12/21/09 2 pit/g MAR



**TELEDYNE
BROWN ENGINEERING, INC.**
A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Glen Marshall, CHP
Philotechnics
201 Renovare Blvd

Oak Ridge, TN 37831-4489

Report of Analysis/Certificate of Conformance

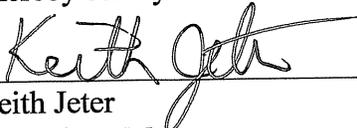
12/23/2009

LIMS #: L40475
Project ID#: PH001-3EREGGM-06
Received: 11/16/2009
Delivery Date: 12/16/2009
P.O.#: PO-0000881
Release #:
SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-29-44-2	L40475-1	
FMF-29-47-1	L40475-2	
FMF-29-46-2	L40475-3	
FMF-29-49-2	L40475-4	
FMF-29-50-2	L40475-5	
FMF-29-48-1	L40475-6	

This report shall not be reproduced or distributed except in its entirety.

Report of Analysis

12/23/09 08:48

L40475

Philotechnics

PH001-3EREGGM-06

Sample ID: FMF-29-44-2	Collect Start: 11/05/2009 16:20	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/16/2009	% Moisture:	
LIMS Number: L40475-1			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.24E+01	1.52E+00		pCi/g		2.91	g wet		12/22/09	5.16	M	+
H-3	2003	<		8.99E-01	pCi/g		2.91	g wet		12/22/09	7	M	U

Sample ID: FMF-29-47-1	Collect Start: 11/05/2009 17:45	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/16/2009	% Moisture:	
LIMS Number: L40475-2			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.22E+02	3.93E+01		pCi/g		2.02	g wet		12/22/09	.3	M	+
H-3	2003	6.00E+00	1.53E+00		pCi/g		2.02	g wet		12/22/09	7	M	+

Sample ID: FMF-29-46-.2	Collect Start: 11/05/2009 16:27	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/16/2009	% Moisture:	
LIMS Number: L40475-3			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.23E+01	5.50E+00		pCi/g		2.45	g wet		12/22/09	1.64	M	+
H-3	2003	<		1.07E+00	pCi/g		2.45	g wet		12/22/09	7	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

12/23/09 08:48

L40475

Philotechnics

PH001-3EREGGM-06

Glen Marshall, CHP

Sample ID: FMF-29-49-2	Collect Start: 11/05/2009 18:20	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/16/2009	% Moisture:	
LIMS Number: L40475-4			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.89E+02	1.90E+01		pCi/g		2.71	g wet		12/22/09	.43	M	+
H-3	2003	7.90E+00	1.43E+00		pCi/g		2.71	g wet		12/22/09	7	M	+

Sample ID: FMF-29-50-.2	Collect Start: 11/05/2009 18:25	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/16/2009	% Moisture:	
LIMS Number: L40475-5			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.24E+01	3.56E+00		pCi/g		2.27	g wet		12/22/09	2.75	M	+
H-3	2003	<		1.15E+00	pCi/g		2.27	g wet		12/22/09	7	M	U

Sample ID: FMF-29-48-1	Collect Start: 11/05/2009 18:10	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 11/16/2009	% Moisture:	
LIMS Number: L40475-6			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.55E+01	4.78E+00		pCi/g		2.68	g wet		12/22/09	1.73	M	+
H-3	2003	2.99E+00	9.99E-01		pCi/g		2.68	g wet		12/22/09	7	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.



Analysis Request Chain of Custody

L40475

E3A

Client name: **Philotechnics**
 Client address: **201 Renovare Blvd**
Oak Ridge, TN 37830

Phone Number **865-285-3018**
 Fax Number: **865-220-0686**

Contact: **Glenn Marshall**

LIMS #: _____
 Variance Report: _____
 (for lab use)

Project Number: _____

E - Environmental: _____
 P - 10CFR61, 10CFR50, Other high level: _____
 Turn-around-time 30 days
 Purchase order: _____

T.I. Number (for lab use)	Client Sample ID	Description	Station	Collection Date/Time		Volume	Units	Matrix or type	Analysis Request
				Start	Stop				
	EMF-29-44-2			11/5/09	16:20	500	GRAMS	Soil	14C and 3H Dredge Analysis
	EMF-29-47-1				17:45	500	GRAMS	Soil	
	EMF-29-46-1				16:27	500	GRAMS	Soil	
	EMF-29-47-2				18:20	500	GRAMS	Soil	
	EMF-29-50-2				18:25	500	GRAMS	Soil	
	EMF-29-48-1				18:10	500	GRAMS	Soil	

Special Instructions: _____

Relinquished by: [Signature] Date: 11/6/09 Relinquished by: [Signature] Date: 11/10/09
 Received by: _____ Date: _____ Received by: _____ Date: _____

10:00

11/18/09 10:58

Teledyne Brown Engineering
Sample Receipt Verification/Variance Report

SR #: SR22354

Client: Philotechnics

Project #: PH001-3EREGGM-06

LIMS #: L40475

Initiated By: JSIMMONS
Init Date: 11/18/09 Receive Date: 11/18/09

Notification of Variance

Person Notified: _____ Contacted By: _____
Notify Date: _____
Notify Method: _____
Notify Comment: _____

Client Response

Person Responding: _____
Response Date: _____
Response Method: _____
Response Comment _____

Criteria	Yes	No	NA	Comment
1 Shipping container custody seals present and intact.			NA	
2 Sample container custody seals present and intact.			NA	
3 Sample containers received in good condition	Y			
4 Chain of custody received with samples	Y			
5 All samples listed on chain of custody received	Y			
6 Sample container labels present and legible.	Y			
7 Information on container labels correspond with chain of custody	Y			
8 Sample(s) properly preserved and in appropriate container(s)			NA	
9 Other (Describe)			NA	

Philotechnics Ltd.
January 2010
Revision 0

Sigma-Aldrich Company
FMF Open Land Soil Sampling and Analysis Report
Phase II
Attachment C

Attachment C

Geophysical Survey Report

**GEOPHYSICAL SURVEY
11542 FORT MIMS DRIVE
ST. LOUIS, MISSOURI**

Prepared for:

Philotechnics, Ltd.
25 Mall Road, Ste. 301
Burlington, Massachusetts 01803

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 09VD22
December, 2009

HAGER-RICHTER GEOSCIENCE, INC.

CONSULTANTS IN GEOLOGY AND GEOPHYSICS

8 INDUSTRIAL WAY - D10
SALEM, NEW HAMPSHIRE 03079

TELEPHONE (603) 893-9944

FAX (603) 893-8313

December 7, 2009

File 09VD22

Matt Norton, CIH, CSP
Philotechnics, Ltd.
25 Mall Road, Ste. 301
Burlington, Massachusetts

Tel: 781.222.5047
Fax: 781.229.0732
Cell: 978.844.0565
Email: mdnorton@philotechnics.com

RE: Geophysical Survey
11542 Fort Mims Drive
St. Louis, Missouri

Dear Mr. Norton:

In this letter, we report the results of a geophysical survey conducted on November 3, 2009 by Hager-Richter Geoscience, Inc. (Hager-Richter) at the above referenced site for Philotechnics, Ltd. (Philotechnics) of Burlington, Massachusetts. The scope of the project and area of interest were specified by Philotechnics.

Introduction

The Site is an inactive industrial facility located at 11542 Fort Mims Drive in St. Louis, Missouri. The general location of the Site is shown in Figure 1. The Site is comprised of a former building floor slab, concrete walkways, parking lot, open grassy areas, and wooded undeveloped land. As part of an environmental investigation, Philotechnics requested a geophysical survey of the accessible portions of the Site to determine whether a former septic system and associated leachate field are present, and to locate an existing sewer line related to the former building. According to Philotechnics, the septic system was installed in the 1960's and was expanded numerous times. It was reportedly filled and closed in place. Philotechnics indicated that the former septic tank is located below either the 3-inch thick concrete floor slab reinforced with 1 foot by 1 foot wire mesh or the western open grassy field at the Site.

The area of interest (AOI) is approximately 3/4 acre in size. Figure 1 is shows the location of the AOI.

Objectives

The objectives of the geophysical survey were to detect, and if detected, to locate 1.) a former septic system and leachate field in the accessible portions of the AOI, and 2.) the sewer line related to the former building.

The Survey

Vanja Dezelic, Ph.D. of Hager-Richter conducted the field operations on November 3, 2009. The project was coordinated with Mr. Matt Norton, CIH, CSP of Philotechnics. Mr. Ryan P. Fahey, also of Philotechnics, was present for the fieldwork and specified the areas of interest at the Site.

The geophysical survey was conducted using two geophysical methods: time domain electromagnetic induction (EM61) and ground penetrating radar (GPR). The EM61 data were acquired at approximately 8-inch intervals along lines spaced 5 feet apart across the accessible portions of the entire property. The EM61 survey detects buried metal. However, the EM61 method cannot provide information on the type of objects causing the anomaly. A GPR survey was conducted along orthogonal traverses spaced approximately 5 feet apart in the accessible portions of western and southern portions of the property. The GPR method is capable of detecting both metal and nonmetal objects with a high degree of confidence that all such objects within the depth of penetration of the GPR signal are detected.

Equipment

EM61. The EM survey was conducted using a Geonics EM61-MK2 time domain electromagnetic induction metal detector. The EM61-MK2 instrument was designed specifically for detecting buried metal objects such as USTs, drums, and utilities. An air-cored transmitter coil generates a pulsed primary magnetic field in the earth, thereby inducing eddy currents in nearby metal objects. The eddy current produces a secondary magnetic field that is sensed by two receiver coils, one coincident with the transmitter and one positioned 40 cm above the main coil. By measuring the secondary magnetic field after the current in the ground has dissipated but before the current in metal objects has dissipated, the instrument responds only to the secondary magnetic field produced by metal objects. Four channels of secondary response are measured in mV and are recorded on a digital data logger. The system is generally operated by pulling the coils configured as a trailer with an odometer mounted on the axle to trigger the data logger automatically at approximately 8-inch intervals.

GPR. The GPR survey was conducted using a Sensors and Software Noggin SmartCart Plus digital GPR system equipped with a survey wheel to trigger recording of data at equal horizontal distances. The GPR system was used with a 250 MHz antenna and a 50 ns¹ time window.

¹ns, abbreviation for nanosecond, 1/1,000,000,000 second. Light and the GPR signal require about 1 ns to travel 1 ft in air. The GPR signal requires about 3.5 ns to travel 1 ft in unsaturated sandy soil.

Limitations of the Methods

HAGER-RICHTER GEOSCIENCE, INC. MAKES NO GUARANTEE THAT ALL UNDERGROUND TARGETS OF INTEREST WERE DETECTED IN THIS SURVEY. HAGER-RICHTER GEOSCIENCE, INC. IS NOT RESPONSIBLE FOR DETECTING TARGETS THAT NORMALLY CANNOT BE DETECTED BY THE METHODS EMPLOYED OR THAT COULD NOT BE DETECTED BECAUSE OF SITE CONDITIONS.

EM61. The EM61 cannot detect non-metallic objects. The data from an EM61 survey are adversely affected by surface metal. The EM61 has a depth sensitivity limited to about 12 feet. The instrument is relatively cumbersome, and works best where the transmit and receive coils can be hand pulled in a small trailer.

Detection and identification should be clearly differentiated. Detection is the recognition of the presence of a metal object, and the electromagnetic method is excellent for such purposes. Identification, on the other hand, is determination of the nature of the causative body (i.e., what is the body -- a cache of drums, UST, automobile, white goods, etc.?). Although the EM61 data cannot be used to *identify* all buried metal objects, they provide excellent guides to the identification of some objects. For example, buried metal utilities produce anomalies with lengths many times their widths.

GPR. There are limitations of the GPR technique as used to detect and/or locate targets such as those of the objectives of this survey. Limitations include: (1) surface conditions, (2) electrical conductivity of the ground, (3) contrast of the electrical properties of the target and the surrounding soil, and (4) spacing of the traverses. Of these restrictions, only the last is controllable by us.

The condition of the ground surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. Sites covered with snow piles, high grass, bushes, landscape structures, debris, obstacles, soil mounds, etc. limit the survey access and the coupling of the GPR antenna with the ground. In many cases, the GPR signal will not penetrate below concrete pavement, especially inside buildings, and a target may not be detectable. The GPR method also commonly does not provide useful data under canopies found at some facilities.

The electrical conductivity of the ground determines the attenuation of the GPR signal and thereby limits the maximum depth of exploration. For example, the GPR signal does not penetrate clay-rich soils, and targets buried in clay might not be detected.

A definite contrast in the electrical conductivities of the surrounding ground and the target material is required to obtain a reflection of the GPR signal. If the contrast is too small, possibly due to construction details or deeply corroded metal in the target, then the reflection

may be too weak to recognize and the target can be missed.

Spacing of the traverses is limited by access at many sites, but where flexibility of traverse spacing is possible, the spacing is adjusted to the size of the target. The GPR operator controls the spacing between lines, and the design of the survey is based on the dimensions of the smallest feature of interest. Targets with dimensions smaller than the spacing between GPR survey lines can be missed.

Results

The geophysical survey consisted of a time domain electromagnetic induction metal detector (EM) survey across the accessible portions of the specified area of interest and a GPR survey across the accessible portions of the western and southern portions of the property. Figure 2 is a color contour plot of the EM data. Figure 3 shows the locations of the GPR traverses and the interpretation of the EM and GPR data.

EM data were acquired across the accessible portions of the site. The color contour plot of the EM data is shown in Figure 2, and our interpretation of the EM data is shown in Figure 3. Interpretation of EM data is based on the *relative* response of the instrument in millivolts to local conditions. The instrument is not calibrated to provide an absolute measure of a particular property, such as the conductivity of the soil or the strength of the earth's magnetic field. Subsurface metal objects produce sharply defined positive anomalies when the EM61 is positioned directly over them. Acquiring data at short intervals along closely spaced lines, as was done at the subject site, provides high spatial resolution of the location and footprint of the targets. Thus, buried metal is recognized in contour plots of EM data by positive anomalies roughly corresponding to the dimensions of the buried metal.

