

U. S. DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration

Great Lakes Environmental Research Laboratory 2205 Commonwealth Blvd.
Ann Arbor, Michigan 48105-2945

September 19, 2007

Material Licensing Branch U. S. Nuclear Regulatory Commission, Region III 2443 Warrenville Road, Suite 210 Lisle, IL 60532-4352

Re: Amendment of License No. 21-16544-01

To: Mr. Kevin G. Null

The Great Lakes Environmental Research Laboratory is requesting that our License No. 21-16544-01 be amended to remove the 2205 Commonwealth Blvd., Ann Arbor, MI 48105 location from the listing of restricted areas on our NRC license. All licensed radioactivity at that site has been disposed of or transferred and a final status survey documenting that the location may be released for unrestricted use has been performed. Two hard copies and an electronic version of the final status survey report, prepared for us by Integrated Environmental Management, Inc., are enclosed.

Thank you for your assistance in this matter. If you have any questions, please call me at (734) 741-2074.

Sincerely,

Kimberly A. Kulpanowski, MS Radiation Safety Officer

¹ IEM is licensed to perform decommissioning and related services by the Maryland Department of the Environment (License No. MD-31-281-01), although the work performed at the GLERL was pursuant to the conditions of License No. 21-16544-01 (i.e., reciprocity was not invoked).

316578

Final Status Survey Report for the Great Lakes Environmental Research Laboratory

Submitted to

US Department of Commerce/NOAA

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by:

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Report No. 2005006/G-3346 August 2, 2007

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1 INTRODUCTION

The Great Lakes Environmental Research Laboratory, located at 2205 Commonwealth Blvd, Ann Arbor, Michigan (hereinafter referred to as GLERL) is named as a radiologically restricted area on License No. 21-16544-01, issued to the U. S. Department of Commerce/NOAA by the U. S. Nuclear Regulatory Commission. At the GLERL, there are nineteen laboratories, two environmental chambers, one storage room and one waste storage building (hereinafter referred to as labs/laboratories) that were authorized to use the radioactive materials listed on License No. 21-16544-01, the selection of which was dictated by the type of study being performed. Radioactivity use was thus limited to selected laboratories.¹

In order to remove the GLERL from the listing of restricted areas on License No. 21-16544.01, the Department of Commerce/NOAA radiation safety staff must demonstrate that there are no radiological issues of concern therein. To that end, BMT Entech, Inc. (Entech) was contracted to perform/document a final status survey demonstrating that the labs may be released for unrestricted use (i.e., without regard for their radiological constituents). Entech subcontracted Integrated Environmental Management, Inc. (IEM) to assist in this task.²

The on-site portion of the project was completed between June 18 and June 28, 2007, followed by the preparation of this report. Included herein is a description of the site, a review of the history of radiological operations in the laboratories and recent radiological conditions, an overview of the project and its objectives, a description of the procedures followed, a listing of all data acquired from the site, and a statement in regard to the release status of the GLERL. Representatives of the GLERL were given an opportunity to review and comment on a draft before the publication of this Final Status Survey Report.

² IEM is licensed by the Maryland Department of the Environment (MDE License No. MD-31-281-01), a USNRC Agreement State, to perform the types of radiation-related services required for this project. However, the final status survey was performed under the applicable terms/conditions of the GLERL license.





¹ For example, radioactive polonium 209 and radium 226 were only used in Laboratories 305 and 406 and stored in Room 400 and the Waste Storage Building.

2 HISTORICAL ASSESSMENT

2.1 Facility History

The GLERL, located at 2205 Commonwealth Boulevard in Ann Arbor, Michigan, has been operating in that location since 1987. The laboratory provides environmental and ecosystem research in support of the Great Lakes and coastal marine environments. It is currently licensed to use radioactive materials by the USNRC for the performance of a variety of fate and transport studies.³ The work with radioactive materials at the site has ceased and the GLERL wishes to release the building from the listing of restricted areas on License No. 21-16544-01.

2.2 Facility Description

The GLERL consists of offices and laboratories in a single-floor, brick building with a total area of approximately 29,000 square feet. Nineteen laboratories and the storage room have been designated as restricted areas where licensed radioactive materials were used (approximately 4,600 square feet) and are thus subject to the final status survey. They are located in the center of the building, separated by six hallways. In addition, there are two walk in environmental chambers, rooms 801A and 801B, and the waste storage building outside the main building. A list of specific rooms is provided in Table 6.1 and Figure 7.1 is a floor plan of the building.

Each of the laboratories is equipped with benches and cabinets for storage. The floors are covered with floor tiles. Most of the laboratories have at least one sink, with connections to a sanitary sewer that discharges to the public-owned treatment works (POTW). Nine of the laboratories have bench hoods, each of which is equipped with a ventilation fan with airborne discharge to the roof of the building.

2.3 Source Term

The GLERL was licensed to use a variety of radioactive materials in an unsealed form. However, not all of those listed on the license were ever present at the site, and many exhibited radiological half lives of less than 120 days, meaning they have long-since decayed. As such, they were not considered in the performance of the final status survey.⁴ Table 6.2 contains the source term applicable to the survey effort.

Over the years, each laboratory was authorized to use any of the isotopes listed on the applicable amendment of the license, the selection of which was dictated by the type of study being performed. Therefore, the radioactivity usage in each laboratory is known. For example, Polonium-209 and Radium-226 were only used in Laboratories 305 and 406, and stored in Room 400 and the Waste

⁴ U.S. Nuclear Regulatory Commission, Consolidated Decommissioning Guidance Characterization, Survey, and Determination of Radiological Criteria, Appendix B, NUREG 1757, Volume 2, Rev 1, September, 2006.





³ US Nuclear Regulatory Commission, *Radioactive Materials License 21-16544-01*, Docket 030-11209, expires on August 31, 2014.

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Storage Building. The GLERL was licensed to use Polonium-210 but did not receive the isotope as a unique stock.⁵ Carbon-14 and Hydrogen-3 (tritium) had the most common use in the laboratories.

During the development of the survey plan, the manifest for the most recent waste shipment on May 9, 2007 was reviewed. According to the RSO, radioactive waste generated during licensed operations was collected within the respective laboratories, packaged into approved shipping containers and transferred to a waste storage building pending disposal.⁶

2.4 Results of Previous Surveys

Routine wipe tests and direct radiation surveys were performed by GLERL on selected surfaces in each laboratory as required by their license. The frequency of surveys varied according to the type of experiment in process, but were generally performed under the direction of the authorized user on a weekly or monthly basis. The laboratories listed in Table 6.1 were surveyed by the RSO or Assistant RSO on a monthly, quarterly, or biannual basis.⁷

The action levels for the historical surveys were essentially "3 times background". If any survey results exceeded this level, the residual radioactivity was removed and the area re-surveyed before the routine surveillance in that area was deemed complete. The Radiation Safety Officer's records, maintained over the history of the license, do not contain evidence of significant spills or otherwise large release of radioactive material on the floor of any laboratory or into the sewer.

A radiation survey of each laboratory and adjacent hallway, performed by GLERL staff on December 16, 2006, shows there was no removable gross beta activity on any surfaces above a detection limit of less than 10 dpm/100cm². Direct scans for alpha and beta radiation, performed by GLERL using a calibrated, gas flow proportional counter with a sensitive area of approximately 100 cm², again reveals the presence of no detectable fixed activity above a detection level of about 33 disintegrations per minute per 100 square centimeter (dpm/100cm²) for beta radiation or 98 dpm/100cm² for alpha radiation for a scan rate of approximately two inches per second.⁸

⁸ The RSO maintains similar survey records collected previously with similar results.





⁵ Conversation between Kim Kulpanowski (GLERL RSO) and Bill Thomas (IEM), June 4, 2007.

⁶ No evidence of packaged waste staged for disposal was noted during the on-site portion of this effort other than that previously identified by the RSO prior to the field team mobilizing to the site. The waste consisted of a container of laboratory grade uranyl acetate, a container of Po-209 labeled filter paper, and some Cesium-137-bearing paper contained within lead pigs. The paper was removed from the pigs-which were subsequently resurveyed and released by the HP Technician-and packaged along with the Po-209 filter paper and uranyl acetate for disposal. The package was picked up for disposal on July 16, 2007.

⁷ Conversation between Kim Kulpanowski (GLERL RSO) and Bill Thomas (IEM), June 4, 2007.

3 APPROACH

3.1 Project Organization

For this work, Mr. R. Alan Duff, RRPT, of IEM's Tennessee office, served as the Project Manager and coordinated the field and final status survey efforts. Mr. Jeffrey W. Sumlin, RRPT, also of IEM's Tennessee office, was the on-site Heath Physics (HP) Technician and was responsible for data acquisition and the preparation of this report. Mr. Bill R. Thomas, CHP, CIH of IEM's Ohio office served as the Project CHP and was responsible for the technical requirements associated with the project. Two GLERL survey technicians assisted with the on-site survey effort under the direction of Mr. Sumlin. Appendix 8.1 contains the qualifications of Mr. Thomas, Mr. Duff and Mr. Sumlin.

3.2 Survey Planning

In advance of mobilizing to the site, a survey plan was prepared and submitted to the Department of Commerce/NOAA RSO for review/approval. Included in the plan were data quality objectives, instrumentation requirements, survey unit classification, data acquisition procedures and quality control and reporting requirements. Additional detail on the remaining subsections of this Chapter can be found in the survey plan.

3.3 Release Criteria

The USNRC has established criteria for ensuring that facilities and property that were used for licensed operations present negligible radiological risk to people and the environment once licensed operations cease. The radiation dose limit that the USNRC believes presents negligible risk is published in Title 10, Code of Federal Regulations, Part 20.1402:

"Decommissioning with license termination shall be limited to sites considered acceptable for unrestricted release where the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent to an average member of the critical group that does not exceed twenty-five millirem per year (25 mrem/yr), including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA)..."

The level of residual radioactivity permissible on a building surface at the GLERL that would ensure compliance with USNRC's radiation dose objective is designated as the derived concentration guideline level (DCGL) as defined in MARSSIM.¹⁰

¹⁰ U.S. Nuclear Regulatory Commission, *Multi-agency Radiation Survey and Site Investigation Manual*, NUREG-1575, Revision 1, August, 2000.





⁹ Integrated Environmental Management, Inc., Report No. 2005006/G-3344 (Rev. 0), "Final Status Survey and Sampling Plan for the Great Lakes Environmental Research Laboratory", June 13, 2007.

For the purpose of this survey effort, the DCGLs were conservatively set to the screening values presented in Table H.1 of NUREG-1757, Volume 2 and Table 5.19 of NUREG-5512, Volume 3.11,12 These screening values were established by the USNRC based on an exposure assessment of less than 25 millirem per year to the critical population for the 1,000-year period after release for unrestricted use. Assumptions designed to maximize the resulting dose were used as input to the assessment.

Table 6.2 contains the DCGLs applicable to the GLERL. For the on-site effort, the data acquired were compared to the lowest applicable DCGL shown in the table. As such, the following are the gross activity release criteria applicable to this survey effort:

- Gross beta 7,100 dpm/100 cm² (DCGL for Cobalt-60); and
- Gross alpha 1,120 dpm/100 cm² (DCGL for Radium-226).¹³

3.4 Data Quality Objectives

The objective of the final status survey was to release the laboratories at the GLERL in accordance with guidance established by the USNRC and MARSSIM. This objective was accomplished in general by:

- Selecting the appropriate instrumentation to adequately detect the radionuclides of concern;
- Establishing proper count times and measurement methods to verify that the release criteria are met;
- Performing surveys to verify the radiological status of the facility;
- Verifying that personnel exposure from residual contamination will not exceed 25 mrem/year based on the future use of the facility; and
- Evaluating the data to ensure that sufficient information is collected to release the rooms for unrestricted use.

¹³ Naturally-occurring radioactive materials, specifically Polonium-209 and Radium-226 were used at the GLERL. Radium-226 was selected as the limiting DCGL for gross alpha radiation measurements.





¹¹ U.S. Nuclear Regulatory Commission, Consolidated Decommissioning Guidance Characterization, Survey, and Determination of Radiological Criteria, Table H.1, NUREG 1757, Volume 2, Rev 1, September, 2006.

¹² U.S. Nuclear Regulatory Commission, *Residual Radioactive Contamination From Decommissioning - Parameter Analysis*, Table 5.19, NUREG 5512, Volume 3, Draft, October, 1999.

In order to ensure the laboratory surfaces meet the applicable release criteria to a reasonable degree of scientific certainty, the following statistical procedures were implemented, with details on each provided in Chapter 5 of the survey plan:

- Impacted areas were classified by contamination potential as Class 2 or Class 3 areas based on use history and contamination probability. Survey unit boundaries were specified based on common history.
- Statistical testing was based on the null hypothesis, which states that the residual radioactivity in the survey unit exceeds the site dose criterion.
- The upper bound of the gray region (UBGR) was defined as the DCGL, and the lower bound of the gray region (LBGR) was set at 0.4 x DCGL.¹⁴
- The Type I decision error was defined as the probability of passing a survey unit that should fail. The Type II decision error was defined as the probability of failing a survey that should pass. Probability limits of 0.05 were assigned for both decision errors.
- The standard deviation was estimated as 0.2 x DCGL.
- The relative shift was set at greater than 1.5.
- The detection sensitivity for all measurement techniques (scan, direct measurements and sample analysis) was normally less than or equal to 75 percent of the DCGL.

3.5 Instrumentation

The radiation detection instrumentation used for this effort was selected and operated according to the type of analysis being performed, and to ensure sensitivities sufficient to detect the identified radionuclides at the minimum detection requirements. Table 6.3 is a list of the instrument types that were used for the GLERL final status survey, along with the types of radiations they detect, and the necessary calibration sources.

The instrument detection limits are dependent upon count times, geometry, sample size, detector efficiency, background, scanning rate and the efficiency of the surveyor.¹⁵ Nominal detection sensitivities were calculated using the guidance in NUREG 1507 and shown in the following

¹⁵ U.S. Nuclear Regulatory Commission, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, NUREG/CR-1507, December, 1997.





¹⁴ The gray region of a population distribution is the range of possible values for which the consequences of decision errors are relatively minor.

subsections, and are summarized in Table 6.4. The following subsections give the calculation methodologies.

3.5.1 Alpha/Beta Direct Measurements

The equation used to calculate the minimum detectable activity for direct measurements of alpha and beta radiation is:

$$MDA = \frac{\frac{2.71}{t_{s}} + 3.29 \sqrt{\frac{R_{b}}{t_{s}} + \frac{R_{b}}{t_{b}}}}{E \times \frac{A}{100}}$$

where MDA = Minimum detectable activity (dpm/100cm²), $R_b = Background$ count rate (cpm), $t_b = Background$ count time (minutes), $t_s = Sample$ count time (minutes), A = Detector area (cm²), and E = Detector efficiency (counts/disintegration).

3.5.2 Alpha/Beta Scans

The equation used for calculating the MDA for alpha and beta scans (MDA_{SCAN}) is:

$$MDA_{SCAN} = \frac{d' \times \sqrt{b_i} \times \frac{60}{i}}{E_i \times E_S \times \sqrt{p} \times \frac{A}{100}}$$

where MDA = Minimum detectable activity (dpm/100cm²), d' = Decision error taken from Attachment 2. (Assumed to be 3.28 for α =0.05 and β =0.95), I = Observation counting interval (detector width divided by the scan speed), b_i = Background count per observation interval, E_i = Detector efficiency, E_s = Surface efficiency (assumed to be 25% for alpha and beta contamination on concrete), p = Surveyor efficiency (Assumed to be 50%), and A = Detector area (cm²). ^{16,17}

3.6 Survey Unit Classification

The GLERL was divided into discrete survey units with a specific size and shape for which separate decisions relative to the DCGL could be made. Impacted areas were those with a potential of being contaminated (i.e., the designated laboratories). Non-impacted areas were those that did not have a potential for being contaminated and were not addressed further in the survey effort.

¹⁷ International Organization for Standardization (ISO), Evaluation of Surface Contamination, ISO 7503, 1988.





¹⁶ ISO-7503 recommends using a surface efficiency based on the type of radiation and radiation energy in the absence of experimentally derived values. A surface efficiency of 0.25 is recommended for alpha radiation and beta radiation with a maximum beta energy between 150 keV and 400 keV.

Survey units were classified as Class 1, 2, or 3. In general, a Class 1 survey unit is an impacted area where there are expected to be locations with concentrations of residual radioactivity that exceed the DCGL. A Class 2 survey unit is an impacted area, less than 1,000 square meters, where there are expected to be locations with concentrations of residual radioactivity detectable above background levels, but that do not exceed the DCGL. A Class 3 survey unit is an impacted areas where there are no expected locations with concentrations of residual radioactivity detectable above background.

3.6.1 Class 1 Survey Unit

No laboratories or rooms at the GLERL were classified as a Class 1 survey unit for the purposes of this survey effort. There are no recorded incidents of significant spills or releases of radioactive materials over the history of the license, and routine surveillance indicated no building surfaces that exceeded the DCGLs specified in Table 6.2. The radiation surveys previously performed by the RSO indicated that the surfaces are not likely to exceed the DCGLs.

3.6.2 Class 2 Survey Unit

Three laboratories and the waste storage building were classified as a Class 2 survey unit. Rooms 305 and 406 are known to have been used for experiments using Polonium-209 and Radium-226, both decaying by alpha emission. The previous surveys performed by the RSO and the authorized users focused on the presence of beta/gamma isotopes and consequently the detection limit for the alpha surveys was not established. While no area is known to be impacted in excess of the DCGLs, these rooms and the waste storage building were surveyed pursuant to the requirements for a Class 2 survey unit. The walls in these rooms to a height of two (2) meters from the floor, and all overhead areas, were classified as a Class 3 survey unit.

3.6.3 Class 3 Survey Unit

All other laboratories listed in Table 6.1 were classified as Class 3. The hallways adjacent to each of these rooms were also surveyed as required for a Class 3 survey unit, as was the walkway in Room 801 that leads from the building to the outside door of the building. This walkway was used to move drums of radioactive waste to the waste storage building, located outside of the facility.

3.7 Survey Procedures

The final status survey of the rooms consisted of beta scans, fixed beta measurements (and alpha measurements where applicable), smears for liquid scintillation analysis, and smears for gross alpha/beta counting. They were performed as described in the following subsections.

3.7.1 Surface Scans

For Class 2 survey units, beta scans were performed over approximately 50% of the accessible building surfaces using proportional counters, equivalent to a Ludlum Model 43-68, while listening to the audible output of the instrument. The detector was maintained at a distance of one (1) centimeter from the surface or less, depending on surface conditions. Scan speeds were established such that contamination at levels of approximately 50% of the applicable release criterion were detectable.





For Class 3 survey units, beta scans were performed for more than 10 percent of the surface area. Those areas with the highest potential for elevated residual radioactivity, based on professional judgement, were selected for scanning. The results for the surface scans are provided in Table 6.8 and Table 6.10.

3.7.2 Direct Alpha/Beta Measurements

Direct alpha/beta measurements were made on the structural surfaces of each survey unit. Direct measurements were also performed on the bench tops and cabinets in the rooms. Measurements were conducted by integrating the total counts over a count time of two minutes, necessary to attain appropriate detection levels. The instrument-specific background was subtracted and the activity in units of dpm/100cm² was calculated. Measurements were made at the nodes of the grids, using a square grid pattern. The number of measurements and spacing were as outlined in the survey plan, with results shown in Tables 6.5 of this report.

3.7.3 Removable Activity Measurements

Smears for removable radioactivity were collected at each direct measurement location and analyzed for beta radiation by liquid scintillation counting. The results, reported in units of dpm/100cm², are shown in Tables 6.6, 6.7 and 6.9.

3.7.4 Measurement Grid Spacing

Grids were established for the purpose of referencing locations of measurements and sampling, relative to structural and/or site features. The grid spacing for the measurement and samples was determined assuming a square grid pattern as follows:

$$L = \sqrt{\frac{A}{N}}$$

where L = grid spacing, A = Survey unit area (square meters), and N = the number of measurements.

The starting point for the survey was established for each survey unit by selecting a reference point for the survey unit such as the corner of the room. A random number generator was used to provide a random number between 0 and 1 for an initial offset from the reference point in both the x and y coordinates. The random number pair was multiplied by the calculated grid spacing providing the offset from the reference point for the first grid location. The one-meter square grid dimensions (one meter by one meter) were described in the survey plan.

3.8 On-site Activities

The field team mobilized to the site on June 18, 2007. Appendix 8.2 contains a copy of the Field Activity Daily Log maintained by the HP Technician. After the necessary training and health safety provisions required in the survey plan were completed, the surveys commenced. Appendix 8.3 contains the instrument records (i.e., calibration certificates and daily checks).





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Each room was cleared of all loose equipment and materials to the maximum extent possible prior to the start of the surveys. The background and detector response to a known quantity of radiation was documented each day before the instrument was used. For each laboratory, the HP Technician developed a data package of results for both direct measurements and removable radioactivity. Completion and review signature blocks in the data packages were used to track the progress of the radiation survey.

Once all of the data were acquired, they were compared to the release criteria shown in Section 3.3, above. The field team demobilized on June 28, 2007.





4 RESULTS

Once the surveys were complete, data were reviewed to ensure they were acquired pursuant to the provisions of the survey plan. The following requirements were confirmed:

- The instruments used to collect the data were capable of detecting the radiation of interest at or below the DCGL;
- The calibration status of the instruments used to collect the data was less than twelve months old;
- Instrument response was checked with satisfactory results before the instrument was used;
- The MDAs and assumptions to develop them are appropriate for the instruments and the survey methods used to collect the data;
- The final survey data set consisted of qualified measurement results that were representative of the current facility status and collected as prescribed in the survey plan; and
- The data were properly recorded.

No discrepancies were identified during data review, thus the data set was deemed valid by both the Project Manager and the Project CHP.

Appendix 8.4 contains the Radiation Survey Forms for each of the rooms identified in Table 6.1. The data points are summarized in Tables 6.5 through 6.10. These show that the residual radioactivity in all of the rooms/areas is not distinguishable from background and, in all cases, below the applicable release criteria.