A few high-amplitude EM anomalies are present in the data for the Site. Most such anomalies are attributed to surface metal such as reinforced concrete, hydrants, water caps, and their locations are shown as blue hatched areas on Figure 3. We note that the presence or absence of subsurface metal objects in such areas cannot be determined on the basis of the EM data alone due to the anomaly caused by the surface metal objects.

One high amplitude EM anomaly not attributable to surface metal is present, and we infer that buried metal is present at this location. This location is shown as red cross-hatched area on Figure 3.

EM was not conducted across the former foundations. Due to the reinforcement within the concrete, it is known that an EM anomaly would be created over the foundations. Therefore, EM would not yield any beneficial results. Therefore, after agreement from Mr. Fahey it was concluded that it is unnecessary to run the EM61 over the foundations that are known to contain metal.

Apparent GPR signal penetration at the Site was fair, with two-way traveltime reflections received from 20-30 nsec. Based on handbook time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have been about 2- 4 feet. The GPR records contain reflections typical of possible utilities and other linear structures, as well as scattered small unidentified buried objects judged too small to be tanks, and their locations are shown on Figure 3 as black dashed lines and black crosses. The configuration of the possible utilities detected in western portion of the Site does not appear to be consistent with that of a septic system, although it is possible that some of the utility segments may have been related to the septic system. GPR reflections consistent with those expected for a possible former excavation are present in the western portion of the Site.

GPR reflections typical of a larger buried object are present in the records for the area of the EM anomaly attributed to buried metal. The location of the object is shown on Figure 3 as red cross-hatched filled rectangles.

GPR reflections typical of buried objects are also present outside the areas of EM anomalies discussed above. One such utility extends from the rear of the building to the south and may represent the sewer service for the building and is labeled PS on Figure 3. The locations of two (2) larger objects are shown on Figure 3 as rectangles with an X. Because no EM anomaly is present at such locations, these objects are inferred to be non-metallic.

GPR data was acquired on the western and oldest portion of the foundation. The reinforcement within the concrete was limiting the GPR signal penetration to approximately 1 foot. The remainder of the foundations was scanned with the GPR but the limited penetration did not yield any beneficial results.

After analyzing the EM data showing no evidence of any buried metal, and with agreement of Mr. Fahey it was concluded that it was not necessary to do a full data acquiring over the eastern parking lot with the GPR. The parking lot was scanned with lines in “no save” mode, and no evidence of any utilities was present in the GPR records. Mr. Fahey agreed that the survey was completed after that point.

No UST or septic tank with: (1) electrical properties sufficiently contrasting with the surrounding soils to produce EM anomalies and/or GPR reflections, or (2) a capacity of 500 gallons or more was detected within the effective depth of penetration of the GPR signal (about 2-4 feet) in the surveyed area. *Whether a UST or septic tank occurs at a depth greater than the effective depth of penetration of the GPR signal or in areas inaccessible to the geophysical survey cannot be determined from the geophysical data.*

Conclusions

Based on the geophysical survey performed by Hager-Richter Geoscience at 11542 Fort

Mims Drive in St. Louis, Missouri, we conclude that:

- No UST or septic tank with: (1) electrical properties sufficiently contrasting with the surrounding soils to produce EM anomalies and/or GPR reflections, or (2) a capacity of 500 gallons or more was detected within the effective depth of penetration of the GPR signal (about 2-4 feet) in the surveyed area. *Whether a UST or septic tank occurs at a depth greater than the effective depth of penetration of the GPR signal or in areas inaccessible to the geophysical survey cannot be determined from the geophysical data.*
- A possible former excavation area was detected in the western portion of the Site.
- The sewer service was possibly detected along the western edge of the southern grassy portion of the property.
- Several unidentified possible utility segments and small buried objects were detected, although the configuration of such features are not typical of a septic distribution system.
- One (1) metallic structure and two (2) non-metallic structures were detected in the southern grassy area.

Limitations on the Use of this Report

This letter report was prepared for the exclusive use of Philotechnics, Ltd. (Client). No other party shall be entitled to rely on this Report or any information, documents, records, data, interpretations, advice or opinions given to Client by Hager-Richter Geoscience, Inc. (Hager-Richter) in the performance of its work. The Report relates solely to the specific project for which Hager-Richter has been retained and shall not be used or relied upon by Client or any third party for any variation or extension of this project, any other project or any other purpose without the express written permission of Hager-Richter. Any unpermitted use by Client or any third party shall be at Client's or such third party's own risk and without any liability to Hager-Richter.

Hager-Richter has used reasonable care, skill, competence and judgment in the performance of its services for this project consistent with professional standards for those providing similar services at the same time, in the same locale, and under like circumstances. Unless otherwise stated, the work performed by Hager-Richter should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

Except as expressly provided in this limitations section, Hager-Richter makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed.

If you have any questions or comments on this letter report, please contact us at your convenience. We look forward to working with you again in the future.

Sincerely yours,
HAGER-RICHTER GEOSCIENCE, INC.

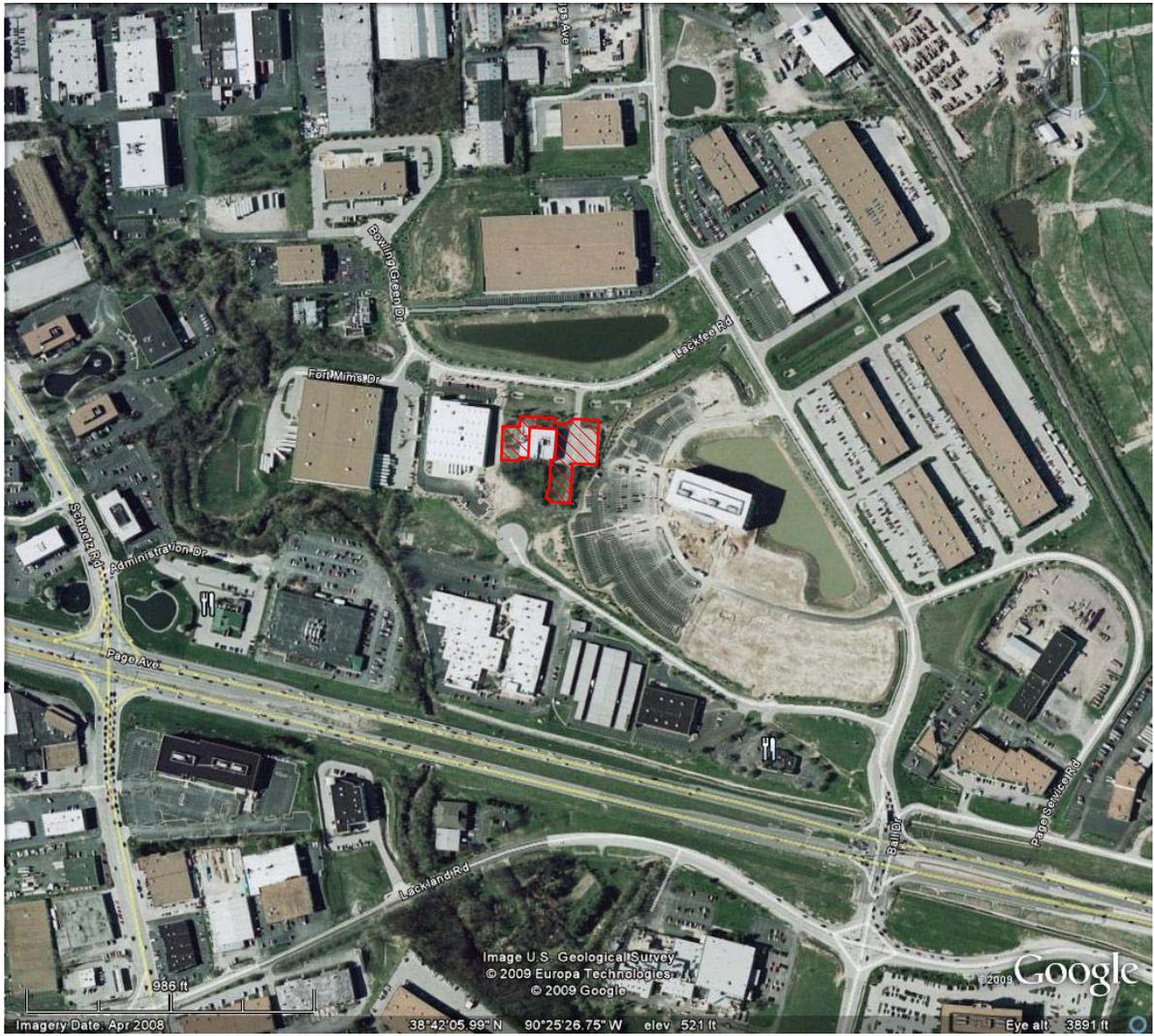


Vanja Dezelic
Geophysicist



Dorothy Richter, P.G.
President

Attachments: Figures 1-3



LEGEND



APPROXIMATE LIMITS
OF GEOPHYSICAL
SURVEY AREA

NOT TO SCALE

Figure 1
General Site Location
11542 Fort Mims Drive
St. Louis, Missouri

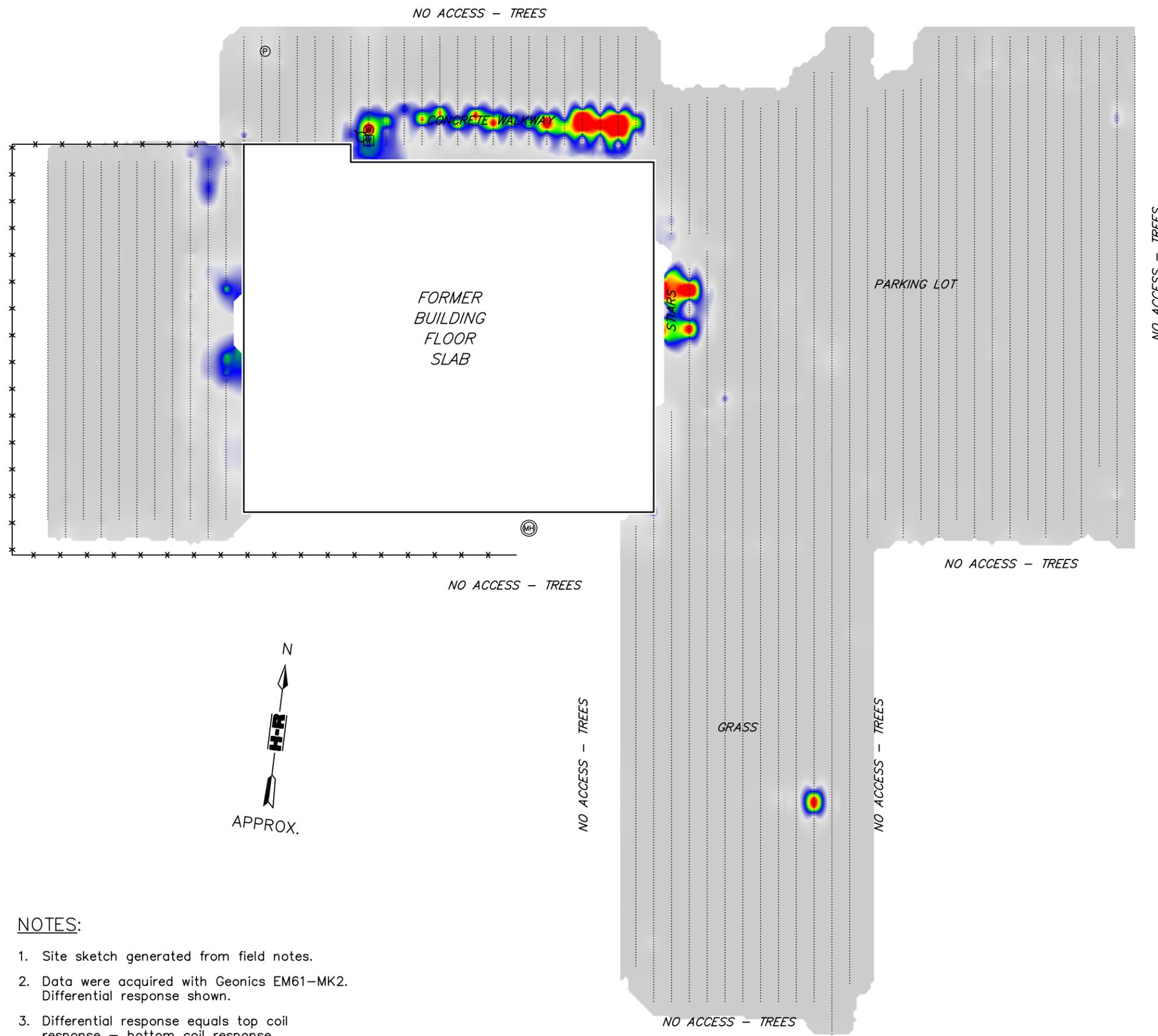
File 09VD22

December, 2009

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

NOTE:

Modified from Google Earth aerial photograph.



NOTES:

1. Site sketch generated from field notes.
2. Data were acquired with Geonics EM61-MK2. Differential response shown.
3. Differential response equals top coil response - bottom coil response.

Figure 2
 EM Survey
 11542 Fort Mims Drive
 St. Louis, Missouri

File 09VD22	December, 2009
HAGER-RICHTER GEOSCIENCE, INC. Salem, New Hampshire	



LEGEND

- APPROXIMATE LIMITS OF EM SURVEY AREA
- GPR TRAVERSE
- UNIDENTIFIED BURIED OBJECT (METAL)
- WATER LINE
- POSSIBLE SEWER LINE
- POSSIBLE UTILITY
- UNIDENTIFIED BURIED OBJECT (LARGE) (NON-METALLIC)
- UNIDENTIFIED BURIED OBJECT (NON-METALLIC)
- EM ANOMALY ATTRIBUTED TO EFFECTS OF SURFACE OBJECTS. THE PRESENCE OR ABSENCE OF BURIED METAL WITHIN THIS AREA CANNOT BE DETERMINED ON THE BASIS OF THE EM61 DATA ALONE.
- AREA OF POSSIBLE FORMER EXCAVATION
- REINFORCED CONCRETE
- WATER METER
- HYDRANT
- WATER VALVE
- MANHOLE
- UNKNOWN PIPE
- FENCE

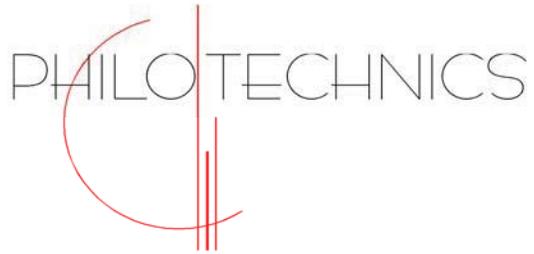


Figure 3
GPR Survey &
Integrated Interpretation
11542 Fort Mims Drive
St. Louis, Missouri

File 09VD22 | December, 2009

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

NOTE:
Site sketch generated from field notes.



Fort Mims Facility
Open Land Sampling and Analysis Report
Phase III

Revision 1

Sigma Aldrich Company
11542 Fort Mims Drive
Maryland Heights, Missouri

August 2010

Prepared by:

**Philotechnics, Ltd.
201 Renovare Boulevard
Oak Ridge, TN 37830**

TABLE OF CONTENTS

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Attachments

Attachment A	–	Survey Unit Map
Attachment B	–	Analytical Results—Soil Samples
Attachment C	–	Analytical Results—Septic Tank

1.0 Executive Summary

Philotechnics, Ltd. (Philotechnics) was retained by Sigma-Aldrich Company to obtain surface and subsurface soil samples from open land areas to assess the current radiological conditions at the site and identify paths forward toward ultimate release of the property for unrestricted use. The soil sampling was performed in compliance with the approved Fort Mims Facility Open Land Soil Sampling and Analysis Plan (Plan) dated October 20th, 2008.

This sampling phase was designed to provide additional data to bound contamination within soils at the site after the removal of the concrete pad. Samples were obtained to bound the vertical extent of soils contamination and to bound the lateral extent of contamination from new adjacent locations. During removal of the concrete pad a buried septic tank was discovered. Additional samples were taken from the tank water, sludge, and surrounding soils to identify contamination.

On May – 24, 2010, a total of fifty-four (54) discrete soil samples were obtained from survey unit 29 to determine if carbon-14 (^{14}C) and/or tritium (^3H) were present in measurable quantities in the upper two (2) meters of soils adjacent to the structure. The sample results indicated ^{14}C concentrations ranging from non-detectible to 483 picocuries per gram (pCi/g) and ^3H concentrations ranging from non-detectible to 7.39 pCi/g. Contamination was detected at the maximum depth sampled and at several locations; therefore the full extent of the soil contamination at the site could not be determined.

A septic tank was discovered underneath the concrete pad during removal. Samples were collected from the tank and surrounding soils. Results of liquid samples from inside the tank indicated ^{14}C concentrations ranging from 7870 pCi/L to 20,000 pCi/L and ^3H concentrations ranging from 11,500 pCi/L to 16,600 pCi/L. Results of soil samples surrounding the tank indicated ^{14}C concentrations ranging from non-detectable to 136 pCi/g and ^3H concentrations ranging from non-detectable to 3.98 pCi/g.

2.0 Plan Implementation

2.1 Soil Sampling Methodology

Sampling was performed in accordance with the approved Plan. Soils samples were collected using spoons or shovels for surface samples. The sampling equipment was decontaminated after each use to prevent cross-contamination of samples. A minimum of 500 grams of soils were collected from each location and depth interval. The sample was transferred into a stainless steel bowl and thoroughly homogenized, then transferred to the appropriate labeled container for off-site radiological analysis.

2.2 Sample ID

Each sample point was designated by a Sample ID, and identified as follows:

- WWW: 3-character designation of facility (for example, “FMF”)
XX: -character designation of survey unit (for example, “29”)
Y: 23-character designation of sample location (for example, “01”)

Z: 1-character designation indicating sample depth, in meters, from the surface.

For example, in the sample identification number, FMF-29-51-.2, “FMF” represents the facility, “29” represents the survey unit, “51” represents the sample location, and “.2” indicates a depth of 0.2 meters. The sample ID number was recorded on the containers and chain-of-custody record at the time of sample collection.

2.3 Sample Shipment and Analysis

All samples were packaged and controlled in accordance with the Plan. The samples were controlled using chain-of custody procedures custody seals and the use of field logbooks during collection,

The soil samples were analyzed by Teledyne Brown Engineering, Inc. in Knoxville, Tennessee. Samples were oxidized in preparation for liquid scintillation analysis in order to remove any interfering chemical luminescence. Teledyne Brown is accredited by the National Environmental Laboratory Accreditation Program, and is licensed to receive and analyze radioactive material.

2.4 Sampling Quality Assurance

Quality assurance samples were collected for statistical analysis. For precision, one (1) field duplicate was obtained for every 20 samples collected. A field duplicate is a duplicate sample collected from the same sample point which has been thoroughly homogenized.

In addition to the field duplicates, Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples were performed by the analytical laboratory. MS/MSD samples are environmental samples that are spiked in the laboratory with a known concentration of a target analyte(s) to verify the efficiencies of the laboratory method.

3.0 Analytical Results-Soil Samples

Table 1 identifies the soil samples and analytical results for the surface soils for Survey Unit FMF-029 at the FMF Site. The analytical results for each sample are included in Attachment B.

<i>Table 1: Soil Sample Locations and Results Survey Unit –FMF-29</i>			
Soil Sample Location	Interval Depth	¹⁴C (pCi/g)	³H (pCi/g)
FMF-29-51-.2	0.2m	95.00	4.42
FMF-29-51-1	1.0m	145.00	4.48
FMF-29-51-2	2.0m	74.30	<2.23
FMF-29-52-.2	0.2m	11.50	<2.09
FMF-29-52-1	1.0m	18.60	<2.04
FMF-29-52-2	2.0m	5.77	<2.09
FMF-29-53-.2	0.2m	25.30	<2.18
FMF-29-53-1	1.0m	5.43	<2.23
FMF-29-53-2	2.0m	12.60	<1.87
FMF-29-54-.2	0.2m	35.20	2.01
FMF-29-54-1	1.0m	6.47	<1.96
FMF-29-54-2	2.0m	14.50	<1.69
FMF-29-55-.2	0.2m	108.00	3.22
FMF-29-55-1	1.0m	3.47	<1.97
FMF-29-55-2	2.0m	16.60	<1.88
FMF-29-56-.2	0.2m	34.00	<2.10
FMF-29-56-1	1.0m	<1.56	<1.97
FMF-29-56-2	2.0m	3.35	<1.68
FMF-29-57-.2	0.2m	24.90	<2.18
FMF-29-57-1	1.0m	<1.78	<2.24
FMF-29-57-2	2.0m	11.10	<2.16
FMF-29-58-.2	0.2m	12.70	<1.72
FMF-29-58-1	1.0m	3.70	<1.89
FMF-29-58-2	2.0m	2.83	<2.01
FMF-29-59-.2	0.2m	2.14	<2.14
FMF-29-59-1	1.0m	10.20	<1.80
FMF-29-59-2	2.0m	4.58	<1.93
FMF-29-60-.2	0.2m	3.95	3.21
FMF-29-60-1	1.0m	<1.52	<1.92
FMF-29-60-2	2.0m	2.53	<1.81
FMF-29-61-.2	0.2m	483.00	6.83
FMF-29-61-1	1.0m	128.00	2.88
FMF-29-61-2	2.0m	398.00	7.39
FMF-29-62-.2	0.2m	3.30	<1.66

<i>Table 1: Soil Sample Locations and Results Survey Unit –FMF-29</i>			
Soil Sample Location	Interval Depth	¹⁴ C (pCi/g)	³ H (pCi/g)
FMF-29-62-1	1.0m	5.35	<2.16
FMF-29-62-2	2.0m	3.71	<1.80
FMF-29-63-.2	0.2m	3.32	<1.77
FMF-29-63-1	1.0m	<1.77	<2.23
FMF-29-63-2	2.0m	<1.62	<2.04
FMF-29-64-.2	0.2m	<1.44	<1.81
FMF-29-64-1	1.0m	<1.37	<1.73
FMF-29-64-2	2.0m	<1.42	1.99
FMF-29-65-.2	0.2m	5.03	<1.83
FMF-29-65-1	1.0m	<1.49	<1.87
FMF-29-65-2	2.0m	<1.47	<1.86
FMF-29-66-.2	0.2m	<1.48	<2.00
FMF-29-66-1	1.0m	<1.57	<2.06
FMF-29-66-2	2.0m	15.40	<1.79
FMF-29-67-.2	0.2m	12.30	2.21
FMF-29-67-1	1.0m	3.81	3.12
FMF-29-67-2	2.0m	<1.67	<2.19
FMF-29-68-.2	0.2m	5.30	<1.85
FMF-29-68-1	1.0m	2.70	3.96
FMF-29-68-2	2.0m	<1.47	<1.92
Average*		33.05	2.37
Maximum		483	7.39

*Average assumes all “<MDA” values were equal to the MDA

4.0 Analytical Results-Septic Tank

Table 2 identifies the liquid, sludge, and soil samples from the septic tank. The analytical results for each sample are included in Attachment C.

<i>Table 1: Septic Tank Locations and Results</i>				
Sample Location	Matrix	Interval Depth	¹⁴ C (pCi/g)	³ H (pCi/g)
FMF-ST1	Liquid	N/A	7870.00	11500.00
FMF-ST2	Liquid	N/A	19400.00	16600.00
FMF-ST3	Liquid	N/A	20000.00	16100.00
FMF-ST4	Liquid	N/A	7900.00	12500.00
FMF-ST6	Sludge	N/A	28.30	<2.28

<i>Table 1: Septic Tank Locations and Results</i>				
Sample Location	Matrix	Interval Depth	¹⁴ C (pCi/g)	³ H (pCi/g)
FMF-ST7	Sludge	N/A	161.00	8.17
FMF-ST8-0.05	Soil	0.05 m	22.90	3.98
FMF-ST8-1	Soil	1 m	9.54	<1.80
FMF-ST9-0.05	Soil	0.05 m	136.00	<1.89
FMF-ST98-1	Soil	1 m	43.80	2.41
FMF-ST10-0.05	Soil	0.05 m	21.10	<2.03
FMF-ST10-1	Soil	1 m	<1.47	<2.01
Average*			33.05	2.37
Maximum			483	7.39

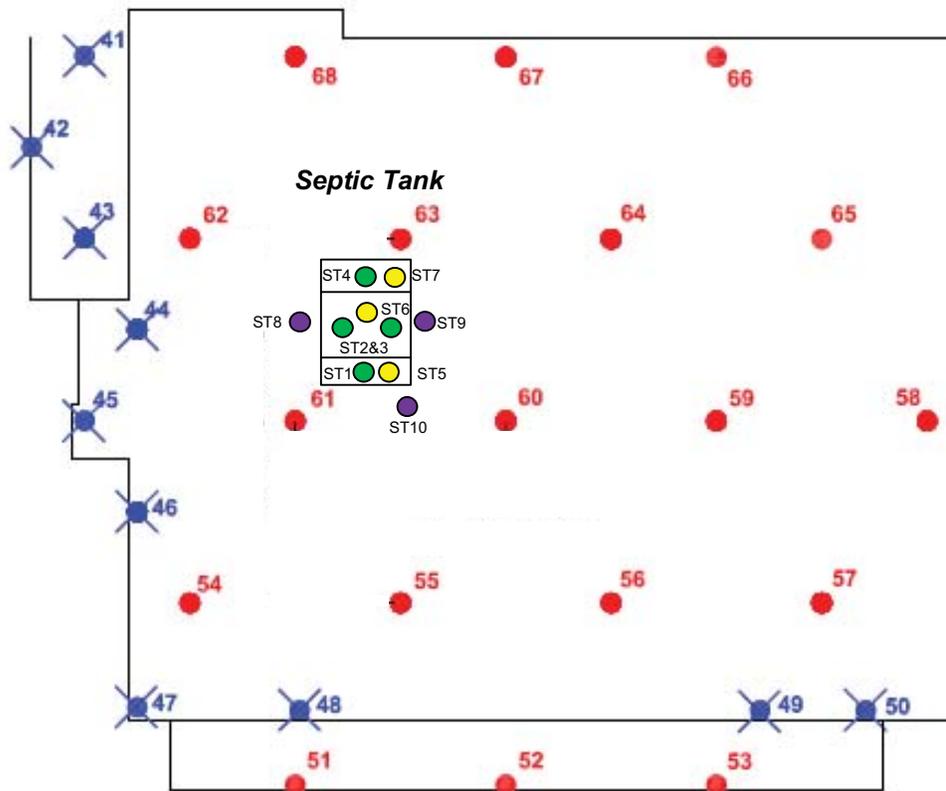
5.0 Conclusions

Phase III soil sample results indicate ^3H contamination is not a significant contributor to the potential dose to the public; it will, however, be included in the final RESRAD dose modeling for the site. Sample results for ^{14}C ranged from non-detectable to 483 pCi/g with an average of 33 pCi/g for Phase III sampling.

Several samples collected at a depth of two meters have detectable ^{14}C levels which indicate the vertical extent of contamination has not been fully bounded. Analysis results from the adjacent sample locations indicate that ^{14}C contamination is present and the lateral extent of contamination has not been determined. The extent of ^{14}C soil contamination at the site has not been fully determined at this time. Additional sampling is recommended to determine the vertical and horizontal boundaries of soil contamination before developing a site remediation plan.

The U.S. Environmental Protection Agency standards for drinking water are 2000 pCi/L ^{14}C and 20,000 pCi/L ^3H (unity). Residual radioactivity in the septic tank exceeds those limits and should be handled as radioactive waste.