5 SUMMARY AND CONCLUSIONS

All survey data collected during the on-site portion of this effort were validated and compared to the following release criteria:

- Gross beta 7,100 dpm/100 cm² (based on the limiting DCGL for Cobalt-60); and
- Gross alpha 1,120 dpm/100 cm² (based on the limiting DCGL for Radium-226).

It is appropriate to assume that a given survey unit or room met the requirements for release for unrestricted use provided (1) an adequate number of measurements were made; and (2) no measurements exceeded these criteria.

The data shown on the Radiation Survey Forms (Appendix 8.4) and measurement records (Tables 6.5 through 6.10) generated during the performance of the final status surveys demonstrate that residual radioactivity within the GLERL is not only below the release criteria, it is not distinguishable from that in the natural background. To a reasonable degree of scientific certainty, the GLERL may thus be released for unrestricted use (i.e., for any purpose without regard for radiological concerns).





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6 TABLES





Table 6.1 - Listing of Rooms Subject to Survey

Laboratory Room Number	Area (square feet)
305	316
307	400
309	391
311	212
400	85
406	296
408	207
410	202
501	246
505	215
505A	71
507	318
509	105
511	211
511A	91
600	227
602	122
604	122
606	227
608	198
801A	128
801B	104
Waste Storage Building	102





Table 6.2 - Source Term and Derived Concentration Guideline Levels

Radionuclide ^{Notal}	Principal Radiation	Radiation Energy, E _{max} (keV)	Derived Concentration Guideline Levels (dpm/100 cm²) ^{Notad}
Antimony-125	beta	303	4.4x10 ⁴
Cadmium-109	beta	126	1.1x10 ⁵
Calcium-45	beta	257	2.8x10 ⁶
Carbon-14	beta	156	3.7x10 ⁶
Cerium-144	beta	319	4.3x10 ⁴
Cesium-134	beta	658	1.3x10 ⁴
Cesium-137	beta	514	2.8x10 ⁴
Chlorine-36	beta	710	5.0x10 ⁵
Cobalt-60	beta	318	7.1x10 ³
Hydrogen-3	beta	18	1.2X10 ⁸
Iodine-129	beta	154	3.5x10 ⁴
Iron-55	beta	231	4.5x10 ⁶
Manganese-54	beta	542	3.2x10 ⁴
Polonium-209	alpha	4,883	2.5x10 ³
Polonium-210	alpha	5,304	2.5x10 ³
Radium-226	alpha	4,784	1.1x10 ³
Silver-100m	beta	531	1.0x10 ⁴
Sodium-22	positron	545	9.5x10 ³
Zinc-65	beta	1,352	4.8x10 ⁴

Note 1: Isotopes with a radioactive half-life shorter than 120 days were omitted from this list. Phosphorus-32 (P-32) and P-33 each have a half-life of less than 30 days.

Note 2: The screening values for unrestricted use of building surfaces are provided in NUREG 1757 and NUREG 5512 such that the potential radiation dose to the critical population is less than 25 millirem per year. 18,19

¹⁹ U.S. Nuclear Regulatory Commission, Residual Radioactive Contamination From Decommissioning - Parameter Analysis, Table 5.19, NUREG 5512, Volume 3, Draft, October, 1999.





¹⁸ U.S. Nuclear Regulatory Commission, Consolidated Decommissioning Guidance Characterization, Survey, and Determination of Radiological Criteria, Table H.1, NUREG 1757, Volume 2, Rev 1, September, 2006.

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Table 6.3 - Survey Instrument Descriptions

Make	Rate Meter Model	Detector Model	Detector Type	Radiation Detected ²⁰	Calibration Source	Une
Ludlum	2224	43-68	Gas flow Proportional	Alpha, 1-5 Mev Beta, 65-1,450 Kev	²³⁰ Th, ⁹⁹ Tc	Direct beta surveys; Beta scan on solid surfaces
Ludlum	2224	239-1F	Gas flow proportional	Alpha, 1-6 Mev Beta, 65-1,450 Kev	²³⁰ Th, ⁹⁹ Tc	Beta scan on solid surfaces
Packard	NA	NA	Liquid scintillation	Beta, 5-1,500 Kev	¹⁴ C and ³ H	Wipe test analysis

²⁰ U.S. Nuclear Regulatory Commission, Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions, NUREG/CR-1507, December, 1997.





Table 6.4 - Survey Instrument Detection Limits

	Background ⁽¹⁾	Detector	Sensitivity (dpm/100cm²)	
Detector Model		Efficiency (c/dis) ⁽³⁾	Scanning	Static Count (1 minute)
43-68	Floor Tile 2.2±0.6 cpm α 175.5±9.8 cpm βγ Concrete 2.8±1.2 cpm α 220±8.2 cpm βγ	0.16 α 0.23 βγ	1,200	900
239-1F	Floor Tile 3.4±1.8 cpm α 516.2±28.4 cpm βγ Concrete 3.0±0.5 cpm α 596.3±6 cpm βγ	0.10 α 0.26 βγ	1,100	400
Liquid Scintillation	8 cpm	0.70 ¹⁴ C 0.55 ³ H	n.a.	12 dpm ¹⁴ C 18 dpm ³ H

⁽¹⁾ Average of the beginning of shift and end of shift values over the course of the survey effort.



⁽²⁾ Average of the daily efficiencies over the course of the survey effort.

Table 6.5 - Stationary (Static) Count Results

Room Number ¹	Number Static Counts Floor	Number Static Counts Wall	MDA dpm/100 cm² (π/β-γ)	Highest Static Readings Floor dpm/100 cm ² (a/β-γ)	Highest Static Readings Wall dpm/100 cm² (α/β-γ)
305	9	6	29/139.2	4.3/-17	4.3/-38
307	5	4	40.1/196	-0.9/2.2	-0.9/2.2
309	6	4	40.1/196	-0.9/-11	-0.9/0.0
311	4	4	34.3/140	-6.4/76	-3.2/74
400	15	4	59.2/220 floor 34.7/142 walls	0.0/97	0.0/42
406	12	9	34.7/142	0.0/-70	0.0/-79
408	5	4	34.3/140	-3.2/157	-6.4/83
410	5	4	34.3/140	-6.4/67	-3.2/65
501	5	4	40.1/196	-0.9/86	-4.1/86
505	6	4	38.3/199	-3.2/57	-3.2/55
505A	5	4	38.3/199	-3.2/62	-3.2/64
507	3	4	40.1/196	-0.9/-31	-0.9/-35
509	3	4	40.1/196	-4.1/-57	-0.9/-68
511	8	4	38.3/199	-3.2/62	-3.2/59
511A	6	4	39.9/204	-4.1/40	-0.9/37
600	6	4	38.3/199	-3.2/70	0.0/68
602	5	4	38.3/199	0.0/158	-2.2/62
604	6	4	38.3/199	0.0/75	-2.2/68
606	6	6	38.3/199	0.0/79	0.0/73
608	4	4	40.1/196	-0.9/75	-4.1/79
801	5	N/A	57.8/221	2.2/42	N/A
801A	5	4	39.9/204	-0.9/-17.6	-0.9/-8.8
801B	5	4	39.9/204	-0.9/55	-4.1/20





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Room Number ¹	Number Static Counts Floor	Number Static Counts Wall	MDA dpm/100 cm² (α/β-γ)	Highest Static Readings Floor dpm/100 cm² (α/β-γ)	Highest Static Readings Wall dpm/100 cm² (α/β-γ)
Waste Building	15	8	58.5/218	0.0/41	0.0/56

1 - Survey results for the counter tops in the rooms were all below the applicable DCGL. See Appendix 8.4 for results.





Table 6.6 - Removable (Gross Alpha/Beta) Contamination Results

Room Number ¹	Number Smears Floor	Number Smears Wall	Flighest Smear Result Floor dpm/100 cm² (α/β-γ)	Highest Smear Result Wall dpm/100 cm² (α/β-γ)
305	9	6	0.7/11.8	2.1/9.9
400	5	4	1.2/14.3	2.6/2.8
406	6	4	1.2/20.1	1.2/18.2
Waste Building	4	4	2.5/18.6	1.1/18.6

^{1 -} Survey results for the counter tops in the rooms were all below the applicable DCGL. See Appendix 8.4 for results.





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Table 6.7 - Removable Contamination Results for Sinks and Fume Hoods

Room Number	Location	Smear Result dpm/100 cm² (α/β-γ)	LSC Smear Result dpm/100 cm ² (H-3/C-14)
305	sink trap	-1.8/-1.5	2.49/0.0
305	hood drain	-1.8/-7.2	0.0/1.37
305	hood exhaust	-0.8/-15.1	0.1/0.0
307	sink trap	N/A	1.46/2.95
307	north hood drain	N/A	0.0/1.38
307	north hood exhaust	N/A	0.0/0.0
307	west hood drain	N/A	0.0/0.0
307	west hood exhaust	N/A	0.0/1.13
309	left sink trap	N/A	0.88/0.49
309	right sink trap	N/A	3.69/0.0
309	hood drain	N/A	5.19/2.67
309	hood exhaust	N/A	0.0/0.0
311	sink trap	N/A	0.13/0.0
408	sink trap	N/A	4.45/1.56
408	hood drain	N/A	5.05/1.72
408	hood exhaust	N/A	1.02/3.22
505	left sink trap	N/A	1.78/2.0
505	right sink trap	N/A	1.46/4.19
505	hood drain	N/A	0.0/0.67
505	hood exhaust	N/A	3.32/0.27
505A	sink trap	N/A	0.0/0.45
507	left sink trap	N/A	1.58/2.97
507	right sink trap	N/A	0.46/0.0
507	hood drain	N/A	0.0/0.11





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Room Number	Location	Smear Result dpm/100 cm² (α/β-γ)	LSC Smear Result dpm/100 cm ² (H-3/C-14)
507	hood exhaust	N/A	1.16/1.98
509	sink trap	N/A	0.0/0.0
511	left sink trap	N/A	1.5/0.0
511	right sink trap	N/A	2.22/0.34
511	hood drain	N/A	0.07/0.9
511	hood exhaust	N/A	1.56/0.0
511A	left sink trap	N/A	3.18/0.0
511A	right sink trap	N/A	3.54/0.0
600	left sink trap	N/A	0.0/0.0
600	right sink trap	N/A	3.31/1.68
600	hood drain	N/A	0.0/0.0
600	hood exhaust	N/A	0.0/1.12
604	sink trap	N/A	0.79/0.0
606	sink trap	N/A	0.0/2.23
606	hood drain	N/A	0.0/0.0
606	hood exhaust	N/A	2.17/0.0
608	left sink trap	N/A	4.19/0.0
608	right sink trap	N/A	0.0/3.13





Table 6.8 - Scan Results (Hand-held Instruments)

Room Number ¹	Number Floor Scans	Number Wali Scans	Scanning MDA dpm/100 cm² α/βγ	Highest Scan Readings Floor dpm/100 cm² (α/β-γ)	Highest Scan Readings Wall dpm/100 cm² (α/β-γ)
305	4	8	674/4403	4/-211	4/-211
307	2	2	725/4437	-29/-114	-29/-465
309	2	2	725/4437	-29/-114	-29/-465
311	1	2	847/4426	-38/-130	-38/217
400	2	4	1178/5017 floor 858/4512 wall	-73/1585	-39/220
406	5	10	858/4512	-39/-150	-39/-150
408	1	2	847/4426	-38/-478	-38/-478
410	1	2	847/4426	-38/-130	-38/-130
501	2 ·	2	725/4437	-29/-114	-29/-465
505	1	2	689/4512	-25/-159	-25/-159
505A	1	1	689/4512	-25/-159	-25/-159
507	1	2	725/4437	-29/-114	-29/-114
509	1	1	725/4437	-29/-114	-29/-465
511	1	2	689/4512	-25/194	-25/-159
511A	1	1	732/4625	-29/-238	-29/-238
600	1	2	689/4512	-25/-511	-25/-159
602	1	2	689/4512	-25/-159	-25/-159
604	1	2	689/4512	-25/-159	-25/-159
606	2	2	689/4512	-25/-159	-25/-159
608	2	2	725/4437	-29/-114	-29/-114
801	N/A	N/A	N/A	N/A	N/A
801A	l	1	732/4625	-29/-590	-29/-590
801B	3	1	732/4625	-29/-238	-29/-238





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Room Number ¹	Number Floor Scans	Number Wall Scans	Scanning MDA dpm/100 cm² α/βγ	Highest Scan Readings Floor dpm/100 cm ² (α/β-γ)	Highest Scan Readings Wall dpm/100 cm² (α/β-γ)
Waste Building	2	2	1175/4979	-72/1565	-72/1913

1 - Survey results for the counter tops in the rooms were all below the applicable DCGL. See Appendix 8.4 for results.





Table 6.9 - Removable (Liquid Scintillation) Contamination Results

Room Number ¹	Number Smears Floor	Number Smears Wall	Highest Smear Result Floor dpm/100 cm ² (H-3/C-14_	Highest Smear Result Wall dpm/100 cm ² (H-3/C-14)
305	9	6	5/1.9	3.9/1.27
307	5	4	0.62/0.0	0.24/0.75
309	6	4	2.24/0.0	2.03/0.0
311	4	4	2.51/2.68	3.79/3.83
400	15	4	3.73/2.87	1.85/0.99
406	12	9	9.46/1.39	2.52/0.0
408	5	4	4.83/0.0	5.23/1.21
410	5	4	1.29/2.04	1.45/0.85
501	5	4	3.89/0.77	4.05/.047
505	6	4	3.33/0.0	5.57/0.0
505A	5	4	3.02/0.0	4.63/1.25
507	3	4	0.0/3.0	0.33/3.7
509	3	4	0.0/0.0	1.53/0.38
511	8	4	5.59/1.45	2.07/4.2
511A	6	4	5.83/0.0	1.55/0.0
600	6	4	0.62/0.0	2.52/0.0
602	5	4	6.95/0.0	4.97/0.0
604	6	4	2.64/1.17	9.08/1.0
606	6	6	0.0/1.38	2.88/3.54
608	4	4	3.63/0.0	3.59/1.17
801	5	N/A	1.4/2.44	
801A	5	4	0.0/3.55	1.88/3.19
801B	5	4	0.71/0.37	2.59/0.0
Waste Building	15	8	0.0/1.85	0.0/0.64





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Room Number ¹	Number Smears Floor	Number Smears Wall	Highest Smear Result Floor dpm/100 cm ² (H-3/C-14_	Highest Smear Result Wall dpm/100 cm ² (H-3/C-14)
Corridors	23	N/A	2.79/2.80	N/A

1 - Survey results for the counter tops in the rooms were all below the applicable DCGL. See Appendix 8.4 for results.





Table 6.10 - Scan Results (Floor Monitor)

Room Number	Number Observed Readings	Scanning MDA dpm/100 cm² (æ/β-γ)	Highest Scan Readings dpm/100 cm² (α/β-γ)
305	11	253/1369	-27/-416
307	11	224/1223	-24/-344
309	14	224/1223	-24/-244
311	7	206/1203	-20/-459
400	11	233/1413	-27/15
406	11	358/1281	-62/-208
408	6	206/1203	-20/-450
410	6	206/1203	-20/-245
501	6	224/1223	-24/-414
505	6	210/1210	-22/-385
505A	2	210/1210	-22/-385
507	8	224/1223	-24/-414
509	3	224/1223	-24/-555
511	6	210/1210	-22/-385
511A	3	216/1221	-23/-481
600	7	210/1210	-22/-455
602	4	210/1210	-22/-525
604	4	210/1210	-22/-525
606	6	210/1210	-22/-455
608	6	224/1223	-24/-414
801	9	224/1307	-26/-200
801A	4	216/1221	-23/-692
801B	N/A	N/A	N/A
Waste Building	10	233/1268	-27/-331
Corridors	121	216/1221	-23/-481





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7 FIGURES





- Building Floor Plan

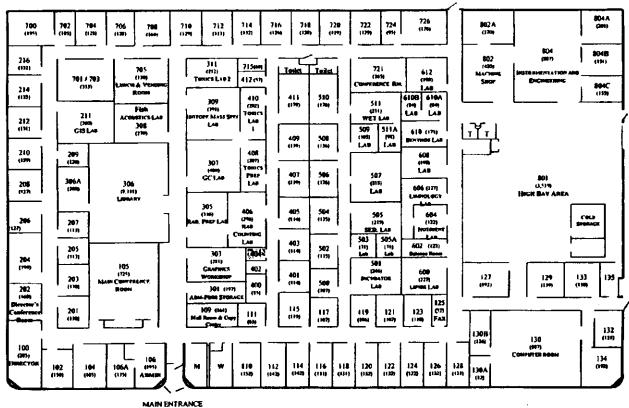
Figure 7.1

Rev 6/99

NORTH →

Great Lakes Environmental Research Laboratory

2205 Commonwealth Boulevard, Ann Arbor, MI 48105



(NUMBERS IN PARENTHESES SHOW APPROXIMATE AREA IN SQUARE FEET)

BMT Entech

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8 APPENDICES





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Appendix 8.1 - Qualifications of Project Personnel





R. Alan Duff - Project Manager

Professional Qualifications

Mr. Duff has over 27 years of experience in nuclear and hazardous materials project management, design support, surveillance, operational health physics, training, and decommissioning activities. He has prepared numerous plans, procedures, and license documents for U. S. Department of Energy facilities, U. S. Department of Defense facilities, U. S. Nuclear Regulatory Commission licensees, and commercial client facilities that are regulated by agreement states. Mr. Duff is well versed in the area of civilian and government radioactive and mixed waste transport and disposal requirements. He is registered by the National Registry of Radiation Protection Technologists (NRRPT).

Education

Advanced Mixed Waste Shipper Certification Training, 2003.

Confined Space Entry Training, 1998

CNSI Advanced Radioactive Material Transportation and Disposal Class, 1989 and 1993

IT Corporation Project Management Course (40 hours), 1992.

40-Hour OSHA HAZWOPER (29 CFR 1910.120) Training, 1987.

Eight-hour Supervisor Training, 1990

Eight-hour OSHA Annual Refresher (29 CFR 1910.120), 2005.

Canberra Multichannel Analyzer Operations Class, 1988.

Operational Water Chemistry and Radiological Controls, U.S. Navy, 1982

Engineering Laboratory Technician School, U.S. Navy, 1980.

Nuclear Power Training Unit (prototype), U.S. Navy, 1980.

Naval Nuclear Power School, U.S. Navy, 1978.

Registrations/Certifications

Registered Radiation Protection Technologist (RRPT), National Registry of Radiation Protection Technologists





Radiation Safety Officer - MDE Radioactive Materials License No. MD-31-281-01.

Authorized User - MDE Radioactive Materials License No. MD-31-281-01.

Experience and Background

2002-Present

Vice President of Nuclear Services, Integrated Environmental Management, Inc., Knoxville, Tennessee - As the director of IEM's Nuclear Services Division, which operates as a compliment to our consulting capability by providing support services and on-site project management for major client initiatives, Mr. Duff is responsible for turn-key decontamination and decommissioning of nuclear facilities - including the preparation of all planning documentation, characterization surveys and sampling - facility and equipment decontamination, final status survey performance, waste packaging/transport/disposal coordination, routine facility surveillance services, emergency response, leak testing of sealed sources, instrument rental, employee monitoring services for internal and/or external exposures, training, and a host of other applied health physics operations.) Mr. Duff also serves as the Radiation Safety Officer (RSO) for IEM operations pursuant to Maryland Department of the Environment Radioactive Materials License No. MD-31-281-01.

1995-2002

Program/Project Manager, Integrated Environmental Management, Inc., Knoxville, Tennessee - Provided high-quality project management and remediation services to commercial and government clients. As a member of the client's response team, worked with clients to: Develop scopes-of-work and bid packages for specialty subcontractors handling highly focused assignments; identify those subcontractors who will provide the greatest value to the client; manage teams of specialty subcontractors to ensure that the client's goals and expectations (technical, regulatory, and financial) are met from the beginning until project completion; provide insights into future regulatory issues and their impact as input to the client's long-range business planning and cost forecasting process; provide site remediation/decommissioning services for radioactive and hazardous materials; advise and train clients on waste transportation and disposal issues; and develop project specific plans and procedures to conduct on site activities.

1994-1995 Senior Environmental Specialist, AWK Consulting Engineers, Inc., Pittsburgh, Pennsylvania While assigned to the Oak Ridge, Tennessee office, was responsible for performing technical and administrative duties required to satisfy customer needs on site characterization and pre-remedial design support projects and for all aspects of D&D projects. Responsible for preparing project plans, project work plans, task specific Health & Safety Plans, and budgets/schedules for these projects. Also responsible for identifying and implementing decommissioning and decontamination methods for these projects.





- 1987-1994 Project Manager, Health Physics Supervisor, Nuclear/Mixed Waste Engineering Services, IT Corporation, Knoxville, Tennessee. Provided project management and health physics support services for nuclear and mixed waste projects throughout the United States.
- 1978-1987 Engineering Laboratory Technician (ELT), Leading Petty Officer, Radiological Controls Shift Supervisor, United States Navy Supervised a division of 40 personnel, provided support for nuclear powered submarines, and performed over 250 error-free shipments of radioactive materials. Served as Leading ELT and Engine Room Supervisor on the USS Grayling, SSN 646.

Professional Society Memberships

Health Physics Society (Plenary Member)

American Nuclear Society

Conference of Radiation Control Program Directors (Advisor to the Radioactive Waste Management Committee E-5 and to the D&D Committee E-24)

Awards

Navy Achievement Medal for conducting the first Trident Class submarine ion exchange resin discharge and solidification.

IT Corporation Project Management Associate

Example Project Descriptions

Project Manager for health physics field activities during characterization, remediation and survey of several oil production sites with soil contaminated with Naturally-Occurring Radioactive Materials (NORM) for multiple clients in support of litigation defense.

Project Manager for the radiological characterization (MARSSIM surveys) of a facility that manufactured thorium fluoride for use as an optical surfacing product. Conducted radiation and contamination surveys and obtained analytical samples of building materials. Returned to the facility to conduct surveys in support of property ownership transfer. Supervised radiological remediation of facility including floor and wall contamination, underground tank removal, drain line removal, roof decontamination, and equipment demolition including ventilation systems, fume hoods, and scrubber systems. Responsible for coordination for treatment and disposal of radioactive and mixed wastes generated during the project and conducted final status surveys at the facility upon completion of work.