Attachment A
Survey Unit Overview Maps



Typical Spacing – 29' 10" or 9.10 m

- ✕ Previous Sampling Location
- New Location – Sample at the Surface, 1 and 2 meter depths
- New Location – Sludge Sample
- New Location – Liquid Sample
- New Location – Judgmental Sample

Attachment B
Analytical Results



Ryan Fahey
 Philotechnics
 85 Brainerd Rd TH 9

 Allston, MA 01234

Report of Analysis/Certificate of Conformance

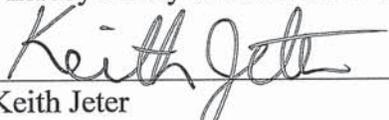
06/17/2010

LIMS #: L42355
 Project ID#: PH001-3EREGMA-10
 Received: 05/26/2010
 Delivery Date: 06/16/2010
 P.O.#: PO-0000881
 Release #:
 SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



 Keith Jeter
 Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-029-051-0-02	L42355-1	
FMF-029-051-1	L42355-2	
FMF-029-051-2	L42355-3	
FMF-029-052-0-02	L42355-4	
FMF-029-052-1	L42355-5	
FMF-029-052-2	L42355-6	
FMF-029-053-0-02	L42355-7	
FMF-029-053-1	L42355-8	



Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-029-053-2	L42355-9	
FMF-029-054-0-02	L42355-10	
FMF-029-054-1	L42355-11	
FMF-029-054-2	L42355-12	
FMF-029-066-0-02	L42355-13	
FMF-029-066-1	L42355-14	
FMF-029-066-2	L42355-15	
FMF-029-067-0-02	L42355-16	
FMF-029-067-1	L42355-17	
FMF-029-067-2	L42355-18	
FMF-029-068-0-02	L42355-19	
FMF-029-068-1	L42355-20	
FMF-029-068-2	L42355-21	

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Report of Analysis

06/17/10 17:46



L42355

Philotechnics

PH001-3EREGMA-10

Sample ID: FMF-029-051-0-02	Collect Start: 05/24/2010 07:30	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-1			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.50E+01	2.87E+00		pCi/g		2.71	g wet		06/16/10	10	M	+
H-3	2003	4.42E+00	1.32E+00		pCi/g		2.71	g wet		06/16/10	10	M	+

Sample ID: FMF-029-051-1	Collect Start: 05/24/2010 07:35	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-2			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.45E+02	3.67E+00		pCi/g		2.47	g wet		06/16/10	10	M	+
H-3	2003	4.48E+00	1.42E+00		pCi/g		2.47	g wet		06/16/10	10	M	+

Sample ID: FMF-029-051-2	Collect Start: 05/24/2010 07:45	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-3			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	7.43E+01	2.98E+00		pCi/g		2.06	g wet		06/16/10	10	M	+
H-3	2003	<		2.23E+00	pCi/g		2.06	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/17/10 17:46

L42355

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-052-0-02	Collect Start: 05/24/2010 08:00	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-4			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.15E+01	1.44E+00		pCi/g		2.2	g wet		06/16/10	10	M	+
H-3	2003	<		2.09E+00	pCi/g		2.2	g wet		06/16/10	10	M	U

Sample ID: FMF-029-052-1	Collect Start: 05/24/2010 08:05	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-5			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.86E+01	1.64E+00		pCi/g		2.25	g wet		06/16/10	10	M	+
H-3	2003	<		2.04E+00	pCi/g		2.25	g wet		06/16/10	10	M	U

Sample ID: FMF-029-052-2	Collect Start: 05/24/2010 08:15	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-6			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.77E+00	1.23E+00		pCi/g		2.2	g wet		06/16/10	10	M	+
H-3	2003	<		2.09E+00	pCi/g		2.2	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:46

L42355

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-053-0-02	Collect Start: 05/24/2010 08:30	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-7		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.53E+01	1.90E+00		pCi/g		2.11	g wet		06/16/10	10	M	+
H-3	2003	<		2.18E+00	pCi/g		2.11	g wet		06/16/10	10	M	U

Sample ID: FMF-029-053-1	Collect Start: 05/24/2010 08:35	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-8		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.43E+00	1.28E+00		pCi/g		2.06	g wet		06/16/10	10	M	+
H-3	2003	<		2.23E+00	pCi/g		2.06	g wet		06/16/10	10	M	U

Sample ID: FMF-029-053-2	Collect Start: 05/24/2010 08:40	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-9		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.26E+01	1.36E+00		pCi/g		2.46	g wet		06/16/10	10	M	+
H-3	2003	<		1.87E+00	pCi/g		2.46	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:46

L42355

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-054-0-02	Collect Start: 05/24/2010 08:50	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-10		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.52E+01	2.05E+00		pCi/g		2.29	g wet		06/16/10	10	M	+
H-3	2003	<		2.01E+00	pCi/g		2.29	g wet		06/16/10	10	M	U

Sample ID: FMF-029-054-1	Collect Start: 05/24/2010 08:55	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-11		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	6.47E+00	1.19E+00		pCi/g		2.35	g wet		06/16/10	10	M	+
H-3	2003	<		1.96E+00	pCi/g		2.35	g wet		06/16/10	10	M	U

Sample ID: FMF-029-054-2	Collect Start: 05/24/2010 09:05	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-12		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.45E+01	1.33E+00		pCi/g		2.72	g wet		06/16/10	10	M	+
H-3	2003	<		1.69E+00	pCi/g		2.72	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/17/10 17:46

L42355

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-066-0-02	Collect Start: 05/24/2010 14:20	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-13		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.48E+00	pCi/g		2.36	g wet		06/16/10	10	M	U
H-3	2003	<		2.00E+00	pCi/g		2.3	g wet		06/16/10	10	M	U

Sample ID: FMF-029-066-1	Collect Start: 05/24/2010 14:23	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-14		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.57E+00	pCi/g		2.23	g wet		06/16/10	10	M	U
H-3	2003	<		2.06E+00	pCi/g		2.23	g wet		06/16/10	10	M	U

Sample ID: FMF-029-066-2	Collect Start: 05/24/2010 14:25	Matrix: Soil (S)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42355-15		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.54E+01	1.41E+00		pCi/g		2.57	g wet		06/16/10	10	M	+
H-3	2003	<		1.79E+00	pCi/g		2.57	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected, Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:46

L42355

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-067-0-02	Collect Start: 05/24/2010 14:30	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-16			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.23E+01	1.33E+00		pCi/g		2.51	g wet		06/16/10	10	M	+
H-3	2003	2.21E+00	1.26E+00		pCi/g		2.51	g wet		06/16/10	10	M	+

Sample ID: FMF-029-067-1	Collect Start: 05/24/2010 14:35	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-17			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.81E+00	1.06E+00		pCi/g		2.42	g wet		06/16/10	10	M	+
H-3	2003	3.12E+00	1.36E+00		pCi/g		2.42	g wet		06/16/10	10	M	+

Sample ID: FMF-029-067-2	Collect Start: 05/24/2010 14:40	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-18			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.67E+00	pCi/g		2.1	g wet		06/16/10	10	M	U
H-3	2003	<		2.19E+00	pCi/g		2.1	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:46

L42355

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-068-0-02	Collect Start: 05/24/2010 14:40	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-19			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.30E+00	1.10E+00		pCi/g		2.48	g wet		06/16/10	10	M	+
H-3	2003	<		1.85E+00	pCi/g		2.48	g wet		06/16/10	10	M	U

Sample ID: FMF-029-068-1	Collect Start: 05/24/2010 14:50	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-20			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.70E+00	1.07E+00		pCi/g		2.25	g wet		06/16/10	10	M	+
H-3	2003	3.96E+00	1.50E+00		pCi/g		2.25	g wet		06/16/10	10	M	+

Sample ID: FMF-029-068-2	Collect Start: 05/24/2010 15:00	Matrix: Soil	(S)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42355-21			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.47E+00	pCi/g		2.39	g wet		06/16/10	10	M	U
H-3	2003	<		1.92E+00	pCi/g		2.39	g wet		06/16/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

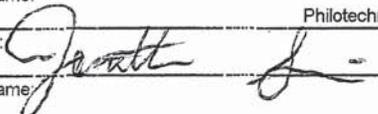
142355
WAT16E

Teledyne Brown Engineering

2508 Quality Lane
Knoxville, TN 37937

Page 1 of 1

ATTN: Sample Receiving

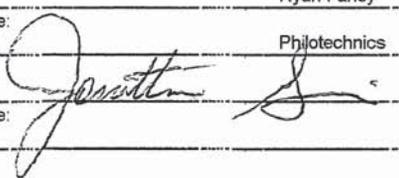
Customer Information				Project Information				Analyses / Method			
Project Name		Sigma Aldrich		Purchase Order				A. Tritium (H-3)			
Quote#				Project Number		5614		B. Carbon 14 (C-14)			
Company		Philotechnics		Bill To		Philotechnics		C. Oxidation			
Send Report To:		Ryan Fahey		Invoice Attn		Pam Sewall		D.			
Address:		85 Brainerd Rd TH 9		Address:		201 Renoware Blvd		E.			
City/State/Zip		Allston, MA 01234		City/State/Zip		Oak Ridge, TN 37830		F.			
Phone		978-844-4560		Phone		(865)285-3017		G.			
Fax		(865) 285-0586		Fax		(865)285-0586		H.			
I.											
Sx No.	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	Ivo. of Bottles	A	B	C	
FMF-029-051-0 02	750 gram	5/24	7:30	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-051-1	750 gram	5/24	7:35	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-051-2	750 gram	5/24	7:45	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-052-0 02	750 gram	5/24	8:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-052-1	750 gram	5/24	8:05	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-052-2	750 gram	5/24	8:15	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-053-0 02	750 gram	5/24	8:30	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-053-1	750 gram	5/24	8:35	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-053-2	750 gram	5/24	8:40	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-054-0 02	750 gram	5/24	8:50	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-054-1	750 gram	5/24	8:55	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-054-2	750 gram	5/24	9:05	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
Disposal of samples by Lab				Shipment Method:				Airbil No.:		21- Day	
Relinquished by:				Date						Date	
Ryan Fahey				5/24/2010							
Company Name:				Time						Time	
Philotechnics				21:00							
Received by:				Date						Date	
				5/26/10				1:00			
Company Name:				Time						Time	

Teledyne Brown Engineering

2508 Quality Lane
Knoxville, TN 37937

Page 1 of 1

ATTN: Sample Receiving

Customer Information				Project Information				Analyses / Method			
Project Name		Sigma Aldrich		Purchase Order				A. Tritium (H-3)			
Quote#				Project Number		5614		B. Carbon 14 (C-14)			
Company		Philotechnics		Bill To		Philotechnics		C. Oxidation			
Serial Report To:		Ryan Fahey		Invoice Attn		Pam Sewill		D.			
Address:		85 Brainerd Rd TH 9		Address:		201 Renovare Blvd		E.			
City/State/Zip		Allston, MA 01234		City/State/Zip		Oak Ridge, TN 37830		F.			
Phone		978-844-4560		Phone:		(865)285-3017		G.			
Fax		(865) 285-0386		Fax		(865)285-0386		H.			
I.											
Sx No.	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	Ivo. of Bottles	A	B	C	
FMF-029-066-0 02	750 gram	5/24	14:20	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-066-1	750 gram	5/24	14:23	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-066-2	750 gram	5/24	14:25	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-067-0 02	750 gram	5/24	14:30	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-067-1	750 gram	5/24	14:35	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-067-2	750 gram	5/24	14:40	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-068-0 02	750 gram	5/24	14:40	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-068-1	750 gram	5/24	14:50	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-068-2	750 gram	5/24	15:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
Disposal of samples by Lab				Shipment Method:				Airbil No.:		21- Day	
Relinquished by:				Date		Drop Off				Date	
Ryan Fahey				5/24/2010							
Company Name:				Time						Time	
Philotechnics				21:00							
Received by:				Date		1:00				Date	
				5/26/10							
Company Name:				Time						Time	



Ryan Fahey
Philotechnics
85 Brainerd Rd TH 9

Allston, MA 01234

Report of Analysis/Certificate of Conformance

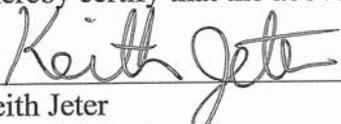
06/17/2010

LIMS #: L42361
Project ID#: PH001-3EREGMA-10
Received: 05/26/2010
Delivery Date: 06/16/2010
P.O.#: PO-0000881
Release #:
SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



Keith Jeter
Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-029-055-0.02	L42361-1	FMF-029-055-0.02
FMF-029-055-1	L42361-2	FMF-029-055-1
FMF-029-055-2	L42361-3	FMF-029-055-2
FMF-029-056-0.02	L42361-4	FMF-029-056-0.02
FMF-029-056-1	L42361-5	FMF-029-056-1
FMF-029-056-2	L42361-6	FMF-029-056-2
FMF-029-057-0.02	L42361-7	FMF-029-057-0.02
FMF-029-057-1	L42361-8	FMF-029-057-1



Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-029-057-2	L42361-9	FMF-029-057-2
FMF-029-058-0.02	L42361-10	FMF-029-058-0.02
FMF-029-058-1	L42361-11	FMF-029-058-1
FMF-029-058-2	L42361-12	FMF-029-058-2
FMF-029-059-0.02	L42361-13	FMF-029-059-0.02
FMF-029-059-1	L42361-14	FMF-029-059-1
FMF-029-059-2	L42361-15	FMF-029-059-2
FMF-029-060-0.02	L42361-16	FMF-029-060-0.02
FMF-029-060-1	L42361-17	FMF-029-060-1
FMF-029-060-2	L42361-18	FMF-029-060-2

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Report of Analysis

06/17/10 17:47

L42361

Philotechnics

PH001-3EREGMA-10

Sample ID: FMF-029-055-0.02	Collect Start: 05/24/2010 09:10	Matrix: Soil	(S)
Station: FMF-029-055-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-1			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.08E+02	3.46E+00		pCi/g		2.18	g wet		06/16/10	10	M	+
H-3	2003	3.22E+00	1.50E+00		pCi/g		2.18	g wet		06/17/10	10	M	+

Sample ID: FMF-029-055-1	Collect Start: 05/24/2010 09:15	Matrix: Soil	(S)
Station: FMF-029-055-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-2			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.47E+00	1.11E+00		pCi/g		2.33	g wet		06/17/10	10	M	+
H-3	2003	<		1.97E+00	pCi/g		2.33	g wet		06/17/10	10	M	U

Sample ID: FMF-029-055-2	Collect Start: 05/24/2010 09:20	Matrix: Soil	(S)
Station: FMF-029-055-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-3			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.66E+01	1.52E+00		pCi/g		2.45	g wet		06/17/10	10	M	+
H-3	2003	<		1.88E+00	pCi/g		2.45	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

No = Peak not identified in gamma spectrum

Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42361

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-056-0.02	Collect Start: 05/24/2010 09:30	Matrix: Soil (S)
Station: FMF-029-056-0.02	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42361-4		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.40E+01	2.11E+00		pCi/g		2.19	g wet		06/17/10	10	M	+
H-3	2003	<		2.10E+00	pCi/g		2.19	g wet		06/17/10	10	M	U

Sample ID: FMF-029-056-1	Collect Start: 05/24/2010 09:40	Matrix: Soil (S)
Station: FMF-029-056-1	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42361-5		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.56E+00	pCi/g		2.34	g wet		06/17/10	10	M	U
H-3	2003	<		1.97E+00	pCi/g		2.34	g wet		06/17/10	10	M	U

Sample ID: FMF-029-056-2	Collect Start: 05/24/2010 09:50	Matrix: Soil (S)
Station: FMF-029-056-2	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42361-6		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.35E+00	9.62E-01		pCi/g		2.74	g wet		06/17/10	10	M	+
H-3	2003	<		1.68E+00	pCi/g		2.74	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42361

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-057-0.02	Collect Start: 05/24/2010 09:53	Matrix: Soil	(S)
Station: FMF-029-057-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-7			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.49E+01	1.93E+00		pCi/g		2.11	g wet		06/17/10	10	M	+
H-3	2003	<		2.18E+00	pCi/g		2.11	g wet		06/17/10	10	M	U

Sample ID: FMF-029-057-1	Collect Start: 05/24/2010 10:00	Matrix: Soil	(S)
Station: FMF-029-057-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-8			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.78E+00	pCi/g		2.05	g wet		06/17/10	10	M	U
H-3	2003	<		2.24E+00	pCi/g		2.05	g wet		06/17/10	10	M	U

Sample ID: FMF-029-057-2	Collect Start: 05/24/2010 10:10	Matrix: Soil	(S)
Station: FMF-029-057-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-9			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.11E+01	1.49E+00		pCi/g		2.13	g wet		06/17/10	10	M	+
H-3	2003	<		2.16E+00	pCi/g		2.13	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- High = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- Spec = Activity concentration exceeds customer reporting value
- L = MDC exceeds customer technical specification
- H = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42361

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-058-0.02	Collect Start: 05/24/2010 10:15	Matrix: Soil	(S)
Station: FMF-029-058-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-10			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.27E+01	1.32E+00		pCi/g		2.67	g wet		06/17/10	10	M	+
H-3	2003	<		1.72E+00	pCi/g		2.67	g wet		06/17/10	10	M	U

Sample ID: FMF-029-058-1	Collect Start: 05/24/2010 10:20	Matrix: Soil	(S)
Station: FMF-029-058-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-11			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.70E+00	1.08E+00		pCi/g		2.44	g wet		06/17/10	10	M	+
H-3	2003	<		1.89E+00	pCi/g		2.44	g wet		06/17/10	10	M	U

Sample ID: FMF-029-058-2	Collect Start: 05/24/2010 10:30	Matrix: Soil	(S)
Station: FMF-029-058-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-12			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.83E+00	1.10E+00		pCi/g		2.29	g wet		06/17/10	10	M	+
H-3	2003	<		2.01E+00	pCi/g		2.29	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42361

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-059-0.02	Collect Start: 05/24/2010 10:35	Matrix: Soil	(S)
Station: FMF-029-059-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-13			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.14E+00	1.13E+00		pCi/g		2.15	g wet		06/17/10	10	M	+
H-3	2003	<		2.14E+00	pCi/g		2.15	g wet		06/17/10	10	M	U

Sample ID: FMF-029-059-1	Collect Start: 05/24/2010 10:40	Matrix: Soil	(S)
Station: FMF-029-059-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-14			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.02E+01	1.28E+00		pCi/g		2.56	g wet		06/17/10	10	M	+
H-3	2003	<		1.80E+00	pCi/g		2.56	g wet		06/17/10	10	M	U

Sample ID: FMF-029-059-2	Collect Start: 05/24/2010 10:45	Matrix: Soil	(S)
Station: FMF-029-059-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-15			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.58E+00	1.14E+00		pCi/g		2.38	g wet		06/17/10	10	M	+
H-3	2003	<		1.93E+00	pCi/g		2.38	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42361

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-060-0.02	Collect Start: 05/24/2010 10:50	Matrix: Soil	(S)
Station: FMF-029-060-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-16			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.95E+00	1.12E+00		pCi/g		2.35	g wet		06/17/10	10	M	+
H-3	2003	3.21E+00	1.41E+00		pCi/g		2.35	g wet		06/17/10	10	M	+

Sample ID: FMF-029-060-1	Collect Start: 05/24/2010 10:55	Matrix: Soil	(S)
Station: FMF-029-060-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-17			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.52E+00	pCi/g		2.4	g wet		06/17/10	10	M	U
H-3	2003	<		1.92E+00	pCi/g		2.4	g wet		06/17/10	10	M	U

Sample ID: FMF-029-060-2	Collect Start: 05/24/2010 11:00	Matrix: Soil	(S)
Station: FMF-029-060-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42361-18			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.53E+00	9.91E-01		pCi/g		2.54	g wet		06/17/10	10	M	+
H-3	2003	<		1.81E+00	pCi/g		2.54	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

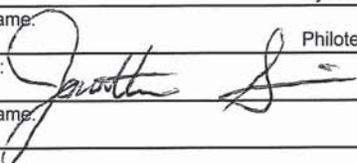
MDC - Minimum Detectable Concentration

L42361

Teledyne Brown Engineering

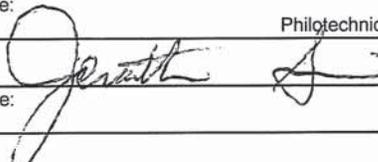
WH16F

2508 Quality Lane
Knoxville, TN 37931

Customer Information				Project Information				Analyses / Method				
Project Name		Sigma Aldrich		Purchase Order				A. Tritium (H-3)				
Quote#				Project Number		5614		B. Carbon 14 (C-14)				
Company		Philotechnics		Bill To		Philotechnics		C. Oxidation				
Send Report To:		Ryan Fahey		Invoice Attn		Pam Sewell		D.				
Address:		85 Brainerd Rd TH 9		Address:		201 Renovare Blvd		E.				
City/State/Zip		Allston, MA 01234		City/State/Zip		Oak Ridge, TN 37830		F.				
Phone		978-844-4560		Phone		(865)285-3017		G.				
Fax		(865) 285-0686		Fax		(865)285-0686		H.				
I.												
Sx No.	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	No. of Bottles	A	B	C		
FMF-029-055-0.02	750 gram	5/24	9:10	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-055-1	750 gram	5/24	9:15	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-055-2	750 gram	5/24	9:20	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-056-0.02	750 gram	5/24	9:30	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-056-1	750 gram	5/24	9:40	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-056-2	750 gram	5/24	9:50	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-057-0.02	750 gram	5/24	9:53	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-057-1	750 gram	5/24	10:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-057-2	750 gram	5/24	10:10	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-058-0.02	750 gram	5/24	10:15	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-058-1	750 gram	5/24	10:20	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
FMF-029-058-2	750 gram	5/24	10:30	Soil	Plastic Bag	None	1	X	X	X	Non-Haz	
Disposal of samples by Lab				Shipment Method: Drop Off				Airbill No.:		21- Day		
Relinquished by: Ryan Fahey			Date: 5/24/2010						Date			
Company Name: Philotechnics			Time: 21:00						Time			
Received by: 			Date: 5/26/10 1:00						Date			
Company Name:			Time:						Time			

Teledyne Brown Engineering

2508 Quality Lane
Knoxville, TN 37931
ATTN: Sample Receiving

Customer Information				Project Information				Analyses / Method			
Project Name		Sigma Aldrich		Purchase Order				A. Tritium (H-3)			
Quote#				Project Number		5614		B. Carbon 14 (C-14)			
Company		Philotechnics		Bill To		Philotechnics		C. Oxidation			
Send Report To:		Ryan Fahey		Invoice Attn		Pam Sewell		D.			
Address:		85 Brainerd Rd TH 9		Address:		201 Renovare Blvd		E.			
City/State/Zip		Allston, MA 01234		City/State/Zip		Oak Ridge, TN 37830		F.			
Phone		978-844-4560		Phone		(865)285-3017		G.			
Fax		(865) 285-0686		Fax		(865)285-0686		H.			
Sx No.	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	No. of Bottles	A	B	C	
FMF-029-059-0.02	750 gram	5/24	10:35	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-059-1	750 gram	5/24	10:40	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-059-2	750 gram	5/24	10:45	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-060-0.02	750 gram	5/24	10:50	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-060-1	750 gram	5/24	10:55	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-060-2	750 gram	5/24	11:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
Disposal of samples by Lab				Shipment Method: Drop Off			Airbill No.:		21- Day		
Relinquished by: Ryan Fahey			Date: 5/24/2010					Date			
Company Name: Philotechnics			Time: 21:00					Time			
Received by: 			Date: 5/26/10 1:00					Date			
Company Name:			Time:					Time			



Ryan Fahey
 Philotechnics
 85 Brainerd Rd TH 9

 Allston, MA 01234

Report of Analysis/Certificate of Conformance

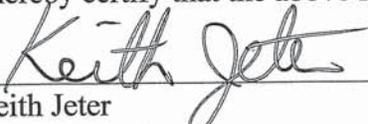
06/17/2010

LIMS #: L42362
 Project ID#: PH001-3EREGMA-10
 Received: 05/26/2010
 Delivery Date: 06/16/2010
 P.O.#: PO-0000881
 Release #:
 SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



 Keith Jeter
 Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-029-061-0.02	L42362-1	FMF-029-061-0.02
FMF-029-061-1	L42362-2	FMF-029-061-1
FMF-029-061-2	L42362-3	FMF-029-061-2
FMF-029-062-0.02	L42362-4	FMF-029-062-0.02
FMF-029-062-0.02-QC	L42362-5	FMF-029-062-0.02-QC
FMF-029-062-1	L42362-6	FMF-029-062-1
FMF-029-062-2	L42362-7	FMF-029-062-2
FMF-029-063-0.02	L42362-8	FMF-029-063-0.02



Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-029-063-1	L42362-9	FMF-029-063-1
FMF-029-063-2	L42362-10	FMF-029-063-2
FMF-029-064-0.02	L42362-11	FMF-029-064-0.02
FMF-029-064-1	L42362-12	FMF-029-064-1
FMF-029-064-1-QC	L42362-13	FMF-029-064-1-QC
FMF-029-064-2	L42362-14	FMF-029-064-2
FMF-029-065-0.02	L42362-15	FMF-029-065-0.02
FMF-029-065-1	L42362-16	FMF-029-065-1
FMF-029-065-2	L42362-17	FMF-029-065-2
FMF-029-065-2-QC	L42362-18	FMF-029-065-2-QC

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Report of Analysis

06/17/10 17:47

L42362

Philotechnics

PH001-3EREGMA-10

Sample ID: FMF-029-061-0.02	Collect Start: 05/24/2010 11:05	Matrix: Soil	(S)
Station: FMF-029-061-0.02	Collect Stop:	Volume:	
Description: N. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-1			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.83E+02	9.81E+00		pCi/g		2.11	g wet		06/17/10	5.35	M	+
H-3	2003	6.83E+00	1.76E+00		pCi/g		2.11	g wet		06/17/10	10	M	+

Sample ID: FMF-029-061-1	Collect Start: 05/24/2010 11:10	Matrix: Soil	(S)
Station: FMF-029-061-1	Collect Stop:	Volume:	
Description: N. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-2			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.28E+02	3.40E+00		pCi/g		2.62	g wet		06/17/10	10	M	+
H-3	2003	2.88E+00	1.26E+00		pCi/g		2.62	g wet		06/17/10	10	M	+

Sample ID: FMF-029-061-2	Collect Start: 05/24/2010 11:15	Matrix: Soil	(S)
Station: FMF-029-061-2	Collect Stop:	Volume:	
Description: N. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-3			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.98E+02	8.10E+00		pCi/g		2.36	g wet		06/17/10	5.79	M	+
H-3	2003	7.39E+00	1.65E+00		pCi/g		2.36	g wet		06/17/10	10	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/17/10 17:47

L42362

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-062-0.02	Collect Start: 05/24/2010 13:00	Matrix: Soil	(S)
Station: FMF-029-062-0.02	Collect Stop:	Volume:	
Description: N. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-4			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.30E+00	9.51E-01		pCi/g		2.77	g wet		06/17/10	10	M	+
H-3	2003	<		1.66E+00	pCi/g		2.77	g wet		06/17/10	10	M	U

Sample ID: FMF-029-062-0.02-QC	Collect Start: 05/24/2010 13:00	Matrix: Soil	(S)
Station: FMF-029-062-0.02-QC	Collect Stop:	Volume:	
Description: N. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-5			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.30E+00	1.01E+00		pCi/g		2.86	g wet		06/17/10	10	M	+
H-3	2003	<		1.61E+00	pCi/g		2.86	g wet		06/17/10	10	M	U

Sample ID: FMF-029-062-1	Collect Start: 05/24/2010 13:04	Matrix: Soil	(S)
Station: FMF-029-062-1	Collect Stop:	Volume:	
Description: S. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-6			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.35E+00	1.28E+00		pCi/g		2.13	g wet		06/17/10	10	M	+
H-3	2003	<		2.16E+00	pCi/g		2.13	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42362