Project Manger for Phase 1 Environmental Assessments conducted at five radioactive waste processing and disposal facilities.





Project Manager and Health Physicist for the remediation and final status surveys/sampling of a former oilfield pipe scale facility. Supervised the demolition of the site building, excavation and disposal of ten truckloads of NORM- contaminated soil, and excavation and release of over 20 truckloads of clean soil. Interfaced with the client and state regulators on the planning and final release of the facility. Work performed under the terms/conditions of License No. MD-31-281.01.

Project Manager and Health Physicist for the remediation and final status survey of a pharmaceutical company's radiological laboratories contaminated with Hydrogen-3 and Carbon-14. Supervised the on site demolition of the labs including fume hoods, lab furniture and ventilation systems. Supervised the disposal of radioactive and mixed wastes from the site and the performance of the final status survey of the facility.

Project Manager for the decommissioning of an oven contaminated with mercury and thorium (mixed waste). Arranged for subcontractors to conduct decontamination and disposal activities, prepared project plans, supervised all field activities, and conducted all radiological surveys during the decommissioning. Responsible for coordination for treatment and disposal of mixed and hazardous wastes generated during the project. Later conducted removal of a central vacuum system that was contaminated with mercury and thorium at the same facility.

Conducted audits of a client's radiation protection program including tour of the site, interviews with employees to verify radiological and respirator training, review of shipping, waste disposal, sealed source, training, and survey records. Also conducted leak tests of client's radioactive sealed sources.

Project Manager for escalated decommissioning a State-licensed site that manufactured, tested, and distributed gauging devices in anticipation of the sale of the company and the possibility of its moving its operations to another location. Responsible for preparation of work plans, negotiations with regulatory agencies, decontamination of indoor and outdoor areas, performance and documentation of a final status survey, shipment of waste, and project-specific health and safety.

Project Manager and health physicist for the remediation of a building foundation drainage system and the processing of over 100,000 gallons of water contaminated with cobalt-60 up to levels of one (1) microcurie per liter for a commercial client. Responsible for coordination of a water processing subcontractor, an excavation subcontractor, and off-site analytical laboratory activities. Also interfaced with on-site U. S. Nuclear Regulatory Commission, U. S. Environmental Protection Agency, and a variety of state and local agencies. Follow up work at the same facility included development of decommissioning funding plans and site decommissioning plans.





Technical writer for the development of a logic flow diagram for identifying radioactive and mixed wastes at the U. S. Department of Energy's Portsmouth (Ohio) Gaseous Diffusion Plant.

Technical writer for the Fernald Remedial Investigation/Feasibility Study (RI/FS). Provided technical guidance to engineering staff, generated reports on radioactive and mixed waste packaging, transport, and disposal.

Site Manager for the characterization survey of an EPA Superfund site three story warehouse that had been used in the past as a lantern mantle manufacturing facility and had been contaminated with thorium. Assisted in the development of project plans and final reports, supervised a crew of Health Physics technicians performing characterization surveys, interfaced with the facility owner and EPA personnel while on site.

Project Manager for the decommissioning and decontamination of three facilities at Sandia National Laboratory contaminated with radioactive and mixed waste. Responsible for the coordination of resources for the development of project plans, development of Project Work Plan, and maintaining project budget and schedule commitments.

Health Physics Supervisor for a transuranic (TRU) waste repackaging project. Supervised the characterization, repackaging and shipment of 130 containers of high-activity americium-241 and plutonium-238 hot cell waste. The waste was packaged to meet the WIPP waste acceptance criteria and was transported (highway route controlled quantity) to the Idaho National Engineering Laboratory (INEL) for storage.

Project Manager for the excavation and disposal of radium waste cells for the Corps of Engineers at Bergstrom Air Force Base in Austin, TX. Developed all project plans, supervised field efforts, and coordinated waste transport and disposal activities.

Project Manager for the decontamination and final release survey of a 70,000 ft² facility that manufactured cesium-137 level gauges. Decontamination efforts involved overhead areas, work area concrete floors, and removal of soil under the floor slab. Facility was released from their license following a verification survey by the state radiological licensing agency. Developed state approved decommissioning plan and final status survey report.

Project Manager for the packaging and disposal of 55,000 Curies of cobalt-60 teletherapy sources. Sources were loaded into cask liners in the facility hot cell and loaded into Type B casks for shipment for disposal. Also supported the packaging and disposal of several low level waste drums and HEPA filters that required the use of shielded Type A and B shipping containers.





Project Manager for the decommissioning and decontamination of IT Corporation's Oak Ridge Mixed Waste Analytical Laboratory. Developed the decommissioning and decontamination plan that was approved by the State of Tennessee. Also supervised the field crew during final surveys of facility.

Project Manager for the decommissioning and decontamination of a magnesium-thorium waterfall grinding booth at Tinker Air Force Base in Oklahoma. Responsible for the development of project plans, schedule and budget management, and disposal of radioactive and mixed wastes.

Project Manager for the decommissioning of a commercial facility which had previously processed ores containing uranium and thorium. Generated the decommissioning plan submitted to and approved by the U. S. Nuclear Regulatory Commission, and was responsible for schedule, budget, and on site activities.

Project Manager for the removal of a 22 MeV particle accelerator from a major university medical center. Developed State-approved decommissioning and decontamination plans, arranged for waste disposal and transfer of the accelerator to a university in Beijing, China, and was responsible for budget, schedule and all on site activities.

Project Manager for the decommissioning and decontamination of two radioactive source manufacturing laboratories at Chevron Research and Technology. The laboratories housed a neutron generator and were contaminated with tritium, carbon-14, cesium-134, and cobalt-60. Negotiated plan approvals with the State agency, and was responsible for budget, schedule, and all on site activities including waste transport and disposal.

Project Manager for the routine quarterly surveillance and special radiological projects at a metallurgical facility licensed by the NRC. Conducted radiation, contamination, and airborne radioactivity surveys as well as personnel bioassay and dosimetry program and environmental monitoring program each quarter. Provided health physics coverage for non-routine activities such as baghouse and stack testing, heats of specialty materials, final release surveys of an excavated road area, storage yard, and a warehouse formerly used for storage of radioactive materials, and recovery of radioactively contaminated equipment improperly released from site. Responsible for the generation of quarterly surveillance reports.

Project Manager for the development of a conceptual decommissioning plan for a maintenance facility located in South Carolina. The plan was generated to provide support for the facility's decommissioning funding plan.

Health and Safety Manager/Project Manager at the U. S. Department of Energy's Fernald site thorium silo and bins decommissioning and decontamination project. Developed the





project-specific health and safety plan, and interfaced with the client on health physics and health/safety issues. This project received safety and quality awards from the client.

Health Physics Supervisor responsible for the sampling of underground storage tanks with radioactive and mixed wastes at Brookhaven National Laboratory.

Health and Safety Manager for the U. S. Department of Energy's Fernald Plant K-65 Silo sampling project. Developed the health/safety and sampling plans. The silos contained up to 0.5 microcurie of Radium-226 per gram and were the largest single source of radon gas in the U.S.

D&D Technical Manager for the decommissioning of the U. S. Department of Energy's LEHR facility at the University of California at Davis. Developed project decommissioning and decontamination plans and field procedures.

Health Physics Supervisor for the excavation of waste materials which included mixtures of uranium and explosives.

Project Manager for the MARSSIM type final status survey of a potentially contaminated 10 acre property on Staten Island, New York. Developed site characterization/survey plans, supervised the on site characterization survey and soil sampling at the site, and developed the project report for submittal to regulators.

Developed numerous business proposals for nuclear decommissioning and decontamination projects including job walk downs, cost estimation, scheduling, and technical content of proposals.

While in the US Navy, acted as radioactive materials shipper for the Trident Submarine Refit Facility. Performed over 250 error-free shipments of radioactive materials including Type B quantity radiography source shipments and radioactive waste shipments to the naval shipyard.





Jeffery W. Sumlin - Health Physics Technician

Professional Qualifications

Mr. Sumlin has over 25 years of experience in the radiation protection field, with emphasis on decontamination, site surveillance and applied health physics. His extensive field and management experience, interpersonal skills, and technical abilities in the decontamination, decommissioning, and radiation protection fields are accompanied by excellent qualifications in project coordination, regulatory compliance, site characterization and radiological oversight and verification.

Education

AA, Nuclear Technology - University of Phoenix, 1991

AS, Liberal Arts - University of the State of New York, 1989

BS, Sociology and Nuclear Technology - University of the State of New York, 1990

Naval Nuclear Power School, 1980

Nuclear Power Training Unit (prototype), 1981

40-Hour OSHA HAZWOPER Training (29 CFR 1910.120), 1996

8-Hour OSHA Annual Refresher (29 CFR 1910.120), 2005

Confined Space Training, 2003

Fall Protection Training, 2005

Certifications and Licenses

Registered Radiation Protection Technologist (RRPT), National Registry of Radiation **Protection Technologists**

Qualified U. S. Department of Energy Health Physics Technician

Authorized User - Maryland Department of the Environment Radioactive Materials License No. MD-31-281-01.

Experience and Background

2006-Present Project Manager and Health Physics Technician, Integrated Environmental Management, Inc., Knoxville, Tennessee - Duties include surveillance activities, instrumentation usage/control, decontamination, site characterization, documentation, report preparation, cost/schedule assessment, research/analysis, and general health physics duties. Mr. Sumlin is also qualified as a Health Physics Technician pursuant to Radiation Safety Procedure No. RSP-006, "Training and Qualification of Radiation Protection Personnel".

2004-2005 Lead Radiological Controls Technician, Oak Ridge National Laboratory, Oak Ridge, Tennessee - Duties involved environmental remediation and transuranic legacy waste recovery.





- 2001-2004 Radiological Controls Technician, Sandia National Laboratory, Albuquerque, New Mexico Duties included support for decommissioning and decontamination activities and the Mixed Waste Management Facility.
- 1995-2001 Senior Health Physics Technician, Pacific Northwest National Laboratory, Hanford, Washington Served in the Hanford Site Health Physics Department as an ALARA Coordinator, Radioactive Source Custodian, and first-line supervisor for various USDOE contractors and projects.
- 1980-1995 U. S. Navy Nuclear Propulsion Program Duties included positions as Mechanical Operator, Engine Room Supervisor, Engineering Watch Supervisor, Radiological Controls Shift Supervisor, and Quality Assurance Supervisor.

Example Accomplishments

Senior Health Physics Technician during the initial emergency response, subsequent recovery and decontamination of the Hanford Plutonium Reclamation Facility after it was damaged from an explosion, Plutonium Finishing Plant, Hanford Nuclear Reservation, 1997.

Senior Health Physics Technician for the start up of Hanford Plutonium Finishing Plant Muffle Furnace for plutonium waste stabilization, Plutonium Finishing Plant, Hanford Nuclear Reservation, 1998.

Senior Health Physics Technician for the decontamination, decommissioning, and turn over of Hanford B Plant Canyon, Hanford Nuclear Reservation, 1998.

After selection as the ALARA Coordinator for the Hanford Plutonium Finishing Plant, rebuilt the ALARA program after five years of neglect resulting in an annual exposure reduction of 35%, Hanford Nuclear Reservation, 1997.

Radiological Controls Supervisor for the Hanford Tank Farms Required Surveillance Program and Radioactive Liquid Waste Cross-Site Transfer System at the Hanford Nuclear Reservation, 1999.

Extensive experience with alpha, low energy beta, beta and gamma contamination, high energy beta, gamma and neutron radiation, and airborne radioactivity.

As Radiological Control First Line Supervisor, revised and administered Hanford Tank Farms Environmental Surveillance Program, including stack emissions monitoring, contamination control and workplace air monitoring at the Hanford Nuclear Reservation, 1999.





Radiological Controls First Line Supervisor for several ground water migration wells at the Hanford Nuclear Reservation, 1999.

Lead Senior Health Physics Technician for the decommissioning and decontamination of several Cold War era plutonium producing reactors at the Hanford Nuclear Reservation, 2000.

Senior Radiological Controls Technician for the decommissioning and decontamination and final release of over 500,000 ft² of structures at Sandia National Laboratories, 2004.

Sandia National Laboratories Decommissioning and Decontamination Radiological Controls Technician authorized to act independently at the Tonopah Test Range, Nevada Test Site, 2003.

Lead Radiological Controls Technician for the remediation of radioactive injection wells and equipment at Oak Ridge National Laboratory, Tennessee, 2005.

Radiological Controls Technician for the recovery of 202 containers of transuranic waste buried over 30 years ago at Oak Ridge National Laboratory, Tennessee, 2005.





Billy R. Thomas - Project CHP

Professional Qualifications

Mr. Thomas has over 28 years of senior-level experience in radiological and industrial hygiene activities with emphasis on systems to minimize personnel exposures to radioactive and hazardous materials, compliance with federal and state regulations, site and facility audits. Mr. Thomas has developed and implemented comprehensive programs for radiation and chemical protection programs. Mr. Thomas is actively involved in all aspects of health and safety including regulatory compliance, site decommissioning, program evaluation, applied health physics, occupational safety, training and project management.

Education

M.S., Environmental Health, University of Oklahoma, 1981 B.S., Health Physics, Oklahoma State University, 1976

Certifications

Certified Health Physicist (Comprehensive Practice), American Board of Health Physics, 1988. Recertified: 1992, 1996, 2000 and 2004.

Certified Industrial Hygienist (Comprehensive Practice), American Board of Industrial Hygiene, 1984. Recertified: 1990, 1996 and 2002.

OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Training. Initial training 1987 and updated each year.

Lead Abatement Training for Supervisors, University of Cincinnati. 1996.

Asbestos Abatement Supervisor Course, Asbestos Consulting and Training Systems, 1997.

Authorized User - Maryland Department of the Environment Radioactive Materials License No. MD-31-281-01.

Experience and Background

2002-Present Vice President, Consulting Division, Integrated Environmental Management, Inc. Findlay, Ohio. As the director of the company's consulting division, Mr. Thomas is responsible for selecting and coordinating the services of senior-level consultants in the areas of radiation safety and industrial hygiene. In addition, he maintains and ensures all members of the division maintain a track record of technical excellence, cost and schedule control, and innovation in solving environmental and health/safety problems for both government and commercial clients.





1999- Senior Health Physicist, Integrated Environmental Management, Inc.

Findlay, Ohio. Provides high-quality radiation protection services to commercial and government clients. As a member of the client's response team, works with clients to promote an understanding of what is required to achieve and/or maintain compliance in the eyes of all pertinent regulatory agencies, individually or jointly; develop and overall strategy for achieving compliance and reduce liabilities in a technically-sound, legally defensible, and fiscally-conservative business manner; recommend specific solutions that are compatible with the client's operating philosophy; and provide insights into future regulatory issues and their impact as input to the client's long-range business planning and cost forecasting process.

Mr. Thomas served as the task manager to develop a baseline human heath risk assessment for a confidential client who previously processed enriched uranium and manufactured fuel pellets. The risk assessment was developed for potential exposures both hazardous chemicals and radioactive materials found in soil and groundwater. The assessment incorporated the requirements of the USEPA Risk Assessment Guidance for Superfund (RAGS) as well as requirements established by the State authorities.

Mr. Thomas developed a Emergency Response and Preparedness Manual for a Canadian client who manufactured uranium pellets for nuclear power reactors. The manual was prepared in accordance with the guidance provided by the Canadian Nuclear Safety Commission (CNSC) and the U.S. Nuclear Regulatory Commission (USNRC). The manual addressed the resources to mobilize to an emergency, involving both hazardous chemicals and radioactive uranium in several different chemical forms. The manual was implemented by the client and approved by the CNSC.

A commercial client, licensed by the Nuclear Regulatory Commission, required an evaluation of their internal dosimetry program. Mr. Thomas prepared a procedure to measure both internal and external exposure. The procedure satisfied the recommendations established by the NCRP and ANSI as well as requirements established by the USNRC.

Mr. Thomas worked as pat of a project team to develop decommissioning plans for four (4) different facilities licensed to process radioactive materials. The decommissioning plans established the derived concentration guidelines levels for a variety of radioactive isotopes, including enriched uranium, thorium and byproduct radioactive materials. The potential exposures to future residents were limited to less than twenty-five millirem per year and evaluated over a period of 1,000 years. The plans were compliant with the requirements established by the USNRC and NUREG 1757. Each plan was approved by the USNRC and implemented by the client in order to decommission the facility and terminate the license.



2002



A commercial client required a plan to survey, remediate and ultimately release the building surfaces for unrestricted use. Mr. Thomas established the release criteria using and developed a procedure to complete the radiation survey. The procedure was consistent with the requirements established by the USNRC and NUREG 1575, MARSSIM.

Mr. Thomas completed radiation surveys to evaluate potential exposures to electromagnetic frequency (EMF) radiation in commercial manufacturing facilities. The evaluation of personal exposures were compared to recommendations published by the ACGIH and OSHA. Recommendations were provided to the clients to limit personnel radiation exposures and verify that exposures were acceptable.

Director of Health and Safety, The IT Group, Findlay, Ohio. Originally joined OHM Remediation Services in 1993. The IT Group purchased OHM in 1998. Duties including conducting site and facility health and safety audits, determination of personal protective equipment and respiratory protection equipment, supervising the development and implementation of site specific health and safety plans, and providing industrial hygiene training and services. He had direct accountability for health and safety compliance, including regulatory compliance with federal, state and local agencies. He implemented a comprehensive health and safety program for demolition and remediation activities by the Midwest region, which accumulated 2.3 million manhours from March, 1994 to July, 1997 without a single lost time injury.

Safety and Health Manager, Kansas City PRAC II, Kansas City District. Duties on this HTRW contract included the development of safety and health plans as well as procedures to be implemented at each of the KC PRAC projects. Developed SSHP for specific KC PRAC projects including, Ottawa, Illinois, Galena, Kansas, Mead Nebraska, and Fort Riley, Kansas. Mr. Thomas provided specific support on the KC PRAC projects including:

Project CIH, Project CHP, Ottawa Radiation Sites, Ottawa, Illinois September 1994 – August 1997. Developed the site specific health and safety plan and radiation protection plan to excavate soil contained radioactive radium generated by a luminous processing company. This project involved the excavation of radioactive contamination from nearby residences and selected sites in the city. Worked with State of Illinois and the EPA to implement an effective contamination control program, including air sampling and personnel monitoring for radium. Provided radiation worker training for the work crew and directed the on-site health physics and industrial hygiene program for the initial phases of the project. Conducted site inspections and project audits on a periodic basis.

Safety and Health Manager, USACE, Omaha District Rapid Response II. Duties on this HTRW contract included the development of program procedures and policies to





work on multiple USACE projects. Developed SSHP for specific Rapid projects, including work at Joliet, Illinois, Ames, Iowa and Des Moines, Iowa. Mr. Thomas conducted site inspections and provided technical support for the implementation of the site safety and health program for RR/IR task orders. Mr. Thomas provided support on each Rapid project, including:

Project CIH, Project CHP; Ames Laboratory Chemical Disposal Site, Ames, Iowa. July 1994 – November 1994. Developed the site specific health and safety plan for the excavation and disposal of approximately 1,000 cubic yards of radioactive uranium wastes and contaminated soils. Developed the radiation protection program to be implemented by project employees to reduce exposures to ionizing radiation to as low as reasonable achievable. Contaminated materials were packaged and shipped for disposal in Clive, Utah.

Safety and Health Manager, USACE, TERC Number 1. Duties on this contract included the development of SSHP for work at Ellsworth AFB in Rapid City SD and KI Sawyer AFB in Michigan. Mr. Thomas provided support for some of the TERC projects including:

Project CIH, Ellsworth AFB, OU2 and OU7, Rapid City South Dakota. November 1996 – September 1997. Developed the site specific health and safety plan to excavate radioactive materials from disposal trenches at OU2 and OU 7. Developed radiation protection plan as well as the release criteria to be implemented to document that the site was free of contamination. Worked with the USAF Radiation Safety Committee to establish protocols to identify plutonium in soil and verify that debris was handled correctly.

Project CIH, Tarracorp Industries, Granite City, Illinois April, 1993 – May, 1997. USACE Omaha PRAC II. Developed the site specific safety and health plan for this project to excavate and treat lead-contaminated soil from smelter emissions. Treatment was completed by stabilizing the soil using a pugmill. This process delists the soils to a "special waste" classification, resulting in key cost savings in disposal. To date, over 300 residential sites have been remediated, and over 100,000 tons of soil have been processed. Excavation, transportation, and disposal of wastes containing battery chips have also taken place. Developed the elements of the air monitoring program. The air monitoring program was sufficient to evaluate the personnel exposures to airborne lead dust, as well as the fugitive emission from the exclusion zone. Performed periodic site visits to review results of the air sampling program and confirm that exposures were acceptable.

Health and Safety Manager, Department of Energy, Weldon Spring Site Remedial Action Program (WSSRAP), April 1993 – July, 1995. OHM was contracted to excavate contaminated construction debris from the WSSRAP quarry. Materials in the





quarry were accumulated from a munitions manufacturing facility at Weldon Spring, as well as the demolition of buildings from the Mallinckrodt site used during the Manhattan project. Personnel exposures to uranium and thorium were documented, as well as nitroaromatics and asbestos. Mr. Thomas completed site inspections to evaluate the effectiveness of the health and safety plan and review the results of employee exposure monitoring.

Health and Safety Manager during the demolition of selected manufacturing buildings at the WSSRAP. The demolition projects involved the controlled demolition of nine buildings. Employees encountered radioactive uranium as well as asbestos containing materials and cadmium based paints. Mr. Thomas evaluated the construction safety program as well as industrial hygiene program during the demolition tasks.

Health and Safety Manager during the remediation of facilities at the Piketon Gaseous Diffusion Plant in Portsmouth, Ohio. OHM was contracted to remediate a chromic acid tank, including the removal of the lead liner in Building X700. OHM also demolished the incinerator in Building X705A. Mr. Thomas prepared the health and safety plan to document the methods necessary to reduce employee exposure to hazardous materials, both chemical and radiation exposures. OHM employees encountered hot environments in Building X700 where chromic acid and uranium were present.

Health and Safety Manager during the remediation of mixed waste that was buried in several burial pits at the Ames Laboratory in Ames, Iowa. Mr. Thomas participated in the planning and execution of the project, including presentations at the public hearings that were provided by the DOE to the public. The waste in the burial pits contained a variety of hazardous materials, including radioactive uranium, thorium, and asbestos as well as volatile organics including methyl ethyl ketone and trichloroethylene. Mr. Thomas prepared the health and safety plan for the project which described the industrial hygiene practice, the construction safety requirements, and the elements of the health physics program. Mr. Thomas evaluated the controls that were implemented and verified that employee exposures were reduced to as low as reasonably achievable.

1990 - Health and Safety Manager, IT Corporation, St. Louis, Missouri.

1993 Provided direction day-to-day for laboratory operations in the areas of health physics, industrial hygiene, hazardous waste management, and laboratory safety. Served as the Radiation Safety Officer for the USNRC Broad Scope license for the use of by-product and source material at the laboratory.

Collateral assignment as Department Manager of a radiochemistry laboratory to analyze samples from a variety of commercial and government facilities, including facilities operated by the DOE. Services were provided to a variety of DOE facilities including Fernald, Idaho National Energy Laboratory, Lawrence Livermore National Laboratory, Nevada Test Site, Oak Ridge National Laboratory, Paducah Gaseous





Diffusion Plant, Rocky Flats, WSSRAP, and the Y12 Production Facility. Supervised the analysis of various environmental media to be analyzed for specific radioactive isotopes including uranium, plutonium, thorium, and radium. Other analyses were performed for fission products and gross methods including alpha and beta analysis. Served as the RSO for the broad-scope license issued to the laboratory by the NRC.

Performed waste management assessment for four different DOE facilities. Principal investigator for hazardous and mixed waste policies, procedures and practices. Recommended program changes and upgrades. Worked at the following facilities, including: Portsmouth Gaseous Diffusion Plant, Piketon, Ohio; K25 Gaseous Diffusion Plant, Oak Ridge, Tennessee; Paducah Gaseous Diffusion Plant, Paducah, Kentucky; and Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Served as project manager for the Industrial Hygiene department at Los Alamos National Laboratory (HSE-5). Responsibilities included reviewing and making recommendations for several of the programs being implemented by HSE-5 for the National Laboratory. These programs included asbestos controls, carcinogen control, sampling strategies and hazardous waste site characterization. Mr. Thomas also developed a sampling strategy to evaluate personnel exposures to hazardous materials. Mr. Thomas evaluated the asbestos management program at Los Alamos Laboratory. He reviewed the work performed by the IH department, including project oversight and air monitoring. He inspected work sites established by contractors including Pan American Services to assess compliance with LANL procedures and OSHA regulations.

Served as project manager to prepare mixed waste and radiative waste management plans and programs for waste generated during the remedial investigation at the Nevada Test Site. The programs required coordination between the Remedial Investigation contractor, the DOE Operations Area office and the facility receiving the waste for disposal.

1988 - Director of Corporate Health and Safety, Burlington Environmental,

Columbia, Illinois. Responsible for designing and implementing health and safety programs to limit exposures to hazardous chemicals and radioactive material during sampling and remediation activities. Developed procedures and conducted training classes for field service personnel to correctly use personal protective equipment and perform air monitoring to evaluate personnel exposures.

Mr. Thomas also served on several audit teams to review the health physics programs at DOE site, including Rocky Flats, Los Alamos and the Nevada Test Site. The criteria for the audits were based on the DOE Technical Safety Appraisal objectives. Mr. Thomas worked with the program personnel to correct deficiencies and measure the effectiveness of the programs.





Member of Technical Advisory Group for Martin-Marietta Energy Systems. The Advisory Group provided oversight of the Federal Facility Agreement regarding the operation of the Low Level Radioactive Waste Tank Systems implemented for Oak Ridge National Laboratory. Made recommendations to implement standard industry practices for the purposes of reducing personnel exposures to hazardous and radioactive materials. Reviewed the elements of the industrial hygiene relating to the engineering controls and administrative controls implemented to reduce exposures to hazardous materials. Evaluated the effectiveness of the health physics programs for the purposes of reducing personnel exposures to radiation to as low as reasonably achievable.

Mr. Thomas reviewed the industrial hygiene and health physics programs being implemented at each facility. Used the Technical Safety Appraisal guidelines developed by DOE to critique the effectiveness of the programs begin implemented. Worked with each respective program managers, responsible for the H&S program, to develop an action plan to upgrade the program and track the progress of the changes.

Member of the Management Advisory Team for Martin Marietta Energy Systems Gaseous Diffusion Plants. The Advisory team reviewed the effectiveness of the Health and safety programs being implemented including the health physics and industrial hygiene programs. The Advisory Group was responsible for reviewing each of the health and safety programs and making recommendations for areas of improvement.

Senior Health Physicist, IT Corporation, Oak Ridge, Tennessee. Provided
 health physics and industrial hygiene consulting to government and commercial clients.
 Served as the project manager for several remedial decontamination projects involving hazardous and radioactive materials. His experience included:

Project CIH, Fernald Feed Materials Production Center, US Department of Energy Cincinnati, Ohio. May, 1987 – June, 1988. Performed health-and-safety review of engineering improvements at DOE uranium metals production facility. Improvements included new ventilation systems, radioactive materials handling systems, and decontamination of the facility. Recommended health physics and industrial hygiene controls to minimize worker's exposure, and updated air monitoring programs for both workplace exposures and effluent sampling.

Task Manager, Fernald Feed Materials Production Center, US Department of Energy Cincinnati, Ohio. August, 1985 – June, 1986. Mr. Thomas developed and implemented the collection and analysis of radiation measurement to assess the concentration of uranium in the soil surrounding the manufacturing facility. This work was performed as part of the site wide Remedial Investigation/ Feasibility study.

Health Physics Supervisor, Joliet, Illinois, Commonwealth Edison, September, 1984 – December, 1985. Provided support for the chemical cleaning of the primary cooling





system at Dresden Nuclear Power Station, Unit 1. Mr. Thomas was responsible for assessment of engineering controls to reduce personnel exposures to radiation. The techniques were successful to remove more than 750 curies of cobalt-60 and other activation corrosion products. Personnel exposures were less than 7 man-Rems for the total project.

Health Physics Supervisor, Confidential Client, August 1983 - July, 1984. Provided support to decommission a facility that manufactured neutron sources (Am-Be) for nuclear power plants and radiography applications. The hot cells and glove boxes were segmented and packages in Type B shipping containers; the TRU waste shipped to Idaho Falls for storage and ultimate disposal by the USDOE. Drums of remote handled TRU were repackaged and characterized in order to satisfy the waste acceptance criteria for the USDOE. All work was performed in containments designed to minimize the spread of radioactive contamination, both airborne and surface contamination. Exposures to remediation workers was maintained below 1,000 millirem per person for the 15 month project; external exposures to gamma and neutron radiation were minimized. Internal exposures to TRU, including plutonium and americium were evaluated and verified to satisfy the requirements of the USNRC.

1976-1983 Senior Research Industrial Hygienist, Dow Chemical, Midland, Michigan Provided health and safety support for employees in and Tulsa, Oklahoma. manufacturing facilities, including plastic and other intermediate chemical production. Assigned as lead health physicist for decontamination projects at several nuclear power plants. From 1977 to 1980, Mr. Thomas served as the radiation safety officer for a NRC broad scope license to authorize the use of mixed fission products and special nuclear material used in manufacturing and research applications at Dow Chemical. The program included a TRIGA reactor, two small accelerators, sealed radioactive sources and tracers for a variety of research programs. Mr. Thomas directed all elements of the health physics program including training, standard operating procedures, exposure assessment and documentation. Mr. Thomas later (1981 - 1983) served as the radiation safety officer for the field services division where sealed sources and mixed fission products were used in treatment systems. This assignment had responsibilities in 22 states for approximately 3,000 employees. Mr. Thomas directed the use of radioactive materials licenses in 16 different states and a NRC license for the use of these radioactive materials.

Professional Society Membership

Health Physics Society (Plenary member)

American Academy of Health Physics

American Industrial Hygiene Association





American Academy of Industrial Hygiene

Bibliography

Mr. Thomas has authored/coauthored a number of papers and technical reports. In addition, he has developed/presented training courses in the field of health physics, industrial hygiene and safety.

Other Appointments/Awards

Ohio Radiation Advisory Council. Appointed by Governor Taft in 2002. Elected Chair of the Council in 2004 and 2005.

Ohio Utility Radiological Safety Board, Citizen's Advisory Council. Elected Chair in 2001 and 2002.

Director of the State of Ohio Low Level Radioactive Waste Facility Development Authority Board. Appointment by the Speaker of the Ohio State Legislature in 1997.

Chairman's Award for Safety Excellence, OHM Remediation Services, 1996, 1997

Senior Technical Associate, International Technology Corporation, 1991.

Member of the People to People Ambassador Delegation visiting the People's Republic of China, 1987. Invited speaker to review health physics practices.





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August 2, 2007

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Appendix 8.2 - Field Activity Daily Logs





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Facility: Great Lakes Environmental Research Laboratory				
Date: 6/18/07 Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945			
Description of Work: Final Status Survey				
	ACTIVITIES AND EVENTS			
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Personnel on Site: Jeffrey Sumlin				
Name (print): Jeffrey W. Sumlin	Signature /AC Z.			

Page ____ of /___

Facility: Great Lakes Environmental Research	Laboratory			
Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945			
Description of Work: Final Status Survey				
DESCRIPTION OF DAILY	ACTIVITIES AND EVENTS			
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Personnel on Site: Jeffrey Sumlin				
Name (print): Jeffrey W. Sumlin	Signature 14			

Page ____ of ___

Facility: Great Lakes Environmental Research	Laboratory			
Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945			
Description of Work: Final Status Survey				
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Weather Conditions: Important Telephone Calls and Interactions:				
Personnel on Site: Jeffrey Sumlin				
Name (print): Jeffrey W. Sumlin Signature				

Page _____ of ____

Facility: Great Lakes Environmental Research Laboratory				
Date: 6/2:/67 Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945			
Description of Work: Final Status Survey				
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Personnel on Site: Jeffrey Sumlin				
Name (print): Jeffrey W. Sumlin	Signature			
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Facility: Great Lakes Environmental Research	1 Laboratory			
ate: 6/22/07 Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	i, Ann Arbor, MI 48105-2945			
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Personnel on Site: Jeffrey Sumlin				
Name (print): Jeffrey W. Sumlin Signatuye,				
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Facility: Great Lakes Environmental Research Laboratory				
Dare 6/35/07 Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	d, Ann Arbor, MI 48105-2945			
Description of Work: Final Status Survey				
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farannaí an Site Jeffrey Sumlin				
Signature M. Sumlin				

Facility: Great Lakes Environmental Research Laboratory

Page	1	of	1	

Date: 06/26/07	Job/Task Number: 2005006.003				
Client Name: BMT Entech					
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945				
Description of Work: Final Status Survey					
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0955 COMPLETED JURULY OF ROWN -	TIA, BOOAN BRITKING TINK DRINS				
FOR SMOKES					
1045 COMPLETED SAMPLING SINT ?					
BOTIMO THRULTING CORRIDOR	25				
1315 COMPLETION SULVEYING CURR	,00KS				
BUS BELOW TURNING ROOM TUIA					
1435 CONPLOTON TURNET OF ROOM 8	WIA BOWN SURSEL BUIB				
135 CONPECTOD JURINI OF ROUMS	RUIB				
1600 PORTURNO OND OF SHIFT INSTRU	MUST CHECKS				
1645 OFF 517E	1645 OFF 517E				
	The state of the s				
Departed site at (insert date and time): (6/26/07-/	Departed site at (insert date and time): cb/26/07 /16/5				
Changes from Plans and Specifications, and Other Special Orders and Important Decisions: DUE TO POSICATE GRUIPMONT IN TURB, FLUCK MANITUR WILL NOT BE USON, WILL SCAN					
FLOOR WITH 43-68					
Weather Conditions: Important Telephone Calls and Interactions:					
HOT OUNCAST					
Personnel on Site: Jeffrey Sumlin					

Signature

Name (print): Jeffrey W. Sumlin

Page ___ of ___

Facility: Great Lakes Environmental Research	Laboratory
	Job/Task Number: 2005006.003
Date: 06/27/07	COD/ Lask Number: 2005006.003
Client Name: BMT Entech	
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945
Description of Work: Final Status Survey	
	ACTIVITIES AND EVENTS
Arrived on site at (insert date and time) OG17767/07/07	
1700 OFF SITE	2) (WE LOVERS AW) MCWHARY
Departed site at (insert date and time): しんけんけん	טשדו
Changes from Plans and Specifications, and Other Special Rokun LSC Fol HALLS AND DANING DUE	1 Orders and Important Decisions: TO MULTIPLE PUSCIC OUTILES
Weather Conditions: THUMOCK, LIGHTWING	Important Telephone Calls and Interactions:
Personnel on Site: Jeffrey Sumlin	<u></u>
Name (print): Jeffrey W. Sumlin	Signature

Page ____ of ___

Facility: Great Lakes Environmental Research Laboratory				
Date: 6/28/07 Job/Task Number: 2005006.003				
Client Name: BMT Entech				
Address of Work Site: 2205 Commonwealth Blvd	, Ann Arbor, MI 48105-2945			
Description of Work: Final Status Survey				
	ACTIVITIES AND EVENTS			
Arrived on site at (insert date and time): し/2억/07-/ U	745			
off on site, entound survey	disucts			
PRIVETO LETTER SLIBNISSION THOMAS TO SEE WHAT DE MOSTREED SOURCE, MAND MELLO	WSKI DISCUSSED SUILULY FINDINGS. SHIPPMONE PRISPOSE OF PAPWITTE TO HAC, WILL CHECK WITH BILL MACTO (IE LIST CHICK SOURCES AND INTO PRIMENT CHICK SUIRCES STATIC KNOT ON SITE AFTER LICINSE			
TORMINATION	Total Circuit			
1570 off 5176				
<u> </u>				
Departed site at (insert date and time): 6/25/67 / /530				
Changes from Plans and Specifications, and Other Special Orders and Important Decisions:				
Weather Conditions: Important Telephone Calls and Interactions:				
Personnel on Site: Jeffrey Sumlin				
Name (print): Jeffrey W. Sumlin Signature July				

US DEPARTMENT OF COMMERCE/NOAA

"Final Status Survey Report for the Great Lakes Environmental Research Laboratory" August 2, 2007

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Appendix 8.3 - Instrumentation Records







GRIFFIN INSTRUMENTS Calibration Certificate

Serial #	B296W	Model	Micro Rem	Owner	IEM
Probe #	N/A	Model	N/A	PO#	IEM
Source Used	10250	Model	28-6A	Cert Date	6/25/04
Pulser Serial	1000	Model	MP-2	Cal Due	7/5/07
Temperature	76.3	Pressure	29.96	Humidity	32%

Batteries: Sat (√) Unsat ()

Desiccant: Sat () Unsat () N/A ($\sqrt{}$)

Saturation: Sat (√) Unsat ()

Geotropism: Sat (√) Unsat ()

Mechanical Zero: As Found: 0

As Left: 0

Reset Switch: Sat

*Pulsed

Scale	Units	Set Point	As Found	As Left
X0.1	μR/hr	4*	2	3.8
X0.1	μR/hr	16*	11	17
X1	μR/hr	40*	40	A.F.
X1	μR/hr	160*	160	A.F.
X10	mR/hr	0.5	0.45	0.5
X10	mR/hr	1.0	0.8	1.0
X10	mR/hr	1.6	1.3	1.6
X100	mR/hr	4	3.2	3.8
X100	mR/hr	10	9	10
X100	mR/hr	16	15.25	16
X1000	mR/hr	40	35	38
X1000	mR/hr	100	95	100
X1000	mR/hr	160	155	160

Are As Left readings w/in 10% of the Set Point? Yes No

Remarks: Red markings are >20% error.	
Performed/Reviewed By: Janu Han	Date:10/10/06
Calibration Due Date: 10/10/07	

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. EXPOSURE RATE SURVEY INSTRUMENT DATA SHEET

Project No. 2005006, 003		Detector		Meter	
Site Location/Background Location: にはこれに	Туре:	Serial No.	Type: BICIZUN	Serial No: B2964	Operating Voltage: ムルタ

Check Source Number	Radionuclide:	Calibration Activity and Date:
3347	Cs-137	luci 11/97

			Start of Shift	Background			End of Shift	Background		Daily Response	.]
Dute	Units	1	2	3	Avg.	1	2	3	Ave.	()	Initials
6/14/07	ulon/h	<i>j</i> 0	10	10	/0	13	10	10	ري	ჯეი	
6/24/57	Morefly	10	10	w	13	10	10	10	10	520	1
42457	e Herrita	10	10	10	10	10	10	10	/U	520	V
6/22/07-	wearth	10	/ن	/ن	رر	/U	jO	10_	10	200	1
6/25/07	while	IU	10	رن	10	10	18	10	Į۵	500	/
426/57	whenth	10	10	10	10	10	10	10	10	420	/
ļ											<u> </u>
				<u> </u>				<u> </u>		1	
<u> </u>				 				 			
				! <u> </u>					-	<u> </u>	
		· ···									
		<u> </u>									

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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. CONTAMINATION SURVEY INSTRUMENT DATA SHEET

Project No: 2005006.0	03			Detector		Meter					
Site Location/Backgrou Laboratory	und Location: Great Lakes	Environmental Research	Type: Ludlum Model	Serial No. 132238	Probe Area (cm²) (7	Type: Ludlum Model	Serial No:	Operating Voltage:			
Check Source No:	2349-98		Cheek Source No: 2	400-G8		Check Source No: W/A-					
Radionuclide:	Radinnuclide: Activity: Date:		Radionuclide:	Activity: 12,700	Date:	Radionuclide: برام (الم	Activity:	Date:			

				5) 150 J	7 Backgran		===		_		_						τ								-=-
Date									ļ				Backgroun		_		Daily Source	r Check (z.)	Daily Source	r Check (l)	MDA¯ - S (de		<u> </u>		
		Α	Upha			В	Ha			Al	pha	Bets			Snaper						Bat. OK	RVOK	Initials		
	Ŀ	1	,	<u></u>	1	1	,	A1.	-	1	,	As.	,	ì	3	As.	(cptn)	LH.	(clam) Sum Les	EH.		, P			
44/1	46			0.8	3294			55	3296								4428	34.9	5255	24.3		<u> </u>		1	5
Tarlos.	3Ç			0.6	3197			53									4316.1							√	3
4.67	38		<u> </u>	ص.د	3100			52									4347.8							1	5
72707			<u> </u>	0.7	3156			53			<u></u>						4346.3	34.6	5244.2	24.2				\	5
6/26/59	37			0,6	3203			53	Ĺ				<u> </u>				4401.4							V	5
			<u> </u>					Ļ									Ĺ								
			<u> </u>	<u> </u>				<u> </u>							<u> </u>						_				
			ļ				_								<u> </u>		<u> </u>								L
			<u> </u>										<u></u>						<u> </u>						
			<u> </u>	<u> </u>																					
		<u> </u>	<u> </u>	L				<u> </u>				<u> </u>	<u> </u>												

$$... MDA = \frac{2.71 \cdot 4.65 \sqrt{9KG_{avg} \times 1}}{I \times E \times \frac{100}{100}}$$

where MDA = the activity level (dpm/100 cm²), BKG_{eg} = the background count rate for this measurement type (cpm), t = the measurement duration (min), E = instrument efficiency, and A = probe area (cm²).



GRIFFIN INSTRUMENTS



CALIBRATION CERTIFICATE FOR Owner: IEM	ł		292	9	SEF	RIAL#	126126	
DATE: 04/02/07			LOCAT	ion:			Griffin	Inst
TECH: Joanne Glenn			DATE	AST (AL EXPIR	RES:	04/3	0/07
Reason For Calibration:	Due	e For C	alibratic	n		○ Repa	ılr (See Rem	arks)
CABLE LENGTH: 39") Oth	er (Se	Remar	ks)		O Due	and Repair	(See Remarks)
NIST TRACEAE	ILE EC	UIPME	NT USE	D DUF	UNG CAL	BRATION		
MODEL: M-500 SER	IAL #:	11	4512			CAL. DUE:	12/11/0	7
MODEL: SER	IAL #:					CAL DUE:		
On distance (i) Ont (i) threat		AF	Mechan	ical Ze	ero: C)		
Condition: (Sat (Unsat		AL	Mechan	ical Ze	ro: 0	 		
					5 × 3			
Beta Channel Window (4-50 mV):			4-50		A.F.			
Alpha Channel Window (175 mV, 120 for 3030):			175		A.F.			
Alpha Counts w/Pulser @ 10,000 CPM:			9,978		A.F.		% Error:	0.2%
Beta Counts w/Pulser @ 10,000 CPM:			9,987		A.F.		% Error:	0.1%
美国新疆国际基础企业,1000年	l'							
1 KV Reading (R-5 on HV Board):			1		A.F.			
Max HV (1500 V +):		(Sat	0	Unsat			
REMARKS: Calibrated w/43-10-1 #PR132238.								
Does Instrument Meet Final Acceptance Criteria?:	•	Yes	0	No				
Calibration Sticker Attached?:	(Yes	O	No				
Date Instrument is Due For Next Calibration:	04/	02/08						
Performed/Reviewed by: Kanne Skun			1000				an	
Jeanne Skoun		Date:	<i>4/2/</i> 2007		Calibrations p	Entere	ed by: <u>V</u> ISI N323A-1997	Initials standards.