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-062-2	Collect Start: 05/24/2010 13:13	Matrix: Soil	(S)
Station: FMF-029-062-2	Collect Stop:	Volume:	
Description: S. Fence Line Env't.	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-7			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.71E+00	1.04E+00		pCi/g		2.55	g wet		06/17/10	10	M	+
H-3	2003	<		1.80E+00	pCi/g		2.55	g wet		06/17/10	10	M	U

Sample ID: FMF-029-063-0.02	Collect Start: 05/24/2010 13:23	Matrix: Soil	(S)
Station: FMF-029-063-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-8			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	3.32E+00	1.01E+00		pCi/g		2.6	g wet		06/17/10	10	M	+
H-3	2003	<		1.77E+00	pCi/g		2.6	g wet		06/17/10	10	M	U

Sample ID: FMF-029-063-1	Collect Start: 05/24/2010 13:27	Matrix: Soil	(S)
Station: FMF-029-063-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-9			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.77E+00	pCi/g		2.06	g wet		06/17/10	10	M	U
H-3	2003	<		2.23E+00	pCi/g		2.06	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/17/10 17:47

L42362

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-063-2	Collect Start: 05/24/2010 13:32	Matrix: Soil	(S)
Station: FMF-029-063-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-10			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.62E+00	pCi/g		2.25	g wet		06/17/10	10	M	U
H-3	2003	<		2.04E+00	pCi/g		2.25	g wet		06/17/10	10	M	U

Sample ID: FMF-029-064-0.02	Collect Start: 05/24/2010 13:36	Matrix: Soil	(S)
Station: FMF-029-064-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-11			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.44E+00	pCi/g		2.54	g wet		06/17/10	10	M	U
H-3	2003	<		1.81E+00	pCi/g		2.54	g wet		06/17/10	10	M	U

Sample ID: FMF-029-064-1	Collect Start: 05/24/2010 13:42	Matrix: Soil	(S)
Station: FMF-029-064-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-12			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.37E+00	pCi/g		2.66	g wet		06/17/10	10	M	U
H-3	2003	<		1.73E+00	pCi/g		2.66	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42362

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-064-1-QC	Collect Start: 05/24/2010 13:42	Matrix: Soil	(S)
Station: FMF-029-064-1-QC	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-13			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.73E+00	pCi/g		2.11	g wet		06/17/10	10	M	U
H-3	2003	<		2.18E+00	pCi/g		2.11	g wet		06/17/10	10	M	U

Sample ID: FMF-029-064-2	Collect Start: 05/24/2010 13:48	Matrix: Soil	(S)
Station: FMF-029-064-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-14			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.42E+00	pCi/g		2.57	g wet		06/17/10	10	M	U
H-3	2003	1.99E+00	1.23E+00		pCi/g		2.57	g wet		06/17/10	10	M	+

Sample ID: FMF-029-065-0.02	Collect Start: 05/24/2010 14:00	Matrix: Soil	(S)
Station: FMF-029-065-0.02	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-15			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	5.03E+00	1.11E+00		pCi/g		2.51	g wet		06/17/10	10	M	+
H-3	2003	<		1.83E+00	pCi/g		2.51	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- +
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/17/10 17:47

L42362

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-029-065-1	Collect Start: 05/24/2010 14:05	Matrix: Soil	(S)
Station: FMF-029-065-1	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-16			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.49E+00	pCi/g		2.46	g wet		06/17/10	10	M	U
H-3	2003	<		1.87E+00	pCi/g		2.46	g wet		06/17/10	10	M	U

Sample ID: FMF-029-065-2	Collect Start: 05/24/2010 14:10	Matrix: Soil	(S)
Station: FMF-029-065-2	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-17			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.47E+00	pCi/g		2.48	g wet		06/17/10	10	M	U
H-3	2003	<		1.86E+00	pCi/g		2.48	g wet		06/17/10	10	M	U

Sample ID: FMF-029-065-2-QC	Collect Start: 05/24/2010 14:10	Matrix: Soil	(S)
Station: FMF-029-065-2-QC	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42362-18			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.74E+00	pCi/g		2.1	g wet		06/17/10	10	M	U
H-3	2003	<		2.19E+00	pCi/g		2.1	g wet		06/17/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

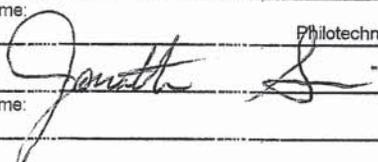
MDC - Minimum Detectable Concentration

L42362
WHITE

Teledyne Brown Engineering

2508 Quality Lane
Knoxville, TN 37931

ATTN: Sample Receiving

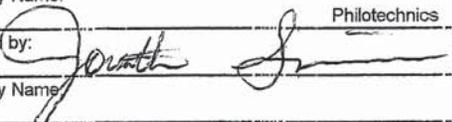
Customer Information				Project Information				Analysis / Method			
Project Name		Sigma Aldrich		Purchase Order				A. Tritium (H-3)			
Quote#				Project Number		5614		B. Carbon 14 (C-14)			
Company		Philotechnics		Bill To		Philotechnics		C. Oxidation			
Send Report To:		Ryan Fahey		Invoice Attn		Pam Sewell		D.			
Address:		85 Brainerd Rd TH 9		Address:		201 Renoware Blvd		E.			
City/State/Zip		Allston, MA 01234		City/State/Zip		Oak Ridge, TN 37830		F.			
Phone		978-844-4560		Phone:		(865)285-3017		G.			
Fax		(865) 285-0583		Fax		(865)285-0586		H.			
I.											
Sx No.	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	Ivo. of Bottles	A	B	C	
FMF-029-061-0 02	750 gram	5/24	11:05	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-061-1	750 gram	5/24	11:10	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-061-2	750 gram	5/24	11:15	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-062-0 02	750 gram	5/24	13:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-062-0 02-QC	750 gram	5/24	13:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-062-1	750 gram	5/24	13:04	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-062-2	750 gram	5/24	13:13	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-063-0 02	750 gram	5/24	13:23	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-063-1	750 gram	5/24	13:27	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-063-2	750 gram	5/24	13:32	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-064-0 02	750 gram	5/24	13:36	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-064-1	750 gram	5/24	13:42	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-064-1-QC	750 gram	5/24	13:42	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
Disposal of samples by Lab				Shipment Method:				Airbill No.:		21- Day	
Relinquished by:				Date		Drop Off				Date	
Ryan Fahey				5/24/2010							
Company Name:				Time						Time	
Philotechnics				21:00							
Received by:				Date						Date	
				5/26/10 1:00							
Company Name:				Time						Time	

Teledyne Brown Engineering

2508 Quality Lane

Knoxville, TN 37931

ATTN: Sample Receiving

Customer Information				Project Information				Analysis / Method			
Project Name		Sigma Aldrich		Purchase Order				A. Tritium (H-3)			
Quote#				Project Number		5614		B. Carbon 14 (C-14)			
Company		Philotechnics		Bill To		Philotechnics		C. Oxidation			
Send Report To:		Ryan Fahey		Invoice Attn		Pam Sewall		D.			
Address:		85 Brainerd Rd TH 9		Address:		201 Renovare Blvd		E.			
City/State/Zip		Allston, MA 01234		City/State/Zip		Oak Ridge, TN 37830		F.			
Phone		978-844-4560		Phone		(865)285-0017		G.			
Fax		(865) 285-0586		Fax		(865)285-0586		H.			
Sx No.	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	Iv. of Bottles	A	B	C	
FMF-029-064-2	750 gram	5/24	13:48	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-065-0 02	750 gram	5/24	14:00	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-065-1	750 gram	5/24	14:05	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-065-2	750 gram	5/24	14:10	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-029-065-2-QC	750 gram	5/24	14:10	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
Disposal of samples by Lab		Shipment Method:				Drop Off		Airbil No.:		21- Day	
Relinquished by:			Date						Date		
Ryan Fahey			5/24/2010								
Company Name:			Time						Time		
Philotechnics			21:00								
Received by:			Date						Date		
			5/24/10								
Company Name:			Time						Time		

Attachment C
Analytical Results
Septic Tank



Ryan Fahey
 Philotechnics
 85 Brainerd Rd TH 9

 Allston, MA 01234

Report of Analysis/Certificate of Conformance

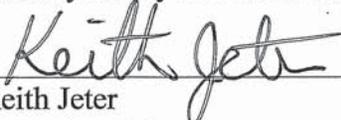
06/04/2010

LIMS #: L42358
 Project ID#: PH001-3EREGMA-10
 Received: 05/26/2010
 Delivery Date: 06/02/2010
 P.O.#: PO-0000881
 Release #:
 SDG#:

This is to certify that Teledyne Brown Engineering - Environmental Services located at 2508 Quality Lane, Knoxville, Tennessee, 37931, has analyzed, tested and documented samples, as received by the laboratory, as specified in the applicable purchase order.

This also certifies that requirements of applicable codes, standards and specifications have been fully met and that any quality assurance documentation which verified conformance to the purchase order is on file and may be examined upon request.

I hereby certify that the above statements are true and correct.



 Keith Jeter
 Operations Manager

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-ST1	L42358-1	
FMF-ST2	L42358-2	
FMF-ST3	L42358-3	
FMF-ST4	L42358-4	
FMF-ST5	L42358-5	
FMF-ST6	L42358-6	
FMF-ST7	L42358-7	
FMF-ST8-0.05	L42358-8	



TELEDYNE
BROWN ENGINEERING, INC.

A Teledyne Technologies Company
2508 Quality Lane
Knoxville, TN 37931-3133
865-690-6819

Cross Reference Table

Client ID	Laboratory ID	Station ID (if applicable)
FMF-ST8-1	L42358-9	
FMF-ST9-0.05	L42358-10	
FMF-ST9-1	L42358-11	
FMF-ST10-0.5	L42358-12	
FMF-ST10-1	L42358-13	

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Case Narrative

06/04/2010 12:03

L42358

PH001-3EREGMA-10

Philotechnics

The duplicate RPD for these samples was 54.8. QC limits are 50. The sample was analyzed wet. The samples were difficult to homogenize wet, which led to the discrepancy between the sample and its duplicate.

Report of Analysis

06/04/10 11:07

L42358

Philotechnics

PH001-3EREGMA-10

Sample ID: FMF-ST1	Collect Start: 05/19/2010 11:30	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-1			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	7.87E+03	1.97E+03		pCi/L		.5	ml		06/04/10	60	M	+
H-3	2003	1.15E+04	3.08E+03		pCi/L		.5	ml		06/04/10	60	M	+

Sample ID: FMF-ST2	Collect Start: 05/19/2010 11:33	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-2			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.94E+04	2.17E+03		pCi/L		.5	ml		06/04/10	60	M	+
H-3	2003	1.66E+04	3.22E+03		pCi/L		.5	ml		06/04/10	60	M	+

Sample ID: FMF-ST3	Collect Start: 05/19/2010 11:35	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-3			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.00E+04	2.18E+03		pCi/L		.5	ml		06/04/10	60	M	+
H-3	2003	1.61E+04	3.20E+03		pCi/L		.5	ml		06/04/10	60	M	+

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
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- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

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MDC - Minimum Detectable Concentration

Report of Analysis

06/04/10 11:07

L42358

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-ST4	Collect Start: 05/19/2010 11:37	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-4			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	7.90E+03	1.97E+03		pCi/L		.5	ml		06/04/10	60	M	+
H-3	2003	1.25E+04	3.11E+03		pCi/L		.5	ml		06/04/10	60	M	+

Sample ID: FMF-ST5	Collect Start: 05/19/2010 11:45	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-5			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	7.92E+02	1.59E+01		pCi/g		2.37	g wet		06/03/10	2.91	M	+
H-3	2003	1.34E+01	2.03E+00		pCi/g		2.37	g wet		06/04/10	10	M	+

Sample ID: FMF-ST6	Collect Start: 05/19/2010 12:05	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-6			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.83E+01	1.97E+00		pCi/g		2.18	g wet		06/03/10	10	M	+
H-3	2003	<		2.28E+00	pCi/g		2.18	g wet		06/04/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Bolded text indicates reportable value.

Report of Analysis

06/04/10 11:07

L42358

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-ST7	Collect Start: 05/19/2010 12:15	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-7			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.61E+02	3.90E+00		pCi/g		2.45	g wet		06/03/10	10	M	+
H-3	2003	8.17E+00	1.73E+00		pCi/g		2.45	g wet		06/04/10	10	M	+

Sample ID: FMF-ST8-0.05	Collect Start: 05/24/2010 15:10	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-8			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.29E+01	1.70E+00		pCi/g		2.43	g wet		06/03/10	10	M	+
H-3	2003	3.98E+00	1.50E+00		pCi/g		2.43	g wet		06/04/10	10	M	+

Sample ID: FMF-ST8-1	Collect Start: 05/19/2010 15:15	Matrix: Solids	(SD)
Station:	Collect Stop:	Volume:	
Description:	Receive Date: 05/26/2010	% Moisture:	
LIMS Number: L42358-9			

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	9.54E+00	1.18E+00		pCi/g		2.76	g wet		06/03/10	10	M	+
H-3	2003	<		1.80E+00	pCi/g		2.76	g wet		06/04/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/04/10 11:07

L42358

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-ST9-0.05	Collect Start: 05/19/2010 15:20	Matrix: Solids (SD)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42358-10		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	1.36E+02	3.47E+00		pCi/g		2.63	g wet		06/03/10	10	M	+
H-3	2003	<		1.89E+00	pCi/g		2.63	g wet		06/04/10	10	M	U

Sample ID: FMF-ST9-1	Collect Start: 05/19/2010 15:25	Matrix: Solids (SD)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42358-11		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	4.38E+01	2.14E+00		pCi/g		2.52	g wet		06/03/10	10	M	+
H-3	2003	2.41E+00	1.36E+00		pCi/g		2.52	g wet		06/04/10	10	M	+

Sample ID: FMF-ST10-0.5	Collect Start: 05/19/2010 15:30	Matrix: Solids (SD)
Station:	Collect Stop:	Volume:
Description:	Receive Date: 05/26/2010	% Moisture:
LIMS Number: L42358-12		

Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	2.11E+01	1.64E+00		pCi/g		2.45	g wet		06/03/10	10	M	+
H-3	2003	<		2.03E+00	pCi/g		2.45	g wet		06/04/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

Report of Analysis

06/04/10 11:07

L42358

Philotechnics

PH001-3EREGMA-10

Ryan Fahey

Sample ID: FMF-ST10-1		Collect Start: 05/19/2010 15:35		Matrix: Solids		(SD)							
Station:		Collect Stop:		Volume:									
Description:		Receive Date: 05/26/2010		% Moisture:									
LIMS Number: L42358-13													
Radionuclide	SOP#	Activity Conc	Uncertainty 2 Sigma	MDC	Units	Run #	Aliquot Volume	Aliquot Units	Reference Date	Count Date	Count Time	Count Units	Flag Values
C-14	2003	<		1.47E+00	pCi/g		2.47	g wet		06/03/10	10	M	U
H-3	2003	<		2.01E+00	pCi/g		2.47	g wet		06/04/10	10	M	U

Flag Values

- U = Compound/Analyte not detected or less than 3 sigma
- + = Activity concentration exceeds MDC and 3 sigma; peak identified(gamma only)
- U* = Compound/Analyte not detected. Peak not identified, but forced activity concentration exceeds MDC and 3 sigma
- High = Activity concentration exceeds customer reporting value
- Spec = MDC exceeds customer technical specification
- L = Low recovery
- H = High recovery

Bolded text indicates reportable value.

- No = Peak not identified in gamma spectrum
- Yes = Peak identified in gamma spectrum

**** Unless otherwise noted, the analytical results reported are related only to the samples tested in the condition they are received by the laboratory.

MDC - Minimum Detectable Concentration

L42358
WHITE

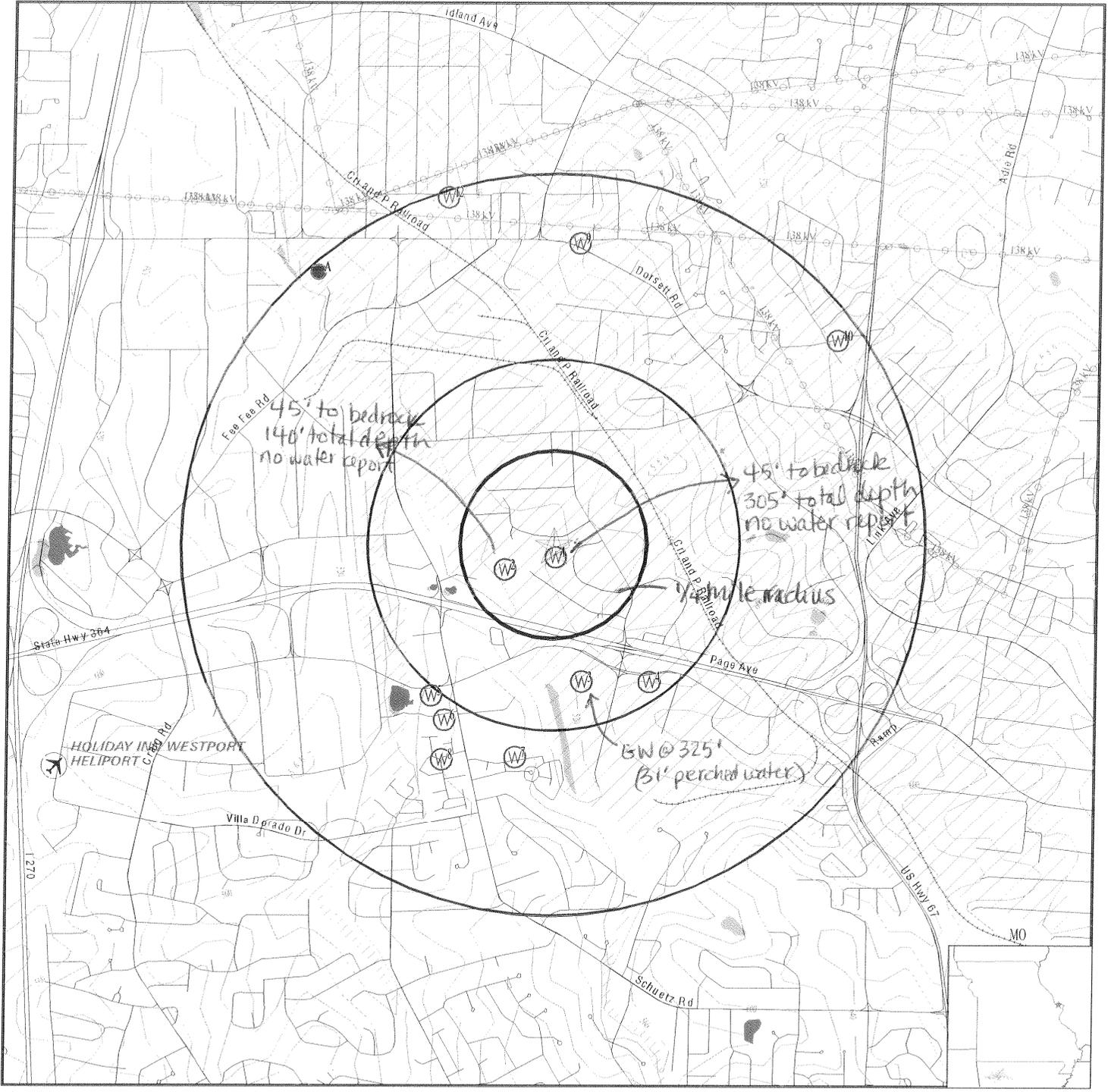
Teledyne Brown Engineering

2508 Quality Lane
Knoxville, TN 37931

ATTN: Sample Receiving

Customer Information			Project Information				Analyses / Method				
Project Name	Sigma Aldrich		Purchase Order				A. Tritium (H-3)				
Quote#			Project Number	5314			B. Carbon 14 (C-14)				
Company	Philotechnics		Bill To	Philotechnics			C. Oxidation				
Send Report To:	Ryan Fahey		Invoice Attn	Pam Sewell			D.				
Address:	85 Brainerd Rd TH 9		Address:	201 Renovare Blvd			E.				
City/State/Zip	Allston, MA 01234		City/State/Zip	Oak Ridge, TN 37830			F.				
Phone	978-844-4530		Phone	(865)285-3017			G.				
Fax	(865) 285-0688		Fax	(865)285-0686			H.				
Sx No	Sample Description	Sample Date	Sample Time	Sample Matrix	Container Type	Preservative	No. of Bottles	A	B	C	
FMF-ST1	500 ml bottle (Septic Tank Sample)	5/19	11:30	Liquid	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST2	500 ml bottle (Septic Tank Sample)	5/19	11:33	Liquid	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST3	500 ml bottle (Septic Tank Sample)	5/19	11:35	Liquid	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST4	500 ml bottle (Septic Tank Sample)	5/19	11:37	Liquid	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST5	500 ml bottle (Septic Tank Sample)	5/19	11:45	Sludge	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST6	500 ml bottle (Septic Tank Sample)	5/19	12:05	Sludge	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST7	500 ml bottle (Septic Tank Sample)	5/19	12:15	Sludge	Plastic Bottle	None	1	X	X	X	Non-Haz
FMF-ST8-0.05	750 g ra 1	5/24	15:10	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-ST8-1	750 g ra 1	5/24	15:15	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-ST9-0.05	750 g ra 1	5/24	15:20	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-ST9-1	750 g ra 1	5/24	15:25	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-ST10-0.05	750 g ra 1	5/24	15:30	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
FMF-ST10-1	750 g ra 1	5/24	15:35	Soil	Plastic Bag	None	1	X	X	X	Non-Haz
Disposal of samples by Lab			Shipment Method:			Drop Off		Airbill No.:		7- Day	
Relinquished by: Ryan Fahey			Date: 5/24/2010						Date:		
Company Name: Philotechnics			Time: 21:00						Time:		
Received by: <i>[Signature]</i>			Date: 5/26/10 1300						Date:		
Company Name:			Time:						Time:		

PHYSICAL SETTING SOURCE MAP - 2920639.1s



- | | |
|--|--|
| County Boundary | Groundwater Flow Direction |
| Major Roads | Indeterminate Groundwater Flow at Location |
| Contour Lines | Groundwater Flow Varies at Location |
| Power transmission lines | Oil, gas or related wells |
| Airports | 100-year flood zone |
| Earthquake epicenter, Richter 5 or greater | 500-year flood zone |
| Water Wells | National Wetland Inventory |
| Public Water Supply Wells | |
| Cluster of Multiple Icons | |



SITE NAME: Sigma-Radiochemicals ADDRESS: 11542 Fort Mims Drive St. Louis MO 63146 LAT/LONG: 38.7026 / 90.4241	CLIENT: Sigma-Aldrich Corporation CONTACT: Cheryl Stipsits INQUIRY #: 2920639.1s DATE: November 12, 2010 3:41 pm
--	---

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
 Direction
 Distance
 Elevation

Database EDR ID Number

1		
South		
0 - 1/8 Mile	MO WELLS	MOLOG1000018780
Higher		

Id:	025256	Located:	Y
Notenough:	Not Reported	Scale:	24k
Locator:	Michael Lemon - Interpolated	Sname:	MISSOURI
Stabbrev:	MO	County:	ST. LOUIS
Utm x:	724016.03226		
Utm y:	4286663.00102		
Latitude:	38.70211		
Longitude:	-90.42399		
Qtr3:	NE	Qtr2:	SE
Qtr1:	NW		
Section:	26		
Tnsp:	46		
Tnspdir:	Not Reported		
Rng:	5		
Rngdir:	E		
Plssx:	723612		
Plssy:	4286120		
Location p:	16		
Elev:	526		
Idnum:	25256		
Swl:	20		
Quadrangle:	CREVE COEUR	Site id:	MOLOG1000018780

Header Information:

Id:	025256	Well type:	Private Well
Agencyname:	GEOLOGICAL SURVEY (DGLS)	County:	ST. LOUIS
Fips:	189	Sname:	MISSOURI
Stabbrev:	MO	Qtr3:	NE
Qtr2:	SE	Qtr1:	NW
Section:	26	Tnsp:	46
Tnspdir:	N	Rng:	05
Rngdir:	E		
Latitude:	38.70211		
Longitude:	-90.42399		
Utm x:	724016.03226		
Utm y:	4286663.00102		
Quadmap na:	CREVE COEUR	Ohio code:	38090F4
Llmeas:	D	Scale:	24k
Locator:	Interpolated	Typelog1:	S
Typelog2:	Not Reported	Typelog3:	Not Reported
Ownerind:	0	Owner:	Morrison, Earl
Leasenam:	Not Reported	Driller:	St. Charles Drlg Co Inc
Drldate:	1967/02/25	Permit:	Not Reported
Logdate:	1969/03/	Logger:	Wells, J.
Elev:	526		
Elevbase:	S	Prodyld:	8
Gpmcfs:	G		
Depthbed:	45		
Sampsav:	0	Swla:	20
Swlb:	Not Reported		
Water at:	Not Reported		
Totdepth:	305	Formation :	ST LOUIS LIMESTONE
Formation1:	SALEM FORMATION		
Intcrdtp:	0		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Intcrdbt:	0	Aquclass:	Not Reported
Drawdown:	Not Reported	Reldate:	Not Reported
Confind:	0	Probnd2:	Not Reported
Probnd1:	Not Reported	Additional:	Not Reported
Probnd3:	Not Reported	Add databa:	Not Reported
Alagency1:	Not Reported	Add data 1:	Not Reported
Addition 1:	Not Reported	Add data 2:	Not Reported
Alnum2:	Not Reported	Rmkind:	N
Add data 3:	Not Reported	C plugind:	Not Reported
Remarks:	MARYLAND HEIGHTS, ON FT MIMS RD, OFF OF PAGE AVE.		
C total:	0		
C remarks:	Not Reported		

Strata Information:

Id:	025256	Stratordr:	0
Fmtp:	0		
Fmbot:	45		
Formation :	NO SAMPLES		
Primlith:	Not Reported	Minlith:	Not Reported
Seclith:	Not Reported		
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025256	Stratordr:	28400
Fmtp:	45		
Fmbot:	305		
Formation :	MISSISSIPPIAN SYSTEM		
Primlith:	Not Reported	Minlith:	Not Reported
Seclith:	Not Reported		
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025256	Stratordr:	30800
Fmtp:	45		
Fmbot:	305		
Formation :	MERAMECIAN SERIES		
Primlith:	Not Reported	Minlith:	Not Reported
Seclith:	Not Reported		
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Minrocc: 0
Rmk20: Not Reported

Strata Information:

Id:	025256	Stratordr:	30900
Fmtop:	45		
Fmbot:	195		
Formation :	ST. LOUIS LIMESTONE		
Primlith:	LIMESTONE		
Seclith:	Not Reported	Minlith:	SHALE
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025256	Stratordr:	31000
Fmtop:	195		
Fmbot:	305		
Formation :	SALEM FORMATION		
Primlith:	LIMESTONE		
Seclith:	DOLOMITE	Minlith:	CHERT
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025256	Stratordr:	31000
Fmtop:	195		
Fmbot:	305		
Formation :	SALEM FORMATION		
Primlith:	LIMESTONE		
Seclith:	DOLOMITE	Minlith:	CHERT
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025256	Stratordr:	99900
Fmtop:	305		
Fmbot:	305		
Formation :	TOTAL DEPTH		
Primlith:	Not Reported		
Seclith:	Not Reported	Minlith:	Not Reported
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Minrocc: 0
Rmk20: Not Reported