GRIFFIN INSTRUMENTS



		IFICATE FOR	43-10-1	PROBE #	PR132238
Owner: IEN	1				
DATE: 04/02 TECH: Joan	2/07 ne Glenn		LOCATION: DATE LAST (CAL EXPIRES:	Griffin Inst 04/30/07
Due For C	alibration	REASON FOI	R CALIBRATION: ks) Other (See	Remarks) 💛	Due and Repair
CABLE	LENGTH: 3	9"	INPUT SENSIT	IVITY: dual	
	NIST TRAC	EABLE EQUIPMENT AN	D STANDARDS USED	DURING CALIBRA	TION
MODEL:	2929	SERIAL #: SERIAL #:		CAL. DUE: CAL. DUE:	
		NIST TRACE	ABLE SOURCES USED		
SOURCE #: ISOTOPE: ACTIVITY(dpm): ASSAY DATE:		2695-00 Tc99 18400 03/01/00	SOURCE #: ISOTOPE: ACTIVITY: ASSAY DATE:	:	
Condition:	Sat	() Unsat Eff	iciency from last cal.:	Pu: 35.84% Th: 32.71%	
		HV		Vernier	
Setpoints from	last cal.:	700		2.92	
Sour	_	Alpha Response	CPM Beta R	esponse CPM	
Backgr		2		71	
Pu-2		6603		340	A-B XTLK: 3.99
Tc-99		3		6448	B-A XTLK: <19
As Found Efficient Th-230 /		00.0070		34.66%	
111-2307	₩14	9863	/	32	.87% /
Backgro	ound:				
Pu-23	39:			A	N-B XTLK:
Tc-99					B-A XTLK:
s Found Efficien	cies Pu, Tc:				

Note: If the as found data is within 10% of the tast calibration and the B-A Xtalk is <1% and the A-B Xtalk is <10%, then the technician may N/A the plateau section, and go directly to remarks.



GRIFFIN INSTRUMENTS



PROBE #: PR132238

Date:

04/02/07

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 S	ource Re (CPM):	esponse		239 So onse (Backgro	und (CPM):	Net A to B Xtalk: <10%	B to A Xtalk: <1%
	A ch.	B ch.	Net Eff.	A ch.	B ch	Net Eff.	A ch.	B ch.	}	
N/A					Г			<u> </u>		
 	 		┤ ──┤	<u></u>	[<u>├</u> ──∦		 _		
	 		╀──┤					 	 	
 			} }			├		 		
L			.L					-4-,,		
								- 		
Alpha / E	leta Bkg ((cpm)	2	7	11					
HV / Vernier		Pu	<u>-239</u>	<u>Tc-99</u>	Ni	<u>Tc-99 5</u>	<u>ss</u> <u>Th</u>	<u>-230</u>	<u>C-14</u>	<u>Sr-90</u>
700 / 2.92	CPM	N:				8543				4154
AL E	fficiencie	s :				22.715	/ 6			39,69%
Th-2	30 Source	#99TH4	70-1815	4/11/06 3	0,000	dpm Pu	-239 Sour	ce #2696-00 7	7/18/06 18,500dj	pm
Tc-99 on Si	tainless Si	teei Sour	ce #99TC	470-1814	8/3/9	9 37,300 d	pm, Sr90 :	Source #2697	-00 3/1/00 12,20	00 dpm
· · -			.,	- · -						
EMARKS: Calibra	ated w/292	29 #1261	26.							
oes Instrument M	leet Final	Accepter	ice Criteri	ia?:		'es () No			
	Attached	? :				es (O No			
allbration Sticker	nitari ibu :									
		Vext Cali	bration:		04/02/	ron:				
allbration Sticker sate instrument is		Next Cali	bration:		04/02/	70B	<u>-</u> -			
					04/02/	708	<u>-</u> -			
	Due For i				04/02/	08 Date: 4/2	/2007		Entered by:	£_initials
ate instrument is	Due For i		bration:		04/02/		/2007		Entered by:	f_initials

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. CONTAMINATION SURVEY INSTRUMENT DATA SHEET

Project No: 2005006.00)3			Detector		Meter					
Site Location/Backgroo Laboratory	ind Location: Great Lakes	Environmental Research	Type: Ludium Model	Serial No. PR17747C	Probe Area (cm²) 430	Type: Ludlum Model ZZ24	Serial No:	Operating Voltage:			
Check Source No:	2399-98		Check Source No:	2400-48		Check Source No:	Check Source No: W/ U-				
Radiomiclide: Tc - 9 9	Activity:	Date: 4/10/98	Radionaclide:	Activity: 12, 700	Date:	Radionuclide:	Activity: ايسر	Date: 7/14			

Planter					A Backgran							End of Shift	-				Daily Sourc	r Check (IX)	Daily Searc	e Check β)	icaler Mode pm)			
		AI	pka				H1			Ale	- As				to .		Source	E.M.	Source	En.		Bar.OK	BYOK	l mitris la
	1		3	A1.	1	2	,	As.	_'_	1	,	Av.	1	1	3	As.	[street	211.	(cpm)		 <u> </u>			
4/19/01	صا	2	0	2.7	521	539	518	526	4	3	3	3.3	529	535	521	528	1185	9.3	4736	23.7	 <u> </u>	V	.i/	5
420/57	G	9	ن	7	449	491	494	445	5	*	7	6.7	502	493	497	497	1338	10.5	4919	24.6	 	1		5
6k407	4	2			,		ř .		3						ł		1329	i	,			/	/	5
12267	4	1	3_	2.7	519	5 28	506	518	2	3	3	2.7	52	508	5/7	5,5	i336	10.5	5302	26.5		/	/	5
125/17	4	2	2	27	496	521	514	5/0	3	3	2.	2.7	315	504	512	5/0	1417	11.2	5316	26.6		V	\	5
6/4	3	2	3	2.7	50 9	518	525	517	3	1	3	23	518	504	511	514	1386	10.9	5307	26.5		1	V	5
																					<u> </u>			
	_																							L

$$.. MDA = \frac{2.71 + 4.65 \sqrt{BKG_{evg} \times 1}}{1 \times E \times \frac{A}{100}}$$

where \tibA = the activity level (tipm/100 cm²). BKG_m = the background count rate for tibls measurement type (cpm), t = the measurement duration (min), E = instrument efficiency, and A = probe area (cm²).

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GRIFFIN INSTRUMENTS



CALIBI Owner:		N CERTIF	ICATE F	FOR	22	24	SER	IAL#	170347	
		06/07/07		·	LOCAT	ON:			Griffin Ins	1
TE	CH.	Joanne G	ilenn		DATE L	AST CAL	FYPIRE	s:	04/26/04	3
Kei	ason For (Canoration:			For Calibration			-	•	
	•			Othe	r (See Remark	(S)		Due an	d Repair (Se	e Remarks)
]	NIST TRACE	ABLE EQU	JIPMENT USE					
MC	ODEL:	M-500	S	ERIAL#:	114512		CA	AL. DUE:	12/11/07	
MC	DDEL:		s	ERIAL#:			CA	AL DUE:		
] Fast/Slo	ow Switch	working proj	oerly 🗹	Audio Re	sponse	☑ Geotn	opism	CABLE	LENGTH:	6'
ONDITION	l:	Good A	F MECHAN	ICAL ZERO):	0 A	L MECHA	NICAL ZEI	RO:	0
EW BATTI	ERIES:	_ 0	Yes 💿	No	BATTERY C	HECK:	_	Se	ıt	
		OUND HY						<u> A.F.</u>	A.L.	
500 V:		500	A.	F.	BT (3.5	5 mV +/- 1	l mV):	4.5	3.5	
1000 V:	1	1000	А	F.	BW (3					
				F.	7					
1500 V:	73/2 T -4 4	1500	Α.	.F.	AT (126	/ MY +/-1	Umiv):	110	120	· · · · · · · · · · · · · · · · · · ·
	SCALE x.1 or x1		AS FOUND	% ERRO	R AS LEFT %	ERROR	AS FOL	IND % EF	ROR AS LE	T % ERRO
	1	250	250	0.0%	A.F.		251	0.4	1% A.F.	
		400	400	0.0%	A.F.					
•	x1 or x10	1000 2500	1000 2500	0.0%	A.F.					
		4000	4000	0.0%	A.F.					
	x10 or	10K	10 k		A.F.					
	x100	25K	25		A.F.					
	100 5	40K	40 H	_	A.F.					
	x100 or x1000	100K 250K	100 k	0.0%	A.F.					
		400K	400 K		AF					
verload Li	ight:	Adjust	ted () No	n 20% of th ot Adj.	e Set Point?: Low Batte	ry (2.2 V)		Yes C		sat
		w/43-37 #PR1				- ,	_			
		t Final Accep	wince Critér	187;	(e) Yes	0	No		
arika-Maa	Sticker At				(Yes	0	No		
	ment is Du	ie For Next Ca	allbration:			6/07/08				



GRIFFIN INSTRUMENTS



	N CERT	IFICATE FOR	43-37	PROBE #	PR177476
Owner: IEM					
DATE: 06/07/ FECH: Josen	e Glenn		LOCATION DATE LAST	: 「CAL EXPIRES:	Griffin Inst 04/26/06
Due For Ca	lihentian	REASON FOR O Repair (See Remark	CALIBRATION:	n Bomarko)	Dun and Danais
					. Due and Repair
CABLE	ENGTH: 6	ستنبير سندر دامه دام	INPUT SENS	ITTVITY: dual	
	NIST TRAC	EABLE EQUIPMENT AND	STANDARDS USE	DURING CALIBR	ATION
MODEL: MODEL:	2224	SERIAL #: SERIAL #:	170347	CAL. DUE: CAL. DUE:	06/07/08
<u> </u>		NIST TRACEA	BLE SOURCES USE	<u>D</u>	· · · · · · · · · · · · · · · · · · ·
SOURCE #:		2695-00	SOURCE #		
ISOTOPE: ACTIVITY(dpm):		Tc99 18400	ISOTOPE:		
ASSAY DATE:		03/01/00	ACTIVITY: ASSAY DAT	re:	
	_			· 	
Condition:	Sat	Unsat Effi	clency from last cal	Pu:	Tc Ni:
				Th:	C-14:
		HV		Vernler	
Setpoints from	last cal.:	N/A		N/A	
Sour	<u>:e</u>	Alpha Response	CPM Beta	Response CPM	
Backgn	ound:				
Pu-2	39:				A-B XTLK:
Tc-99	Ni:				B-A XTLK:
As Found Efficie	encies Pu, To	c:			
Th-230 /	C-14		1		1
Backgro	ound:				
Pu-23	19 :				A-B XTLK:
Tc-99	Ni:				B-A XTLK:
As Found Efficien	cies Pu, Tc:				
Th-230 / (C-14		ı		1
as found efficien	1cy within 20)% of the efficiency from	the last only	() V	ā) n. 40 =
		last calibration and the B-A Xtalk Is		○ Yes	No (See Remar



2 pi efficiencies denoted in italica,

GRIFFIN INSTRUMENTS



PROBE #: PR177476

Calibrations performed to ANSI N323A-1997 standards.

Date: 06/07/07

PLATEAU AND SET POINT DATA

HV / Vernier:	Tc-99 S	CPM):	sponse		39 Soonse	ource (CPM):	Back	grou	ind (CPM):	Net A to B Xtalk; <10%	B to A Xtall <1%
<u> </u>	A ch.	B ch.	Net Eff.	A ch.	B ct	. Net Eff.	Αc	h.	B ch.	<u> </u>	L
1500	3	2616	13.5%	969	366	5.2%	2	_	127	19.8%	<1%
1550	3	4227	21.5%	1838	456	9.9%	3		272	9.1%	<1%
1600	7	5749	29.0%	2430	580	13.1%	3		411	6.5%	<1%
1650	0	6244	30.3%	2753	861	14.9%	4		665	6.6%	<1%
1700	9	5576	25.2%	3151	1130	17.0%	3		937	5.8%	<1%
Alpha / B	eta Bkg		3	68							
<u>HV / Vernier</u>		<u>Pu</u>	-239	<u>Tc-99</u>	<u>Ni</u>	<u>Tc-99 :</u>	<u>55</u>	Th-	<u>230</u>	<u>C-14</u>	<u>Sr-90</u>
1650	CPI	M: 3	097	6375	5	8807		48	77		3948
4 pi AL Ei	fficiencie	s: 16.	72%	30.95	%	21.799	/o	16.2	25%		31.89%
2 pi AL E	fficiencie	s: 32.	95%	49.51	%	34.889	%	32.0	07%		45.61%
	ainless S	iteel Sour	ce #99TC	470-1814	8/3/9	9 37,300 d				7/18/06 18,500d; -00 3/1/00 12,20 	
es Instrument M	eet Final	Acceptar	ice Criteri	a7:	• '	Yes (O NO)			
alibration Sticker	Attached	? :			•	Yes (0			
ate instrument is	Due For I	Next Cali	bration:		06/07	7/08					
Performed/Revie	wed by:	Zere Zere	rane Gkni	ap		Date: 6/7	12007			Entered by:	& Initia

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. CONTAMINATION SURVEY INSTRUMENT DATA SHEET

Project No: 2005006.00	3			Detector			Meter	
Site Location/Backgrou Laboratory	nd Location: Great Lakes E	nvironmental Research	Type: Ludium Madel 43-48	Serial No. PRIGOUYS	Probe Area (cm²)	Type: Ludlum Model 2224	Serial No: 116239	Operating Vultage:
Check Saarce No:	2399-98		Check Source No: 2	400-98		Check Source No:	NIA	
Radionuclide:	Activity: 20,000	Date: 8710/98	Radiomuclide: Th-230	Activity: 12, 700	Date: 8/6/98	Radionuclide:	Activity:	Date:

Bere				_	h Backgrou							End of Shah or 12	-				Daily Smrc	r Check #)	Daily Source	r Check (3)	MDA [™] - So (dp				
			pho				ria .			Ale	As .			В	**2		Somery (cana)	Eff.	Southern (Charles)	ΣfL		р	Bat. OK	uv ak	feitials
61.			,	A+-	1	2	3	At.	_'_	1	3	An.	•	2	3	As.									5
6/4857		3					193		-4		2_	1.3	178	184	176	179	1917	15.1	4747.5	23.7	29	134.2			-
6/4/04	2	2		1.7	152	160	เรีๆ	157	\perp	2									4481				/		5
423/57	3	4	2.	3	185	173	133	177	2	3	3	2.7	174	182	177	178	1973	15.5	4540	22.7	74.7	142	✓	V	5
4/2/54	4	2	3	3	17)	180	174	as	3	4	1	2.7	181	17.3	176	177	1998	15.7	45965	23	34.3	140	J	1	5
trop	2	3	2.	2.3	68	177	175	173	3	2	3	27	173	168	174	172	2008	15.8	4560	22.8	40.1	196	>	V	5
447	1	2.	3	2	175	Γ 7 3	177	178	2	4		2,3	140	174	171	178	1988	15.7	4534	22.7	38,3	199	1	V	5
6/242	ż	۲	3	2.3	191	184	185	187	3		2				t—			1 -	45-65				\	1	2
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						<u> </u>													<u> </u>						
						<u> </u>					<u> </u>							L		L	<u> </u>				

..
$$MDA = \frac{2.71 + 4.65 \sqrt{BKG_{evg} \times 1}}{1 \times E \times \frac{A}{100}}$$

where MDA = the activity level (dpm/100 cm²), BKG_{ng} = the background count rate for this measurement type (cpm), t = the measurement duration (min), E = instrument efficiency, and A = probe area (cm²).



GRIFFIN INSTRUMENTS



Owner:		I CERTIF	ICATE F	OR	2	224	SERIA	\L#	116239	
- 		10/13/06				ATION:	· - 		Griffin Inst	****
TE	CH:	Joanne G	lenn		DATE	LAST CAL	. EXPIRES:		10/05/06	
				(a) Dua E			_		(See Remarks	•
Ne	asun rui (Januauon.								-
				Other	(See Rema	rks)		Due an	d Repair (See	Kemarks)
		1	NIST TRACE	BLE EQU	IPMENT US	ED DURIN	G CALIBRA	TION		
MC	DDEL:	M-500	SE	RIAL#:	114512		CAL.	DUE:	11/14/06	
M	DDEL:		SE	RIAL #:			CAL	DUE:		
Fast/Slo	ow Switch	working proj	oerly 🔽	Audio Res	oonse	₩ Geots	maiaa	CABLE	LENGTH: :	39"
										-
ONDITION			AF MECHANIC							0
EW BATT	ERIES:	0	Yes (●)	No	BAITERY	CHECK:	· 	S	<u></u>	
HY	AS FO	OUND HV	AS LEF	<u> </u>	WIN	DOW SETT	INGS:	<u>A.F.</u>	<u>A.L.</u>	
500 V:		500	A.F		BT (3.5 mV +/- 1	1 mV):	3.5	A.F.	
1000 V:	1	000	A.F	•	BW	(30 mV +/≺	3 mV):	30	A.F.	
1500 V:	1	500	A.F	•	AT (20 mV +/-1	0 mV):	120	A.F.	
	x.1 or x1	100 250	100	0.0%	A.F.	70 ENRON	250		RROR AS LEF	AENRO
		400	400	0.0%	A.F.					
·	х1 ог х10	1000 2500	1000 2500	0.0%	A.F.	<u> </u>				
		4000	4000	0.0%	A.F.					
	x10 or	10K	10 K	0.0%	A.F.					
	x100	25K 40K	25 K	0.0%	A.F.					
	x100 or	100K	100 K	0.0%	A.F.					
	x1000	250K	250 K	0.0%	A.F.					
		400K	400 K	0.0%	A.F.					
	lo	the As Found	i Produ 186abin	000/ af 46.	- O-A D-11	_	~ ··	_		
							● Ye		No	_
Overload Li	•	_	_	Adj.	Low Ba	ttery (2.2 V): •	Sat	() Uns	at
temarks; C	alibrated v	w/43-68 #PR1	90483.							
		t Final Accep	tance Criteria	7:		Yes	() N	lo		
alibration	Sticker At	tached?:				Yes	0 1	10		
Date Instru	ment is Du	e For Next C	alibration:			10/13/07				
										-
_										_

Entered by: Initials



GRIFFIN INSTRUMENTS



Owner: IEM	H OEKI	IFICATE FOR	43-68	PROBE #	PR190483
DATE: 10/13/ TECH: Joanne	06 e Glenn		LOCATION DATE LAS	V: IT CAL EXPIRES:	Griffin Inst 10/05/06
(a) ss. a		REASON F	OR CALIBRATION-		1000700
Due For CalCABLE LI		C Repair (See Rem	arks) Other (S		Due and Repair
			INPUT SENS		
	NIST TRACE	ABLE EQUIPMENT	AND STANDARDS USE	D DURING CALIBRA	TION .
MODEL:	2224	SERIAL #: SERIAL #:	116239	CAL. DUE: CAL. DUE:	10/13/07
		NIST TRAC	EABLE SOURCES USE		
SOURCE #:		2695-00			
ISOTOPE:		Tc99	SOURCE #:		
ACTIVITY(dpm):		18400	ISOTOPE: ACTIVITY:		
ASSAY DATE:		03/01/00	ASSAY DAT	E:	
Condition:	Sat	O Unsat E	ifficiency from last cal.	: Pu:	
				ru: Th:	Tc Ni: C-14:
		H⊻		<u>Vernier</u>	G-14.
Setpoints from las	st cal.:	N/A			
<u>Source</u> Backgroui	nd;	Alpha Respons	e CPM Beta	Response CPM	
Pu-239:					
Tc-99 Ni:					A-B XTLK:
As Found Efficienc	ies Pu, Tc:				B-A XTLK:
Th-230 / C-1			1		
Backgroun	d:				1
Pu-239;					
Tc-99 NI:				A	B XTLK:
Found Efficiencies	Pu, Tc:			В	-A XTLK;
Th-230 / C-14					
s found efficiency v	vithin 20% o	f the efficiency from	/ the last cal?	○ Yes ⑥ M	/
				— U Te\$ (●) N	lo (See Remarks) /A the plateau section, and



Performed/Reviewed by:

Jeanne Ghnn

GRIFFIN INSTRUMENTS



PROBE #: PR190483

Date:

10/13/06

Entered by:____Initials

PLATEAU AND SET POINT DATA

HV / Vernier: Tc-99 Source Response | Pu-239 Source | Background (CPM): Net A to B | B to A Xtalk:

1707 Vallation	1.000	(CPM):		Resp	опѕе	(CPM):	o-congre	suna (or my.	Xtalk: <10%	<1%
	A ch.	B ch.	Net Eff.	A ch.	B ch	. Net Eff.	A ch.	B ch.	<u> </u>	<u> </u>
1500	10	2555	13.7%	1479	245	8.0%	1	34	12.5%	<1%
1550	B	4291	23.0%	2371	275	12.8%	1	63	8.2%	<1%
1600	15	5624	30.0%	3325	324	18.0%	2	113	6.0%	<1%
1650	16	5556	29.2%	3534	364	19.1%	1	187	4.8%	<1%
1700	87	4193								2.07%
Alpha / E	Beta Bkg (2 <u>-239</u>	Tc-99	00 <u>Ni</u>	<u>Tc-99 :</u>	<u> </u>	1- <u>230</u>	<u>C-14</u>	<u>Sr-90</u>
1600	CPM	A: 31	071	543	6	7845	4	888		
· -	fficiencie 30 Source	-			0,000	•	-239 Soun		7/18/06 18,500dg	pm
111-2		Tc-99 or	n Stainles:	Steel S	onice	#99TC470-	1814 8/3/9	99 37,300 dpn	η	
EMARKS: No pre	vious plat	tesu data	ı. Calibrate	ad w/222	4 #116	3239.		99 37,300 dpn	n	
EMARKS: No pre	vious plat	tesu data	ı. Calibrate	ad w/222	4 #116		1814 8/3/8	99 37,300 dpn	n	
EMARKS: No pre	evious plat	teau data Acceptar	ı. Calibrate	ad w/222 a?:	A #116	3239.		99 37,300 dpr	n 	

Calibrations performed to ARSI N323A-1997 standards.