2
WSW
1/8 - 1/4 Mile
Lower

MO WELLS MOLOG1000018772

Id:	025364	Located:	Y
Notenough:	Not Reported	Scale:	24k
Locator:	Michael Lemon - Interpolated	Stname:	MISSOURI
Stabbrev:	MO	County:	ST. LOUIS
Utm x:	723800.15723		
Utm y:	4286603.46965		
Latitude:	38.70163		
Longitude:	-90.42649		
Qtr3:	NW	Qtr2:	SE
Qtr1:	NW		
Section:	26		
Tnsp:	46		
Tnspdir:	Not Reported		
Rng:	5		
Rngdir:	E		
Plssx:	723612		
Plssy:	4286120		
Location p:	16		
Elev:	506		
Idnum:	25364		
Swl:	0		
Quadrangle:	CREVE COEUR	Site id:	MOLOG1000018772

Header Information:

Id:	025364	Well type:	Private Well
Agencyname:	GEOLOGICAL SURVEY (DGLS)	County:	ST. LOUIS
Fips:	189	Stname:	MISSOURI
Stabbrev:	MO	Qtr3:	NW
Qtr2:	SE	Qtr1:	NW
Section:	26	Tnsp:	46
Tnspdir:	N	Rng:	05
Rngdir:	E		
Latitude:	38.70163		
Longitude:	-90.42649		
Utm x:	723800.15723		
Utm y:	4286603.46965		
Quadmap na:	CREVE COEUR	Ohio code:	38090F4
Llmeas:	D	Scale:	24k
Locator:	Interpolated	Typelog1:	S
Typelog2:	Not Reported	Typelog3:	Not Reported
Ownerind:	0	Owner:	Montgomery, Medford
Leasenam:	Not Reported	Driller:	St. Charles Drlg Co Inc
Drldate:	1967/05/26	Permit:	Not Reported
Logdate:	1969/06/	Logger:	Wells, J.
Elev:	506		
Elevbase:	S	Prodyld:	80
Gpmcfs:	G		
Depthbed:	45		
Sampsav:	0	Swla:	Not Reported
Swlb:	Not Reported		
Water at:	Not Reported		
Totdepth:	140	Formation :	ST LOUIS LIMESTONE
Formation1:	ST LOUIS LIMESTONE		
Intrdtp:	0		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Intcrdbt:	0	Aquclass:	Not Reported
Drawdown:	Not Reported	Reidate:	Not Reported
Confind:	0	Probnd2:	Not Reported
Probnd1:	Not Reported	Additional:	Not Reported
Probnd3:	Not Reported	Add databa:	Not Reported
Alagency1:	Not Reported	Add data 1:	Not Reported
Addition 1:	Not Reported	Add data 2:	Not Reported
Alnum2:	Not Reported	Rmkind:	N
Add data 3:	Not Reported	C plugind:	N
Remarks:	BOWLING GREEN ST		
C total:	45		
C remarks:	Not Reported		

Construction Information:

Id:	025364	Well type:	Private Well
Agencyname:	GEOLOGICAL SURVEY (DGLS)	Datecomp:	196705
Plugind:	N	Dateplug:	Not Reported
Casemat1:	Not Reported	Casemat2:	Not Reported
Cas1dpth:	45		
Cas1diam:	6.6		
Cas2dpth:	0		
Cas2diam:	0		
Cas3dpth:	0		
Cas3diam:	0		
Cas4dpth:	0		
Cas4diam:	0		
Inout1:	O	Typgrrt1:	Not Reported
Typgrrt2:	Not Reported	Typgrrt3:	Not Reported
Mthgrout:	Not Reported	Rigtype:	Not Reported
Weltreat:	Not Reported	Rmkind:	Not Reported
Dateabnd:	Not Reported		
Plgdpt1b:	0		
Plgdpt1t:	0		
Multcase:	N		
Szcashol:	0		
Szbelcas:	0		
Sizscrn:	0		
Slotsize:	0		
Lenscrn:	0		
Typescrn:	Not Reported	Typedev:	Not Reported
Typepump:	Not Reported		
Pumpcap:	0		
Pumptdh:	0		
Pumpset:	0		
Typecomp:	Not Reported		
Perfintt:	0		
Perfintb:	0		
Oilprod:	Not Reported	Gasprod:	Not Reported
Tubeptes:	Not Reported	Remarks:	Not Reported
Other data:	Not Reported	Formation :	ST LOUIS LIMESTONE
Formation1:	ST LOUIS LIMESTONE		

Strata Information:

Id:	025364	Stratordr:	0
Fmtp:	0		
Fmbot:	45		
Formation :	NO SAMPLES		
Primlith:	Not Reported		
Seclith:	Not Reported	Minlith:	Not Reported
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Minrocc: 0
Rmk20: Not Reported

Strata Information:

Id:	025364	Stratordr:	28400
Fmtp:	45		
Fmbot:	140		
Formation :	MISSISSIPPIAN SYSTEM		
Prmlith:	Not Reported		
Seclith:	Not Reported	Minlith:	Not Reported
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025364	Stratordr:	30800
Fmtp:	45		
Fmbot:	140		
Formation :	MERAMECIAN SERIES		
Prmlith:	Not Reported		
Seclith:	Not Reported	Minlith:	Not Reported
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025364	Stratordr:	30900
Fmtp:	45		
Fmbot:	140		
Formation :	ST. LOUIS LIMESTONE		
Prmlith:	LIMESTONE		
Seclith:	DOLOMITE	Minlith:	CHERT
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		
Minrocc:	0		
Rmk20:	Not Reported		

Strata Information:

Id:	025364	Stratordr:	99900
Fmtp:	140		
Fmbot:	140		
Formation :	TOTAL DEPTH		
Prmlith:	Not Reported		
Seclith:	Not Reported	Minlith:	Not Reported
Primmin:	Not Reported		
Primocc:	0		
Secmin:	Not Reported		
Secocc:	0		
Minrmin:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Minrocc: 0
Rmk20: Not Reported

3
SSE
1/4 - 1/2 Mile
Higher

FED USGS USGS2484566

Agency cd:	USGS	Site no:	384150090252101
Site name:	T46N R05E 26DBA1	EDR Site id:	USGS2484566
Latitude:	384150	Dec lat:	38.69727404
Longitude:	0902521	Coor meth:	M
Dec lon:	-90.42261778	Latlong datum:	NAD27
Coor accr:	S	District:	29
Dec latlong datum:	NAD83	County:	189
State:	29	Land net:	Not Reported
Country:	US	Map scale:	24000
Location map:	CREVE COEUR		
Altitude:	548.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Lower Missouri. Missouri. Area = 1590 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19430000
Date inventoried:	Not Reported	Mean greenwich time offset:	CST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	SALEM FORMATION		
Well depth:	325	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0		
Daily flow data end date:	0000-00-00	Daily flow data begin date:	0000-00-00
Peak flow data begin date:	0000-00-00	Daily flow data count:	0
Peak flow data count:	0	Peak flow data end date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data begin date:	0000-00-00
Ground water data begin date:	1943-09-01	Water quality data count:	0
Ground water data count:	1	Ground water data end date:	1943-09-01

Ground-water levels, Number of Measurements: 1

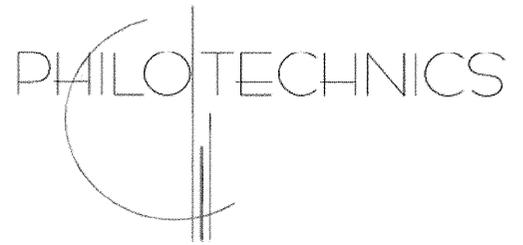
Date	Feet below Surface	Feet to Sealevel

1943-09-01	31	

4
SE
1/4 - 1/2 Mile
Higher

MO WELLS MOLOG1000018735

Id:	008478	Located:	Y
Notenough:	Not Reported	Scale:	24k
Locator:	Michael Lemon - Interpolated	Sname:	MISSOURI
Stabbrev:	MO	County:	ST. LOUIS
Utm x:	724443.81357		
Utm y:	4286136.78131		
Latitude:	38.69726		
Longitude:	-90.41924		
Qtr3:	NE	Qtr2:	NW
Qtr1:	SE		



Technical Proposal

Sigma-Aldrich Chemical Co.
Fort Mims Facility Phase 4 Septic Tank Removal and
Oversight of Footing Removal

Prepared by:

Philotechnics, Ltd.
201 Renovare Blvd.
Oak Ridge, TN 37830

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1. Introduction

Philotechnics Ltd., a provider of professional health physics and radioactive material management services for more than 20 years, is submitting this technical proposal for radiological oversight of the remaining footer removal/disposal and the removal of the Septic Tank at the Fort Mims Facility in Maryland Heights, Missouri. This proposal details Philotechnics proposed approach complete these tasks. This will include mobilization, oversight of the footer removal, removal of the septic tank contents and removal of the septic tank. This proposal also includes the estimated costs for preparation of the required D&D Plan amendment(s) and RESRAD modeling in support of this work. The primary goal is to support release of the site for unrestricted use.

Project activities will be performed under Philotechnics radioactive materials license via reciprocity and in compliance with site radiation protection requirements. This proposal does not include the cost of disposal of any hazardous material (including radioactive) based on chemical composition or other unknown hazards.

2. Technical Approach

The following sections detail Philotechnics' approach to performing the oversight of the concrete pad and soil sampling activities associated with this scope of work. The scope of work will require mobilization of a three (3) person team from Philotechnics Oak Ridge, TN facility.

All project work will be performed in compliance with the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulation (CFR) 1926 and 1910, as applicable.

2.1 Finalize Work Plan and Schedule

Philotechnics proposes to perform this project scope using one (1) project manager, one (1) health physics technician, and one (1) waste technician.

This proposal includes three options for treatment of the septic tank. Option A assumes that the tank contents and the tank itself are releasable for unrestricted use. Option B assumes the contents must be treated as low level radioactive waste (LLRW) but the tank itself can be released for unrestricted use. Option C assumes the contents and the tank must be disposed of as LLRW.

We estimate that the scope for Options A or B will take approximately three (3) working days to complete unhindered by inclement weather or coincidental work activities at the site. Option C is estimated to take approximately five (5) working days to complete. The proposed schedules are based on the field crew working ten hours per day. Philotechnics will finalize the work plan and project schedule with Sigma-Aldrich upon award of the project.

2.2 Oversight of Footer Removal

Sigma Aldrich will be responsible for any training or monitoring required of contractor personnel.

Philotechnics personnel will be onsite for radiological oversight during the removal of the remaining building footers by a contractor designated by Sigma-Aldrich. The project team will scan the footers as they are removed to assure ^{14}C levels are below facility release limits.

The project team will use beta probes to detect levels of ^{14}C during the removal process. Any soils exhibiting contamination that is distinguishable from background will be packaged as LLRW/DAW.

Disposal costs for any additional soil wastes generated are not included in this proposal.

We request Sigma Aldrich make arrangements with the removal/hauling contractor(s) to use dedicated equipment for the project to facilitate release surveys at the conclusion of work. Contractor vehicles hauling materials from the site to the landfill will be monitored prior to leaving the site. Such monitoring will consist of, at a minimum, spot scanning and large area wipes of accessible exterior vehicle surfaces.

At the conclusion of removal activities, Philotechnics will perform equipment release surveys on all vehicles and equipment used by the contractor at the site and made available to us for survey by Sigma Aldrich.

2.3 Septic Tank Removal

Based on the samples collected on the contents of the discovered septic tank during Phase 3 activities, the water in the tank meets the sewer release disposal limits. However, below the water exists approximately three inches of sludge. This sludge does not meet the sewer release limits and will need to be collected and disposed of as radioactive waste.

Sigma Aldrich requested this proposal to include three options regarding the septic tank:

Option A: Contents are releasable to sewer and concrete septic tank is releasable.

Option B: Contents shipped as radioactive waste and concrete septic tank is releasable.

Option C: Contents and concrete septic tank shipped as LLRW.

Because the contents of the septic tank have already been sampled and analyzed and the NRC has indicated that the release criteria used for the building release can be used for the septic tank structure, only Option B will be discussed here. However, the cost estimate will include the three options.

The water above the sludge will be pumped to the sewer. Pumping will stop as the water level approaches the top of the sludge later so as to prevent sludge from entering the sanitary sewer system. Clear transparent hoses will be used during pumping to verify only water is being pumped.

As much sludge as is possible will be manually removed by shoveling, scraping, mopping, and similar means.

After the septic tank is empty, surveys will be performed to determine whether or not the tank may be released. Contamination limits are the same as those used previously for the building and concrete slab. Contaminated areas may be decontaminated as deemed practicable.

The septic tank will be removed from the ground and handled as either clean industrial waste or radioactive waste based on survey results. To minimize waste disposal costs, contaminated portions may be broken off and handled as radioactive waste while the rest of the tank is released. Based on the current activity in the sludge, it is anticipated that the tank will easily meet the building release criteria from the approved D&D Plan. For the purposes of this proposal, the cost estimate assumes that the tank will be free released and disposed of as sanitary waste.

2.4 Waste Management

The sludge/water mixture will be packaged in 55-gallon drums for processing and disposal by Toxco Inc. in Oak Ridge, TN. It is expected that no more than four (4) 55-gallon drums of the sludge/water mixture will be generated. It is anticipated that approximately one (1) 55-gallon drum of Dry Active Waste (DAW) will also be generated during the project activities. All radioactive wastes generated will be packaged, manifested and shipped by Philotechnics to Toxco Inc. in Oak Ridge, TN. In the event the septic tank or portions of it does not meet the release criterion, it will be loaded into an intermodal container and shipped to Toxco for processing and disposal as LLRW.

3. Conclusion

Philotechnics estimates the cost for the scope of work described in this proposal to be [REDACTED] on a time and materials contract basis.

As requested, pricing for the three options specified in the RFP are as follows:

Option	Septic Tank	Contents	Estimated Cost
A*	Released	Released	[REDACTED]
B	Released	RadWaste	[REDACTED]
C	RadWaste (LLRW)	RadWaste	[REDACTED]

*We believe Option A will not be feasible because the sludge is not releasable to the sanitary sewer.

These are "time-and-materials" estimates. Philotechnics will only use the resources necessary to complete the scope of work and will keep Sigma-Aldrich apprized of both progress and cost. Project

materials, reasonable expenses and labor not specifically listed in this proposal will be provided at cost plus [REDACTED]