Date: 10/13/2006



FIELD SERVICE REPORT

PerkinElmer LAS, Inc. 710 Bridgeport Avenue SHELTON CT 06484-4794 TEL: (800) 762-4000 FAX: (203) 944-4983

 SERVICE ORDER NO:
 320402147

 TYPE:
 ZM02

PAGE 1 OF 1

FUNCTIONAL LOC. ADDRESS	US100521472 GREAT LAKES ENVIRO RES LABS 2205 COMMONWEALTH BLVD ANN ARBOR MI 48105 USA	EQUIPMENT NO. DESCRIPTION JOB TYPE	10367672 TRICARB2500 / 403636 Planned Maintenance
		SHIP-TO NO. PAYER NO. PURCHASE ORDER	100521472 4521098 CRCARD
CONTACT TELEPHONE FAX EMAIL	DUANE GOSSIAUX 734-741-2390 DUANE.GOSSIAUX@NOAA.GOV	CONTRACT NO. LINE ITEM DESCRIPTION	
START DATE END DATE	05.07.2007 05.07.2007	COVERAGE	
SOFTWARE HARDWARE	RRD		

PROBLEM DESCRIPTION HW-BILLABLE PM VISIT

WORK DESCRIPTION

Travel - Billable

Travel - Billable Billable P.M. Service

I decontaminated, cleaned & lubricated as required. I checked a lignments, connections, & voltages. I replaced the dual low voltage power supply due to +4vdc on the +5vdc line & 700mvac ripple on the +5vdc line. I checked & reset system error log & I.P.A. baselines. I ran chkdst/f & defrag on the hard drive. I ran I.P.A. & backed up user data files to disk. H.V.R. = 3373, H.V. L. = 2986

3H EFF = 60.2, BKG = 12.7, 14C EFF = 96.4 BKG = 19.7

Cycles: 669 elevator cycles since 27 Jun. 2005

MATERIAL	DESCRIPTION			QTY	UNIT	
7401286	DUAL POWER SUPPLY ASSY		 .	1	PC	
ACTIVITY	CSE	START	FINISH	DURATION	UNIT	
Travel - Billable Repair-BillableLabor	US03078 FAY, DALE L. (BB)(VM US03078 FAY, DALE L. (BB)(VM	05.14.2007 05.14.2007	05.14.2007 05.14.2007	1.0 4.0	HR HR	

US DEPARTMENT OF COMMERCE/NOAA
"Final Status Survey Report for the Great Lakes Environmental Research Laboratory"
August 2, 2007

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Appendix 8.4 - Field Survey Records





JURVEYS BY ROOM

	 5V:			Cal	ibrati	ion D	ne.					Site	Nam	e:					Date	e:	Tin	
2224	116239			_			11					1	GLE		۷				6/13	107	14	
Instrument S	SN:_	- m		Cal	ibrat	ion D	ue:					Г	ation	: _			_					
	PR 1904	85		├-		•	15					} -			. سرد	30	7					
	N: 4/4		<i>-</i>					الم				_	pose:								<!--</del-->	_
Survey Perfe	ormed By (Pri	nt): -	Jus	-fAc	У.	لہ	<u></u>	wi	<u>ن,</u>			Su	vey P	erfo	med	Ву (Signa	ture):	H	كور	<u>L</u>	<u> </u>
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Survey Number CG18U7-2	HADIOLOGICAL SURVEY	FORIVI	Page of
Instrument/SN: 2724/116239	Calibration Due:	Site Name:	Date: Time:
Instrument/SN: 43-C8/PR150483	Calibration Due:	Location:	
Instrument/SN: W/W-	Calibration Due: 🛶 📭	Purpose: (-55	
Survey Performed By (Print): Jor-	FREY W Suncial	Survey Performed By (Signature)	140/
□ Battery OK	Source Check OK	Grid Dimensions: 2 × 2	ches ntimeters
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5 5	SHELVED		
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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.

RADIOLOGICAL SURVEY FORM

Page 1 of 9

	Instrument/SN: 2224 114239											Ca		tion l			_		=			Site Name:								Da د/رن	ie: がい	Tin	ne:		
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Survey Sumber 061807-3

Static Count and Smear Locations

25

D+3.0, 1+2.0, 8.0

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roo	m 305	
Surv	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+4.5, 0+1.0	0/170
2	B+2.5, 0+4.5	2/140
3	C+0.5, 0+1.5, 2.5	1/125
4	C+4.5, 0+4.5	1/146
5	C+2.5, 1+1.5	1/155
6	C+5.0, 1+2.0	3/177
7	D+1.5, 1+2.0, 3.0	2/103
8	C+5.5, 1+5.5	1/130
9	C+4.5, 2+2.0, 3.0	2/106
10	B+3.5, 2+1.5, 5.0	1/153
11	B+2.5, 1+5.0	1/143
12	A+4.0, 2+0.5	2/164
13	A+3.0, 1+3.0	2/149
14	B+0.0, 1+1.0, 3.0	0/155
15	B+3.0, 1+3.0, 3.0	1/167
16	C+0.5, 1+0.5, 3.0	0/156
17	C+0.5, 1+2.0, 2.5	2/172
18	B+3.0, 0+0.0, 4.0	3/126
19	C+5.5, 0+0.0, 5.0	1/154
20	D+4.0, 0+3.5, 4.0	1/161
21	D+1.5, 2+4.0, 6.0	2/148
22	B+5.5, 2+4.0, 4.0	2/159
23	A+0.0, 1+2.0, 7.5	2/167
24	B+1.0, 2+3.0, 0.5	2/150

Smear only

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. Copyright © Integrated Environmental Management, 2003 RSP-019 (Rev. 003) - Attachment 4

Client Name: Gl	ERL.			IEM Project No.:	2005006.003								
Sample Collecti June 18, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 19, 2007	Date:	Report Date:							
			DATA AC	QUISITION									
Instrument Man Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		instrument Seria 126126/132238	il No.:	Calibration Due: April 2, 2008							
Analysis Method	d:			Instrument	Efficiency								
■ IEM RSP (sp ■ Other (specifi	edify): RSP-019 y):	Source Identifier/SN	Source Activity - 4ग (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)						
Analysis Type:		2400-98	12700	44280	10	4427	0.35						
■ Gross Alpha □ Gross Beta				Instrument (Background	· 							
□ Other (specify	/) :	Gross	Counts	Count (m		Background Count Rate (cpm)							
			46 60 1										
			RESI	ULTS	·		<u> </u>						
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes						
1	1	2	-0.3	-0.8	0.5	1.5	8						
2	1	2	-0.3	-B.G-	0,5	1.5	a						
3	0	2	-0.8	-2.2	0.0	1.5	a						
4	1	2	-0.3	8.0-	0.5	1.5	8						
5	0	2	-0.8	-2.2	0.0	1.5	8						
6	2	2	0.2	0.7	0.7	1.5							
7	11	2	-0.3	-0.8	0.5	1.5	9						
8	1	2	-0.3	-0.8	0.5	1.5	8						
9	1	2	-0.3	-0.8	0.5	1.5	8						
10	0	2	-0.8	-2.2	0.0	1.5	. a						
11	2	2	0.2	0.7	0,7	1.5	а						
12	3	2	0.7	2.1	0.9	1.5	<u>a</u>						
13	1	2	-0.3	-0.8	0.5	1.5	8						
14	0	2	-0.8	-2.2	0.0	1.5	8						
Codes; (8) - No correction for a (b) - Visible damage to (c) - Sample returned to (d) - Other (describe); e) - Other (describe);	sample	Notes: Room 305											
Analysis perform	ned by (print):		Analysis perform	ed by (tignature):		License No.:							
leffrey W <u>. Su</u> mlin,	RRPT		MDE License No: MD-31-281										

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Client Name: Gl	LERL			IEM Project No.:	2005006.003					
Sample Collecti June 18, 2007	on Oate:	Sample Ship Da N/A	te:	Sample Analysis June 19, 2007	Date:	Report Date:				
 			DATA AC	QUISITION						
Instrument Man Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238) No.:	Calibration Due: April 2, 2008				
Analysis Metho	d:			Instrument	Efficiency					
■ IEM RSP (sp □ Other (specify	edfy): RSP-019 y):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)			
Analysis Type:		2400-98	12700	44280	10	4427	0.35			
☐ Gross Alpha ☐ Gross Beta ☐ Other (specify	A.			instrument i	Background					
- Olliel (apeca)	,,.	Gross	Counts	Count (m	Time in)	Background Count Rate (cpm)				
			16	6	0	1				
			RESU	JLTS	_ 					
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes			
15	2	2	0.2	0.7	0.7	1.5	a			
16	3	2	0.7	2.1	0.9	1,5	a			
17	0	2	-0.8	-2.2	0.0	1,5	8			
18	0	2	-0.8	-2.2	0.0	1.5	8			
19	1	2	-0.3	-0.8	0.5	1.5	<u>a</u>			
20	3	2	0.7	2.1	0.9	1.5	a			
21	2	2	0.2	0.7	0.7	1.5	a			
22	11	2	-0.3	-0.8	0.5	1.5	<u>a</u>			
23	0	2	-0.8	-2.2	0.0	1.5	8			
24	1	2	-0.3	-0.8	0.5	1.5	a			
25	1	2	-0.3	-0.8	0.5	1.5	a			
Codes: (a) - No correction for a (b) - Visible damage to (c) - Sample returned t (d) - Other (describe): (a) - Other (describe):	sample	Notes: Room 305								
Analysis perform	ned by (print):		Analysis perform	ed by (signature):	License No.:					
Jeffrey W. Sumlin	RRPT		1km	<i>y</i>	MDE License No: MD-31-281-01					

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		. 		· · · · · · · · · · · · · · · · · · ·		 			
Client Name: GL	ERL	-		IEM Project No.:	2005006.003	·			
Sample Collecti June 18, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 19, 2007	Date:	Report Date:	· · · · · ·		
		<u> </u>	DATA AC	QUISITION		<u> </u>			
Instrument Man Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238	il No.:	Calibration Due: April 2, 2008			
Analysis Method	1 :			Instrument	Efficiency				
■ IEM RSP (sp □ Other (specify		Source Identifier/SN	Source Activity - 47 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)		
Analysis Type:		2399-98	20000	52550	10	5200	0.26		
□ Gross Alpha ■ Gross Beta			•••	Instrument l	Background				
□ Other (specify	n):	Gross	Counts	Count (m	t Time in)		Count Rate		
		32	?96	6	0	5	5		
		· · · · · · · · · · · · · · · · · · ·							
Smear No.	Gross Counts	Count Time (mln)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes		
1	116	2	3.1	11.8	5.4	6.7	8		
2	98	2	-5.9	-22.8	5.0	6.7	а		
3	112	2	1.1	4,1	5.3	6.7	a		
4	106	2	-1.9	-7.4	5.1	6.7	8		
5	109	2	-0.4	-1.7	5.2	6.7	a		
6	115	2	2.6	9.9	5.4	6.7	a		
7	102	2	-3.9	-15.1	5.1	6.7	8		
8	95	2	-7.4	-28.6	4.9	6.7	a		
9	99	2	-5.4	-20.9	5.0	6.7	8		
10	104	2	-2.9	-11.3	5.1	6.7	a		
11	107	2	-1.4	-5.5	5.2	6.7	а		
12	114	2	2.1	7.9	5.3	6.7	8		
13	101	2	-4.4	-17.1	5.0	6.7	a		
14	105	2	-2.4	-9.4	5,1	6.7	8		
Codes: (a) - No correction for s (b) - Visible demage to (c) - Sample returned t (d) - Other (describe): (e) - Other (describe):	sample	Nates: Room 305							
Analysis perform	ned by (print):		Analysis perform	ed by (signature):		License No.:			
Jeffrey W. Sumlin	RRPT		MDE License No: MD-						

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Client Name: GL	ERL			IEM Project No.:	2005006.003	1				
Sample Collection June 18, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 19, 2007	Date:	Report Date:				
			DATA AC	QUISITION	···					
Instrument Manu Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 128126/132238	i No.:	Calibration Due: April 2, 2008				
Analysis Method	l:			Instrument	Efficiency					
■ IEM RSP (specify		Source Identifier/SN	Source Activity - 4⊓ (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)			
Analysis Type:		2399-98	20000	52550	10	5200	0.26			
□ Gross Alpha ■ Gross Beta				Instrument I	Background					
☐ Other (specify):	Gross	Counts	Count (m		Background Count Rate				
		32	96	6	0	5	5			
			RESU							
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes			
15	119	2	4.6	17.6	5.5	6.7	а			
16	104	2	-2.9	-11.3	5.1	8.7	8			
17	102	2	-3.9	-15.1	5.1	6.7	a			
18	113	2	1.6	6.0	5.3	6.7	а			
19	108	2	-0.9	-3.6	5.2	6.7	a			
20	99	2	-5.4	-20.9	5.0	6.7	a			
21	115	2	2.6	9.9	5.4	6.7	a			
22	107	2	-1.4	-5.5	5.2	6.7	8			
23	111	2	0.6	2.2	5.3	6.7	<u>a</u>			
24	98	2	-5. 9	-22.8	5.0	6.7	a			
25	102	2	-3.9	-15.1	5.1	6.7	a			
		<u> </u>								
Codes: (a) - No correction for so (b) - Visible damage to a (c) - Sample returned to (d) - Other (describe): (e) - Other (describe):	sample	Notes: Raom 305								
Analysis perform	ed by (print):		Analysis perform	ed by (signature):		License No.:				
Jeffrey W. Sumlin,	RRPT		MDE License No: MD-31-281-01							

20 Jun 2007 17:41

TRI-CARB - 1.09

Suf 9 Page #1

Protocol #:18

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Background Subtract: 1st Vial

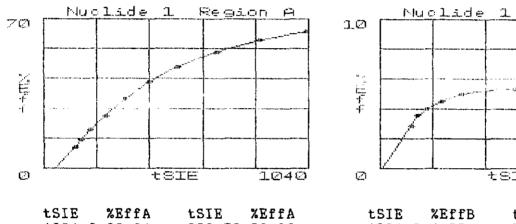
Low Energy: 3H

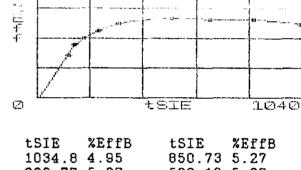
High Energy: 14C

Region B

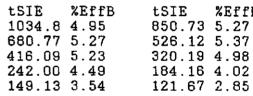
LCR $\Gamma\Gamma$ UL25% BKG Region A: 0.0 - 12.00 0.0 13.97 12.0 - 156 Region B: 0 0.0 12.73 0.0 - 0.0Region C: 0 0.0 0.00

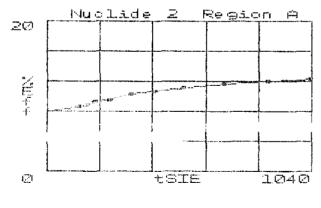
Quench Indicator: tSIE/AEC Ext Std Terminator: Count





tSIE	%EffA	tSIE	%EffA
1034.8	63.94	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10





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tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	11.99
697.16	11.62	538.87	11.12
426.87	10.69	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

0.000 688.96

Page #2

User : KIM

0.00

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SYSTEM NORMALIZED

10.00

26

0.00

C14 IPA DATA PROCESSED - 20-Jun-2007 22:27

C14 Eff (0-156 keV) = 95.79 %

C14 CHI SQUARE IPA DATA PROCESSED - 20-Jun-2007 22:38

C14 Chi Square = 19.52

H3 IPA DATA PROCESSED - 20-Jun-2007 22:39

H3 Eff (0-18.6 keV) = 60.22 %

H3 CHI SQUARE IPA DATA PROCESSED - 20-Jun-2007 22:49

H3 Chi Square = 24.08

BKG IPA DATA PROCESSED - 20-Jun-2007 23:50

Bkg (0-18.6 keV) = 13.38 cpm

Bkg (0-156 keV) = 21.42 cpm

C14 E^2/B (1-156 keV) = 524.56

H3 E^2/B (1-18.6 keV) = 270.84

0.00

Instrument SN: BICROH / B 2960								Ca		ion D		7_				Site	e Nan	ne: C	አረ <i>ር</i>	U		_	Dat 4/4	e: lsp	Tm	
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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.

RADIOLOGICAL SURVEY FORM

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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.

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Survey Number 062207 - G
RADIOLOGICAL SURVEY FORM

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Nurves Number 062207-8

Page ______ of _____

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43-68/PR 190483	(0/13/07	Room 3U7
Instrument SN: W/W	Calibration Due: ハハ	Purpose: C55
Survey Performed By (Print): 506-		Survey Performed By (Signature): 14,05%
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Page 1 of 5

Number 062207-9

RADIOLOGICAL SURVEY FORM

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roo	m 307	
Surv	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	C+2.5, 2+4.5	1/174
2	C+2.0, 0+4.0	0/162
3	B+1.0, 0+4.0	1/177
4	A+1.5, 2+0.5, 3.0	2/171
5	B+3.0, 2+3.5	1/169
6	A+4.5, 2+4.5	1/163
7	B+2.5, 3+0.5, 3.0	1/176
8	B+3.0, 3+2.5, 6.0	Smear only
9	C+3.5, 2+2.5, 3.0	2/174
10	C+5.5, 2+3.0, 6.0	Smear only
11	D+0.0, 1+1.0, 4.0	0/157
12	B+2.0, 0+0.0, 4.0	1/154
13	A+0.0, 1+2.5, 6.0	1/142
14	C+1.5, 3+3.0, 2.0	2/150
15	A+2.5, 3+0.5, 2.5	0/171

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:27

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

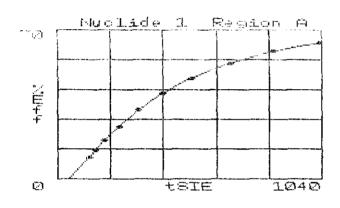
High Energy: 140

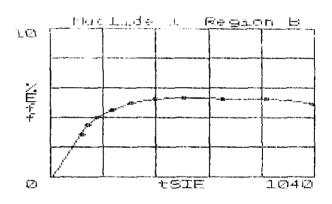
Background Subtract: 1st Vial

LCR 25% LL UĻ BKG Region A: 0.0 - 12.00 0.0 11.49 Region B: 12.0 - 156 0 0.0 13.91 0.0 -Region C: 0.0 0 0.0 0.00

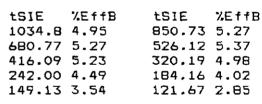
Room 307

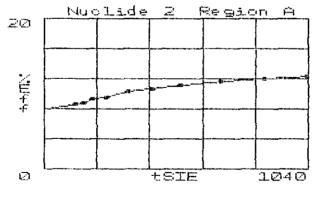
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

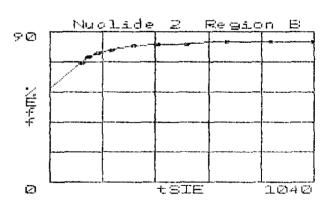




tSIE	%EffA	tSIE	%EffA
1034.8	63.94	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10,70	329.70	10.31

tsiE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.54

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	152.9	73 8.76	122.5	8 8.59		152.93	75.21	122.58	71.52	
S#	TIME	CPMA	CPMB	DPM1	DPM2	SIS	tSIE	FLAG		
1	10.00	11.49	13.91			65.754	721.27	В		
2	10.00	0.00	0.00	0.00	0.00	0.000	701.02			
3	10,00	0.00	0.00	0.00	0.00	0.000	703.89			
4	10.00	0.00	0.00	0.00	0.00	0.000	704.83			
5	10.00	0.00	0.00	0.00	0.00	0.000	714.45			
6	10.00	0.26	0.00	0.48	0.00	0.000	722.52			
7	10.00	0.34	0.00	0.62	0.00	0.000	708.37			
8	10.00	0.00	0.00	0.00	0.00	0.000	717.70			
9	10.00	0.00	0.00	0.00	0.00	0.000	697.15			
10	10.00	0.00	0.00	0.00	0.00	0.000	702.B4			
11	10.00	0.00	0.94	0.00	1.13	0,000	705.39			
12	10.00	0.00	0.00	0.00	0.00	0.000	718.36			
13	10.00	0.13	0,00	0.24	0.00	0,000	714.29			
14	10.00	0.00	0.00	0.00	0.00	0.000	717.41			
15	10.00	0.00	0.00	0.00	0.00	0.000	723.94			
16	10.00	0.00	0.63	0.00	0.75	0.000	708.99			

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Instrument SN: ムル		Calibratio	on Due:	/ /				Loc	ation);	R	بدن	3	07				
Instrument SN	214	Calibratio	on Due:	411				┡	pose:		F5.							
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Survey Number 062207-4

Calibration Due	113/07- :: (2)/3/07	Purpose: F55	Page
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room 309

10001	. 507			
Survey Location		CPM α/β per 100 cm ² (total for 2 minute count)		
1	A+4.5, 1+4.5	1/168		
2	A+5.5, 3+0.5	1/161		
3	C+4.5, 2+3.5, 3.0	0/172		
4	C+1.5, 1+2.5	2/156		
5	B+4.5, 0+3.5	0/166		
6	A+2.5, 1+4.0, 3.0	0/170		
7	A+1.0, 1+4.5, 6.0	Smear only		
8	C+4.5, 1+1.5, 2.5	1/169		
9	C+4.5, 1+4.0, 2.5	1/158		
10	D+0.0, 2+1.5, 4.0	2/163		
11	B+2.0, 3+3.0, 6.0	0/172		
12	A+0.0, 1+0.5, 2.0	0/166		
13	B+3.0, 0+0.0, 6.0	1/153		
14	C+0.5, 1+5.5	0/169		
15	A+0.5, 3+2.5	1/173		

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

25 Jun 2007 18:47 Protocol #:29

TRI-CARB - 1.09

SURVEY

Page #1 User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

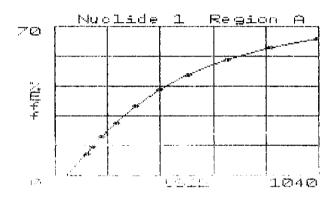
High Energy: 14C

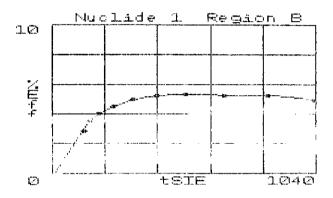
Background Subtract: 1st Vial

	LL	UL	LCR	25%	BKG
Region A:	0.0 -	12.0	0	0.0	11.68
Region B:	12.0 -	156	0	0.0	15.02
Region C:	0.0 -	0.0	0	0.0	0.00

0.0 - 0.0 O 0.0 0.00 Room 309

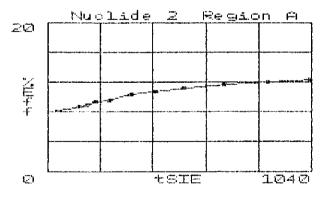
Quench Indicator: tSIE/AEC Ext Std Terminator: Count





tSIE	%EffA	tSIE	%EffA
1034.8	63.94	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE tSIE %EffB %EffB 1034.8 4.95 850.73 5.27 6B0.77 5.27 526.12 5.37 416.09 5.23 320.19 4.98 242.00 4.49 184.16 4.02 121.67 2.85 149.13 3.54



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1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

%EffB tSIE tSIE %EffB 869.29 84.06 1035.1 83.64 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.54

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Proto	col #:2	9	SUR	JEY .					User	: KIM	
	239.	94 9.55	188.5	5 9.32		239.94	79.05	188.56	77.31		
	152.	93 8.76	122.58	8.59		152.93	75.21	122.58	71.51		
S#	TIME	CPMA	CPMB	DPM1	DPM2	SIS	tSIE	FLAG			
1	10.00	11.68	15.02			72.811	722.71	B			
2	10.00	0.39	0.00	0.71	0.00	0.000	714.21				
3	10.00	0.30	0.00	0.54	0.00	0.000	737.75				
4	10.00	0.00	0.00	0.00	0.00	0.000	724.50				
5	10.00	0.00	0.00	0.00	0.00	0.000	706.48				
6	10.00	1.22	0.00	2.24	0.00	0.000	708.08				
7	10.00	0.00	0.00	0.00	0.00	0.000	712.32				
В	10.00	0.00	0.00	0.00	0.00	0.000	709.92				
9	10.00	0.00	0.00	0.00	0.00	0.000	720.54				
10	10.00	0.00	0.00	0.00	0.00	0.000	713.83				
11	10.00	0.00	0.00	0.00	0.00	0.000	715.87				
12	10.00	0.00	0.00	0.00	0.00	0.000	716.87				
13	10.00	1.11	0.00	2.03	0.00	0.000	723.42				
14	10.00	0.22	0.00	0.39	0.00	0.000	714.64				
15	10.00	0.00	0.00	0.00	0.00	0.000	713.25				
16	10.00	0.12	0.00	0.22	0.00	0.000	715.09				

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Survey Number 1062107-19

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roor	n 311						
Surv	ey Location	CPM α/β per 100 cm ² (total for 2 minute count					
1	A+2.5, 0+2.5	0/198					
2	B+1.5, 0+3.5	1/206					
3	A+5.5, 1+1.5	1/203					
4	B+3.5, 1+5.5, 3.0	0/210					
5	A+5.5, 2+3.5	1/196					
6	B+5.0, 1+1.5, 4.0	1/205					
7	A+5.5, 3+1.0, 4.0	0/209					
8	A+0.0, 2+0.5, 6.0	1/201					
9	B+1.5, 0+0.0, 2.0	2/209					
10	A+1.0, 1+2.0, 2.0	1/202					
11	B+3.0, 2+5.0, 0.5	1/196					

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

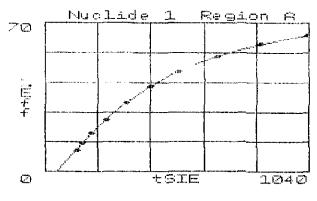
High Energy: 14C

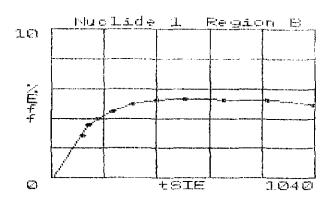
Background Subtract: 1st Vial

	LL	UL	LCR	25%	BKG
Region A:	0.0 -	12.0	0	0.0	10.96
Region B:	12.0 -	156	0	0.0	11.24
Region C:	0.0 -	0.0	0	0.0	0.00

Room 31/

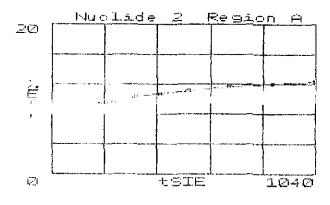
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

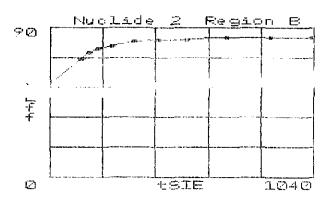




tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE		tSIE	
1034.8 680.77		950.73 526.12	
416.09		320.19	
242.00		184.16	
149.13	3.54	121.67	2.85





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	B69.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	ХЕffВ	tsie	%EffB
1035.1	B3.64	869.29	84.06
697.16	B4.32	538.87	82.87
426.87	82.43	329.70	81.55

	239.	13:40 3 74 9.55 73 8.76	SUR 188.5	-CARB - VEY 6 9.32 8 8.59	1.09	239.94 152.93			77.31	
S# 1 2 3 4 5 6 7 8 4 10 11 12	TIME 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00	CPMA 10.96 0.00 0.35 0.42 2.62 1.56 0.00 0.57 0.00 0.00 2.39 0.00	CPMB 11.24 0.34 0.00 2.27 2.18 1.34 1.80 1.83 0.81 3.19 2.21 1.39	DPM1 0.00 0.65 0.19 4.32 2.51 0.00 0.57 0.00 0.00 3.79 0.00	DPM2 0.41 0.00 2.68 2.32 1.43 2.16 2.14 0.97 3.83 2.39 1.67	0.000 0.000 3.537 14.819 0.000 0.000 0.000 68.958 53.875	715.76 718.48 711.56 706.28 683.85 719.47 707.88 716.00 717.06 709.73	FLAG B		

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RADIOLOGICAL SURVEY FORM

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Survey Number C62C07-10

Instrument SN: 2224/116235	Calibration Due:		Site Name:	<u> </u>	Date:	Time:
Instrument SN: 43-68 PR Ko483	(2/13/c Calibration Due: (2/13/0		Location:	400	1-70+	1430
Instrument SN w/A-	Calibration Due:		Purpose: F55			 -
	AROY W 5		Survey Performed E	Ry (Signature)	100	/
Ø Battery OK Ø HV OK		Source Check OK	Grid Dimensions: meters feet	Lal Incl		
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Moles PORFURMUS 2 MINING & B AND LSC A			LUCT TOV) Su	n P 3 fo	(GRC	>>5

Static Count and Smear Locations

A+0.0, 0+4.0, 2.0

20

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

_	400	
Roon	n 400	
Surve	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+1.5, 1+1.5	2/223
2	A+1.5, 0+5.5	2/231
3	A+2.0, 0+4.0	2/244
4	A+1.5, 0+2.5	2 <i>/</i> 227
5	A+2.0, 0+1.0	1/219
6	A+4.0, 0+1.5	2/233
7	A+4.0, 0+2.5	1/218
8	A+4.0, 0+4.5	1/226
9	A+4.0, 1+0.5	2/236
10	B+0.0, 1+0.0	2/219
11	B+0.5, 0+4.5	3/222
12	B+0.5, 0+2.5	2/208
13	B+0.5, 0+1.5	2/217
14	B+1.5, 0+1.5	3/323
15	B+3.0, 1+1.0	2/231
16	B+2.0, 0+1.0, 0.5	1/196
17	A+3.5, 0+0.0, 4.0	1/114
18	B+4.0, 0+5.5, 5.0	2/126
19	B+0.5, 1+2.0, 6.0	2/119

1/124

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

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Client Name: GL	ERL			IEM Project No.:	2005006.003						
Sample Collecti June 20, 2007	on Date:	Sample Ship Dai N/A	Sample Analysis Date: June 20, 2007			Report Date:					
			DATA ACC	DUISITION		<u>.</u>					
Instrument Man	ufacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008					
Analysis Method	d:		Instrument Efficiency								
■ IEM RSP (sp □ Other (specify	ecify): RSP-019 y):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)				
Analysis Type:		2400-98	12700	43161	10	4316	0.34				
■ Gross Alpha □ Gross Beta				Instrument I	Background						
□ Other (specify	<i>(</i>):	Gross	Counts	Count (m	•	Background (cp					
		3	36	6	0	1					
			RESI	ULTS							
Smear No. Gross Counts		Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes				
1	1	2	-0.1	-0.3	0.5	1.3	8				
2	1	2	-0.1	-0.3	0.5	1.3	a				
3	0	2	-0.6	-1.8	0.0	1.3	a				
4	2	2	0.4	1.2	0.7	1.3	<u>a</u>				
5	1	2	-0.1	-0.3	0.5	1.3	а				
6	1	2	-0.1	-0.3	0.5	1.3	8				
7	1	2	-0.1	-0.3	0.5	1.3	а				
8	1	2	-0.1	-0.3	0.5	1.3	8				
9	0	2	-0.6	-1.8	0.0	1.3	â				
10	0	2	-0.6	-1.8	0.0	1.3	a				
11	2	2	0.4	1.2	0.7	1.3	8				
12	0	2	-0.6	-1.8	0.0	1.3	а				
13	2	2	0.4	1.2	0.7	1.3	8				
14	0	2	-0.6	-1.8	0.0	1.3	a				
Codes: (a) - No correction for (b) - Visible damage to (c) - Sample returned (d) - Other (describe): (e) - Other (describe):	sample to client	Notes: Raom 400.									
Analysis perfora	med by (print):		Analysis perfern	ed by (signature):	License No.:						
Jeffrey W. Sumlir	a. RRPT		1 1/w /	<u>.</u> .	MDE License No: MD-31-281-01						

5009

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. Copyright © Integrated Environmental Management, 2003 RSP-019 (Rev. 003) - Attachment 4

Client Name: GL	ERL			IEM Project No.:	2005006.003		···				
Sample Collecti June 20, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 20, 2007	Date:	Report Date:					
			DATA AC	DATA ACQUISITION							
Instrument Manu Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126128/132238	Calibration Due: April 2, 2008						
Analysis Method	d:		Instrument Efficiency								
■ IEM RSP (spi □ Other (specify	ecify): RSP-019 /):	Source Identifier/SN	Source Activity - 4⊓ (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)				
Analysis Type:		2400-98	12700	43161	10	4316	0.34				
☐ Gross Alpha ☐ Gross Beta		Instrument Background									
☐ Other (specify) ;	Gross	Counts	Count (m		Background (cp					
		3	96	6	0	1					
			RESI	JLT\$							
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes				
15	0	2	-0.6	-1.8	0.0	1.3	a				
16	2	2	0.4	1.2	0.7	1.3	a				
17	2	2	0.4	1.2	0.7	1.3	а				
18	3	2	0.9	2.6	0.9	1.3	а				
19	1	2	-0.1	-0.3	0.5	1.3	a				
20	0	2	-0.6	-1.8	0.0	1.3	а				
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					, <u> </u>						
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (a) - Other (describe):											
Analysis perform	ed by (print):		/ /, \ =	ed by (signature):		License No.:					
Jeffrey W. Sumlin,	RRPT		17W Z	<u> </u>		MDE License No: MD-31-281-01					

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Cilent Name: GL	ERL			IEM Project No.:	2005006.003		
Sample Collecti June 20, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysia June 20, 2007	Date:	Report Date:	
			DATA AC	QUISITION			
Instrument Man Ludium	ufacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	ł No.:	Calibration Due: April 2, 2008	
Analysis Method	d:			Instrument	Efficiency		
■ IEM RSP (sp □ Other (specify	ecify): RSP-019 y):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (mln)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2399-98	20000	52406	10	5187	0.26
□ Gross Alpha ■ Gross Beta				Instrument i	Background	······································	
□ Other (specify	y):	Gross	Counts	l e	t Time in)	Background (cp	
		31	97	6	0	5	3
			RESI	ULTS		-	
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
1	103	2	-1.8	-6.9	5.1	6.6	8
2	86	2	-4.3	-16.5	5.0	6.6	a
3	102	2	-2.3	-8.8	5.1	6.6	a
4	110	2	1.7	6.6	5.2	6.6	B
5	114	2	3.7	14.3	5.3	6.6	a
6	107	2	0.2	0.8	5.2	6.6	a
7	96	2	-5.3	-20.4	4.9	6.6	a
8	101	2	-2.8	-10.7	5.0	6.6	a
9	99	2	-3.8	-14.6	5.0	6.6	a
10	108	2	0.7	2.8	5.2	6.6	a
11	102	2	-2.3	-8.8	5.1	6.6	8
12	114	2	3.7	14.3	5.3	6.6	a
13	112	2	2.7	10.5	5.3	6.6	a
14	103	2	-1.8	-6.9	5.1	6.6	8
Codes: (a) - No correction for (b) - Visible damage to (c) - Sample returned (d) - Other (describe): (e) - Other (describe):	o sample to client	Notas: Room 400.			-		
Analysis perfora	med by (print):		Analysis perform	ned/by (signature):		License No.:	
Jeffrey W. Sumlir	n. RRPT		1102	<u> </u>		MDE License No:	MD-31-281-01

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				T			
Client Name: G	LERL		 	IEM Project No.:	2005006.003		
Sample Collect June 18, 2007	ion Date:	Sample Ship Da N/A	te:	Sample Analysis June 19, 2007	Date:	Report Date:	
			DATA ACC	QUISITION		<u>-</u>	
Instrument Mar Ludium	nufacturer:	Instrument Mod- 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008	
Analysis Metho	od:			Instrument	Efficiency		
Other (specif		Source identifier/SN	Source Activity - 477 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2399-98	20000	52406	10	5187	0.26
□ Gross Alpha ■ Gross Beta				Instrument	Background	<u> </u>	
□ Other (specif	ÿ):	Gross	Counts		t Time in)		Count Rate
ı		31	197	6	0	5	3
			RESI	ULTS		<u>, </u>	<u> </u>
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
15	105	2	-0.8	-3.0	5.1	6.6	a
16	99	2	-3.8	-14.6	5.0	6.6	a
17	103	2	-1.8	-6.9	5.1	6.6	3
18	103	2	-1.8_	-6.9	5.1	6.6	8
19	108	2	0.7	2.8	5.2	6.6	a
20	101	2	-2.8	-10.7	5.0	6.6	a
							_
							_
	-						
Codes: (a) - No correction for (b) - Visible demage is (c) - Sample returned (d) - Other (describe): (e) - Other (describe):	o semple to client	Notes: Room 400.					
Analysis perfor	med by (print):		Analysis perform	red by (signature):		License No.:	
Jeffrey W. Sumlir	n, RRPT		1107	_		MDE License No:	MD-31-281-01

21 Jun 2007 07:45

TRI-CARB - 1.09

Protocol #:18

SURVEY

Page #1 User : KIM

Time: 10.00

Region A:

Region B:

Region C:

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

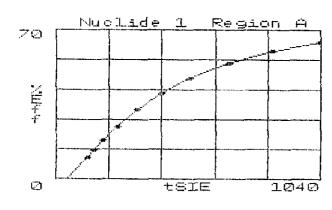
High Energy: 14C

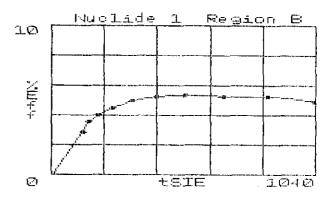
Background Subtract: 1st Vial

LLLCR 2S% UL BKG 0.0 - 12.0D 0.0 10.65 12.0 - 156 0.0 - 0.0 0.0 0 12.25 0 0.0 0.00

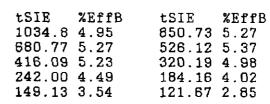
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

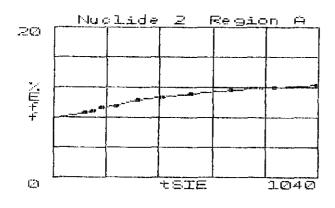
Rm 400

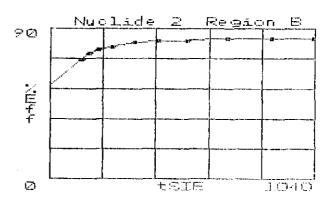




%EffA 63.95 54.36 40.44 24.70	850.73 526.12 320.19 184.16	59.86 47.53 32.62 18.16
13.67		
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7	10.00	0.48	1.12	0.59		121.28	706.83			
8	10.00	0.00	1.80	0.00		1168.4				
9	10.00	0.00	1.12	0.00			682.10			
10	10.00	2.19	1.31	3.73		41.845	691.22			
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18	10.00	0.00	0.00	0.00	0.00	0.000	696.59			
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Survey Number 062007-6 Date: Time: Instrument/SN Calibration Due: Site Name: 424/sz GLERL BICRUN / 10/10/07 Calibration Due: Instrument/SN: Location: Room 406 WIA Calibration Due: 4/1 F55 Instrument/SN: Purpose: N/4 Survey Performed By (Print): Jaffley W. Suncid Survey Performed By (Signature): **Z**∕Source **₹**HV OK Grid Dimensions: **四** Battery OK Check OK □ meters □ inches **E**Seet □ centimeters ٥ DOUR TUD HOSO יינטן, שאינים 700 منہہ OUUL CERRIOUR 4 BKGO = 15 u Rom/h, WACK THRU OF ROUM WITH NOTUR AT WAIST HOIGHT HAD NO REMAINGS ABOVE BKGD

RADIOLOGICAL SURVEY FORM

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roon	n 406	
Surve	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+4.5, 0+1.5	2/142
2	A+1.5, 0+4.5	3/112
3	A+4.5, 1+2.5	3/145
4	A+1.5, 2+2.5	2/118
5	B+3.5, 2+0.5, 2.5	2/126
6	C+1.5, 1+5.5	3/138
7	D+0.0, 1+5.5	3/122
8	C+4.0, 1+0.0	2/117
9	D+0.0, 1+2.0	2/124
10	C+2.5, 1+3.5	3/119
11	C+1.5, 0+1.5	2/141
12	B+1.5, 0+1.5, 3.0	2/138
13	B+4.0, 0+4.5	2/117
14	C+0.5, 1+0.0, 3.0	3/144
15	B+0.5, 1+1.5, 3.0	3/146
16	A+1.0, 0+0.0, 4.0	3/130
17	B+0.5, 0+0.0, 3.0	2/126
18	C+4.5, 0+0.0, 5.0	2/141
19	D+2.0, 0+2.5, 4.0	2/136
20	D+2.0, 1+5.0, 3.0	2/119
21	C+4.5, 2+3.0, 6.0	2/124
22	B+0.5, 2+3.0, 4.0	2/132
23	A+0.0, 1+5.5, 3.0	2/128
24	A+0.0, 0+4.5, 6.0	2/134
25	C+5.5, 1+0.5, 3.0	2/121
26	D+2.0, 1+0.0, 5.0	Smear only

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. Copyright © Integrated Environmental Management, 2003 RSP-018 (Rev. 003) - Attachment 4

Client Name: G	LERL			IEM Project No.:	2005006.003			
Sample Collection Date: June 20, 2007		Sample Ship Da N/A	ite:	Sample Analysis Date: June 20, 2007		Report Date:		
			DATA AC	QUISITION				
Instrument Manufacturer: Ludium		Instrument Model: 2929 Scaler w/43-10-1 Probe		Instrument Serial No.: 126126/132238		Calibration Due: April 2, 2008		
Analysis Method:				Instrument	t Efficiency			
■ IEM RSP (specify): RSP-019 □ Other (specify):		Source Identifier/SN	Source Activity - 4π (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)	
Analysis Type:		2400-98	12700	43161	10	4316	0.34	
■ Gross Alpha □ Gross Beta □ Other (specify):		Instrument Background						
		Gross	Gross Counts		Count Time (min)		Background Count Rate (cpm)	
		3	36	6	0	1		
			RESI	JLTS		·		
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes	
11	2	2	0.4	1.2	0.7	1.3	8	
2	C	2	-0.6	-1.8	0.0	1.3	8	
3	0	2	-0.6	-1.8	0.0	1.3	a	
4	1	2	-0.1	-0.3	0.5	1.3	8	
5	1	2	-0.1	-0.3	0,5	1.3	9	
6	2	2	0.4	1.2	0.7	1.3	8	
7	0	2	-0.6	-1.8	0.0	1.3	а	
8	0	2	-0.6	-1.8	0.0	1.3	а	
9	1	2	-0.1	-0.3	0.5	1.3	a	
10	0	2	-0.6	-1.8	0.0	1.3	8	
11	3	2	0.9	2.6	0.9	1.3	a	
12	1	2	-0.1	-0.3	0.5	1.3	a	
13	1	2	-0.1	-0.3	0.5	1.3	a	
14	0	2	-0.6	-1.8	0.0	1.3	a	
codes; a) - No correction for a b) - Visible damage to c) - Sample returned t d) - Other (describe); a) - Other (describe);	sample	Notes: Room 406.						
Analysis performed by (print):			Analysis performed by (signature): License No.:					
Jeffrey W. Sumlin, RRPT			MDE License No: MD-			/D-31-281-01		

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Client Name: GLERL				IEM Project No.: 2005006.003						
Sample Collection Date: June 20, 2007		Sample Ship Da N/A	ite:	Sample Analysis Date: June 20, 2007		Report Date:				
			DATA AC	QUISITION						
Instrument Mani Ludium					Calibration Due: April 2, 2008					
Analysis Method	d:			Instrument	t Efficiency					
■ IEM RSP (specify): RSP-019 □ Other (specify):		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)			
Analysis Type:		2400-98	12700	43161	10	4316	0.34			
■ Gross Alpha □ Gross Beta		Instrument Background								
□ Other (specify) :	Gross Counts		Count Time (min)		Background Count Rate (cpm)				
		3	36	60	0	1				
	RESULTS									
Smear No.	Gross Counts	Count Time (mln)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes			
15	1	2	-0.1	-0.3	0.5	1.3	a			
16	2	2	0.4	1.2	0.7	1.3	а			
17	1	2_	-0.1	-0.3	0.5	1.3	a			
18	1	2	-0.1	-0.3	0.5	1.3	a			
19	0	2	-0.6	-1.8	0.0	1.3	8			
20	0	2	-0.6	-1.8	0.0	1.3	8			
21	2	2	0.4	1.2	0.7	1.3	a			
22	1	2	-0.1	-0.3	0.5	1.3	а			
23	1	2	-0.1	-0.3	0.5	1.3	а			
24	0	2	-0.6	-1.8	0.0	1.3	a			
25	1	2	-0.1	-0.3	0.5	1.3	a			
26	1	2	-0.1	-0.3	0.5	1.3	В			
Codes: (a) - No correction for self-ebsorption (b) - Visible damage to sample (c) - Sampla returned to clent (d) - Other (describe): (e) - Other (describe):		Notes: Room 406.								
Analysis performed by (print):			Analysis perform	nalysis performed by (signature): License						
Jeffrey W. Sumlin, RRPT			Analysis performed by (signature):			MDE License No.: MD-31-281-01				

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Client Name: Gl	.ERL			IEM Project No.:	2005006.003				
Sample Collection Date: June 20, 2007		Sample Ship Date: N/A		Sample Analysis Date: June 20, 2007		Report Date:			
			DATA AC	QUISITION					
Instrument Manufacturer: Ludium		Instrument Model: 2929 Scaler w/43-10-1 Probe		Instrument Serial No.: 126126/132238		Calibration Due: April 2, 2008			
Analysis Method:			Instrument Efficiency						
■ IEM RSP (specify): RSP-019 □ Other (specify):		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)		
Analysis Type:		2399-98	20000	52406	10	5187	0.26		
□ Gross Alpha ■ Gross Beta		Instrument Background							
□ Other (specify):		Gross Counts		Count Time (min)		Background Count Rate (cpm)			
			97	6	0	53			
RESULTS									
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes		
1	112	2	2.7	10.5	5.3	6.6	a		
2	116	2	4.7	18.2	5.4	6.6	a		
3	110	2	1.7	6.6	5.2	6.6	a		
4	98	2	-4.3	-16.5	5.0	6.6	a		
5	113	2	3.2	12.4	5.3	6.6	а		
6	104	2	-1.3	-4.9	5.1	6.6	a		
7	97	2	-4.8	-18.4	4.9	6.6	а		
8	100	2	-3.3	-12.7	5.0	6.6	а		
9	108	2	0.7	2.8	5.2	6.6	a		
10	114	2	3.7	14.3	5.3	6.6	a		
11	108	2	0.7	2.8	5.2	6.6	a		
12	111	2	2.2	8.5	5.3	6.6	8		
13	117	2	5.2	20.1	5.4	6.6	а		
14	109	2	1.2	4,7	5.2	6.6	а		
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (e) - Other (describe):		Notes: Room 406							
Analysis performed by (print):		Analysis performed/by (signature):			License No.:				
Jeffrey W. Sumlin, RRPT			MW)L:			MDE License No: MD-31-281-01			

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Client Name: Gl	LERL			IEM Project No.:	2005006.003				
Sample Collection Date: June 18, 2007		Sample Ship Date: N/A		Sample Analysis Date: June 19, 2007		Report Date:			
			DATA AC	QUISITION					
Instrument Manufacturer: Ludium		Instrument Model: 2929 Scaler w/43-10-1 Probe		Instrument Serial No.: 126126/132238		Calibration Due: April 2, 2008			
Analysis Method:				Instrumen	t Efficiency				
■ IEM RSP (specify): RSP-019 □ Other (specify):		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)		
Analysis Type:	Analysis Type:		20000	52406	10	5187	0.26		
□ Gross Alpha ■ Gross Beta		Instrument Background							
□ Other (specif	□ Other (specify):		Gross Counts		Count Time (min)		Background Count Rate (cpm)		
			197	6	0	53			
		•	RESI	ULTS					
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes		
15	118	2	5.7	22.0	5.4	6.6	а		
16	103	2	-1.8	-6.9	5.1	6.6	8		
17	109	2	1.2	4.7	5.2	6.6	а		
18	116	2	4.7	18.2	5.4	6.6	A		
19	106	2	-0.3	-1.1	5.1	6.6	8		
20	97	2	-4.8	-18.4	4.9	6.6	а		
21	113	2	3.2	12.4	5.3	6.6	a		
22	109	2	1.2	4.7	5.2	6.6	a		
23	111	2	2.2	8.5	5.3	6.6	a		
24	104	2	-1.3	-4.9	5.1	6.6	а		
25	101	2	-2.8	-10.7	5.0	6.6	a		
26	113	2	3.2	12.4	5.3	6.6	a		
							-		
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (e) - Other (describe):		Notes: Room 406.							
Analysis performed by (print):		Analysis performed by (signature):			License No.:				
Jeffrey W. Sumlin, RRPT			1/2/2			MDE License No: MD-31-281-01			

21 Jun 2007 11:36

TRI-CARB - 1.09

Protocol #:18

SURVEY

Page #1 User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

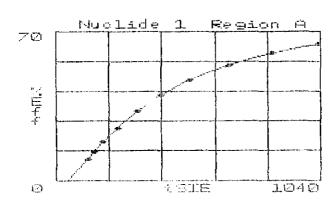
High Energy: 14C

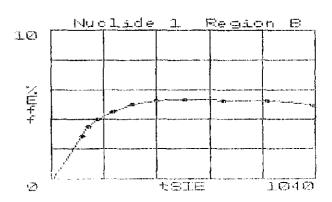
Background Subtract: 1st Vial

LCR 25% LLBKG UL 0.0 - 12.0Region A: 0.0 0 11.16 12.0 - 156 0.0 - 0.0 Region B: 0.0 0 13.94 Region C: 0 0.0 0.00

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

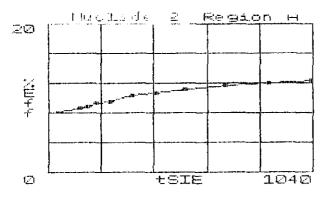
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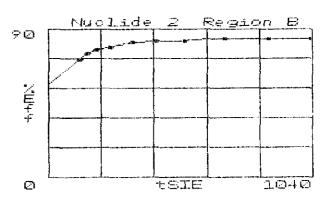




tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tSIE %EffB 1034.8 4.95 850.73 5.27 680.77 5.27 526.12 5.37 416.09 5.23 320.19 4.98 242.00 4.49 184.16 4.02 149.13 3.54 121.67 2.85





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.54

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Survey Number 062007-3

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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. RADIOLOGICAL SURVEY FORM

Page _____ of ___

Survey Number 062007 - 4

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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. RADIOLOGICAL SURVEY FORM

Survey Number 062107 - 10

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room	408	
Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+4.5, 1+3.5	0/202
2	A+5.5, 0+3.5	1/211
3	B+3.5, 1+3.5, 3.0	1/206
4	C+3.0, 1+0.5	0/198
5	C+4.5, 0+1.5	2/211
6	C+2.5, 1+5.0, 2.0	0/204
7	A+0.0, 0+2.5, 4.0	1/202
8	C+2.5, 0+0.0, 6.0	1/210
9	D+1.0, 0+4.5, 4.0	1/213
10	C+0.0, 0+1.0, 3.0	2/216
11	C+1.5, 0+5.5	1/203
12	C+4.5, 1+1.5, 3.0	0/202
13	D+1.0, 1+1.0, 6.0	Smear only

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

21 Jun 2007 16:32 TRI-CARB - 1.09

Protocol #:18

SURVEY

Page #1

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

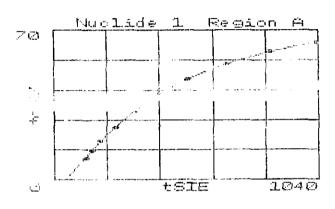
High Energy: 14C

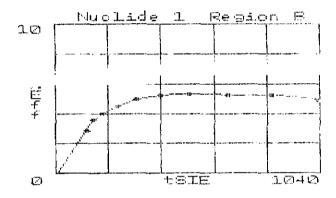
Background Subtract: 1st Vial

LCR $\Gamma\Gamma$ UL 25% BKG Region A: 0.0 0.0 - 12.00 9.72 12.0 - 156 0.0 - 0.0 Region B: 0 0.0 13.08 Region C: 0 0.0 0.00

Room 408

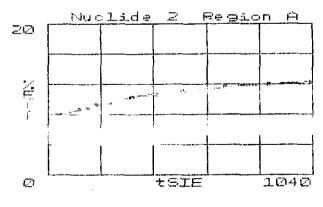
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count





tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tSIE %EffB 1034.8 4.95 850.73 5.27 680.77 5.27 526.12 5.37 416.09 5.23 320.19 4.98 242.00 4.49 184.16 4.02 149.13 3.54 121.67 2.85



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697,16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
.1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

21 Jun 2007 16 Protocol #:18	:32	TRI-CARB - SURVEY	1.09	<u> </u>		50°	< Page	#2 : KIM
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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. RADIOLOGICAL SURVEY FORM

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Survey Number 062107 - 14

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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. RADIOLOGICAL SURVEY FORM

Page ____ of ___

Survey Number 062107 - 16 Instrument SN Site Name: Calibration Due: Date: Time: 6/21/57 1520 GLURL 10/10/07 BICRON 1 BZGGW Instrument SN: Calibration Due: Location: RUOM 410 W/12 MIA Instrument/SN: Calibration Due: NA Purpose: F55 NK Survey Performed By (Signature): Survey Performed By (Print): JULIANT W JULLI ZHV OK ✓ Source Grid Dimensions: **Ø**Battery OK Check OK □ meters □ inches d feet centimeters е N اله صفرك FOURER L)C CHANGE (FQ) ABI NET mary ٠, 15 te, BKGD = 15 whom/h. WAZKOD ROUM WITH METER WAIST HIGH. UN REMAINES MONE BACKGROUND

RADIOLOGICAL SURVEY FORM

Page _______ of _____

TRITIMENT SN: 43-68 PRIGUYSS INSTRUMENT SN: 43-68 PRIGUYSS INSTRUMENT SN: PARTICIPATION Due: Calibration Due: INSTRUMENT SN: Survey Performed By (Print): SUFFRY U SINCE Check OK Check OK Check OK Tometers Feet A A A D F S S T S T S S T	nature): 1	
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Notes PORFORMEN 2 MINUTE COUNT ON FLOOR MYD COMNTON		

Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room	410	
Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+1.5, 0+3.0	1/196
2	A+4.5, 1+3.5, 3.0	0/202
3	B+2.5, 0+5.5	1/198
4	C+4.0, 1+2.5	0/206
5	C+4.5, 0+2.0	0/203
6	C+2.0, 0+5.5	1/205
7	D+1.0, 0+5.0, 6.0	1/200
8	B+5.5, 1+5.0, 4.0	1/197
9	A+0.0, 0+5.5, 2.0	2/204
10	B+3.5, 0+0.0, 4.0	0/205

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

21 Jun 2007 19:06 Protocol #:26

TRI-CARB - 1.09 SURVEY

Yuf Page #1 User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

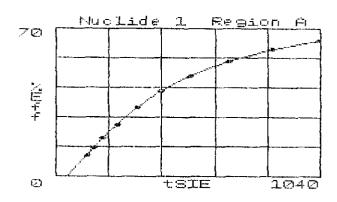
High Energy: 14C

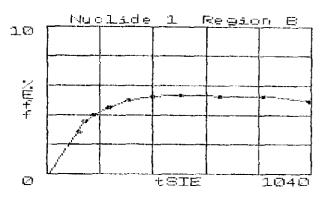
LLUL LCR 2S% BKG Region A: 0.0 - 12.00.0 0 11.36 Region B: 12.0 - 156 0.0 0 13.04 Region C: 0.0 - 0.00 0.0 0.00

Room 410

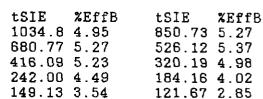
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

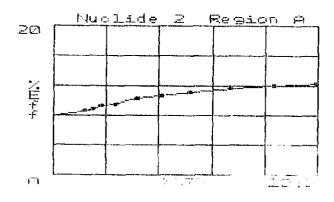
Background Subtract: 1st Vial

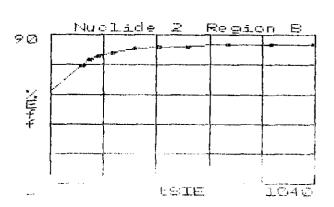




tSIE	%EffA	tSIE	%EffA
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680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697,16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

21 Ju	n 2007	19:06	TRI-	-CARB -	1.09				Page	#:	2
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RADIOLOGICAL SURVEY FORM Nurvey Number 062207-12 Page _ _ UI _ 1 Instrument SN Calibration Due: Site Name: Date: Time: 2224/116239 6/2267 1120 10/13/07 GLERL Instrument SN Calibration Due: Location: 43.68/ 71140483 RUUM 501 10/13/07 Instrument SN: Calibration Due: WITE UM Purpose: FSS Survey Performed By (Print): JUGGROY W Survey Performed By (Signature): Battery OK **≇**HV OK **≥**Source Gnd Dimensions: Check OK □ meters 2 inches 🗷 feet □ centimeters RUUM 523 ROWN 600 , g CURRIDOR 1 13 20 SCANNOD 2 FLOOR GRIDS MIGHOST POMDINGS IN alBERN/10000

RADIOLOGICAL SURVEY FORM Page _____ of Survey Number 062207-13 Instrument SN Calibration Due: Site Name: Date: Time: 42407 1135 2224 116239 GLERL 10/13/07 Instrument SN Calibration Due: Location: 43-68/ 71190483 RUUM 501 10/13/07 Purpose: histrument SN Calibration Due: ~// F55 N/A Survey Performed By (Print): Survey Performed By (Signature): JURIEUY W Junery **≅**Source **28-**Battery OK ZNIV OK 2 , 2 Grid Dimensions: Check OK □ meters □ inches **⊠**feet ☐ centimeters WAL MILLOUT TO ROUM TO 3 WALL NO JACONT TO CORRIDUC 1 13 Raum CURRIDOR 19 20 ELANOR 2 WALL GRIDS. HIGHOST ROTTOINGS IN 4/B CAM / WULLE (i) 0/60

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. RADIOLOGICAL SURVEY FORM

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

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1 501	_
y Location	CPM α/β per 100 cm ² (total for 2 minute count)
A+2.5, 0+1.5	1/206
A+4.5, 1+4.0	1/209
A+2.5, 2+4	2/206
B+4.0, 2+2.0	1/195
B+3.5, 0+4.0	1/212
B+1.0, 0+5.0, 6.0	0/203
C+1.0, 1+3.0, 4.0	1/209
B+2.5, 3+0.0, 4.0	0/206
A+0.0, 1+3.5, 2.0	1/212
	y Location A+2.5, 0+1.5 A+4.5, 1+4.0 A+2.5, 2+4 B+4.0, 2+2.0 B+3.5, 0+4.0 B+1.0, 0+5.0, 6.0 C+1.0, 1+3.0, 4.0 B+2.5, 3+0.0, 4.0

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Page #1

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

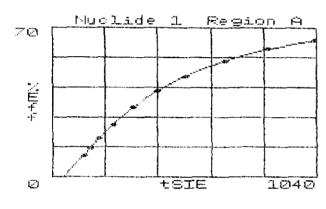
Background Subtract: 1st Vial

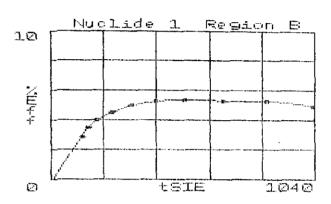
High Energy: 14C

LCR 25% LL ÜL BKG Region A: 0.0 - 12.00 0.0 10.93 Region B: 12.0 - 156 0 0.0 13.37 Region C: 0.0 -0.0 0 0.0 0.00

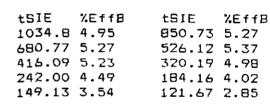
Room 501

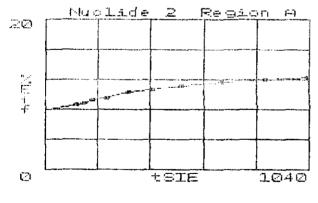
Guench Indicator: tSIE/AEC Ext Std Terminator: Count

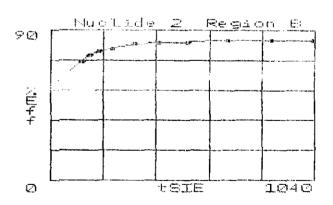




tSIE	%EffA	tsie	%EffA
1034.8	63.95	850.73	59.86
6B0.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE %EffB tSIE %EffB 1035.1 83.64 869.29 84.06 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.55

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Proto	col #:18	3	SUR	VEY					User	:	KIM
		34 9.55 33 8.76		6 9.32 8 8.59		239.94 152.93		188.56 122.58			
S#123456789	TIME 10.00 10.00 10.00 10.00 10.00 10.00 10.00	CPMA 10.93 1.35 0.00 0.00 2.25 0.00 0.00 2.29 1.06	CPMB 13.37 0.00 0.00 0.00 0.85 0.00 0.09 0.61 0.00	DPM1 2.48 0.00 0.00 3.89 0.00 0.00 4.05 1.94	DPM2 0.00 0.00 0.00 0.77 0.00 0.11 0.47	0.000 0.000 0.000 0.000 0.000 0.000	tSIE 739.06 699.44 718.99 714.75 712.93 704.87 719.52 702.25 714.41	FLAG B			

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. RADIOLOGICAL SUBVEY FORM

RADIOLOGICAL SURVEY FORM Sur e. Number 062507-24 Page ____ or ____ Instrument SN: Calibration Due: Site Name: Date fime: 41 XUZ 2224/ 16239 GLLRL 1413/07 <u>1450</u> Instrument SN Calibration Due: Location: 1200 M 505 43-681 PR 140483 14/13/07 Institument SN Calibration Due: Purpose. F 55 Survey Performed By (Print): Survey Performed By (Signature): JORFROY W Junes MU NE Luntery OK & Source Grid Dimensions. Check OK □ meters I inches 🛎 centimeters **Z**-feet 100 m 507 (16) **(1)** からん (d) (d) Fune two **(6)** (2) (4) ני A 15 0 16 ROUMS 503,505A ٠a 13 20 PORFURNOS 2 MINUTE STATIC COUNTS, POSUCTS IN CRIMAIS/100CME. Notes TOOK JUCKES FOR LSC IN SAME LOCATIONS

Static Count and Smear Locations

C+0.0, 1+1.5, 4.0

16

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roon	n 505	
Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	B+3.5, 0+2.5	1/194
2	A+4.5, 1+1.5	0/197
3	B+1.5, 1+4.5	0/201
4	A+4.5, 2+3.5	1/193
5	B+2.5, 3+0.5	0/196
6	B+0.5, 2+5.5	1/204
7	B+5.0, 2+1.0, 2.0	1/202
8	B+5.0, 2+2.0, 2.0	1/197
9	B+4.5, 1+2.5, 2.5	0/206
10	A+1.0, 0+3.5, 2.5	0/202
11	B+3.5, 2+5.0, 2.5	0/199
12	C+0.0, 2+5.0, 6.0	Smear only
13	A+2.5, 3+1.0, 3.0	1/203
14	A+0.0, 1+2.5, 4.0	1/198
15	A+4.5, 0+0.0, 4.0	0/201

1/201

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

TRI-CARB - 1.09

Protocol #:18

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

High Energy: 140

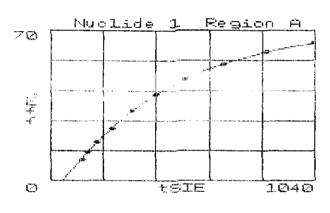
	LL	UL	LCR	25%	BKG
Region A:	0.0 -	12.0	0	0.0	10.11
Region B:	12.0 -	156	0	0.0	13.29

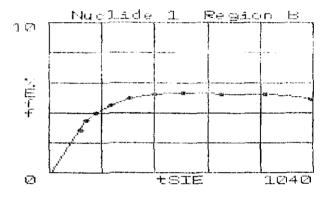
0.0 - 0.0 Region C:

0 0.0 0.00

Quench Indicator: tSIE/AEC Ext Std Terminator: Count

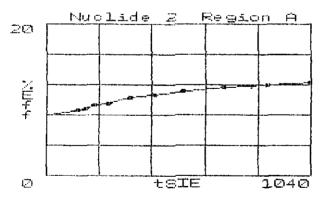
Background Subtract: 1st Vial

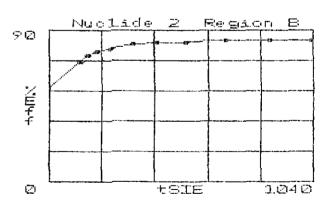




tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tsie %effB 1034.8 4.95 B50.73 5.27 526.12 5.37 680.77 5.27 320.19 4.9B 416.09 5.23 242.00 4.49 184.16 4.02 149.13 3.54 121.67 2.85





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
.1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

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	152.	93 8.76	122.56	8.60		152.93	75.21	122.58	71.52	
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2	10.00	0.00	0.00	0.00	0.00	0.000	726.04			
3	10.00	1.76	0.00	3.17	0.00	0.000	739.55			
4	10.00	0.00	0.00	0.00	0.00	0.000	745.38			
5	10.00	1.30	0.00	2.36	0.00	0.000	725.17			
6	10.00	1.51	0.00	2.75	0.00	0.000	726.85			
7	10.00	0.75	0.00	1.36	0.00	49.354	734.59			
В	10.00	1.85	0.00	3.33	0.00	0.000	744.21			
9	10.00	0.61	0.00	1.11	0.00	0.000	734.16			
10	10.00	0.68	0.00	1.23	0.00	0.000	722.77			
11	10.00	1.09	0.00	1.95	0.00	0.000	745.66			
12	10.00	1.23	0.00	2.21	0.00	-	741.89			
13	10.00	1.88	0.40	3.32	0.27	112.18	723.66			
14	10.00	0.00	0.00	0.00	0.00	0.000	729.66			
15	10.00	3.08	0.00	5.57	0.00	65.943	734.90			
16	10.00	1.77	0.00	3.17	0.00	0.000	742.11			
17	10.00	1.46	0.04	2.60	0,00	144.45	745.11			

RADIOLOGICAL SURVEY FORM Survey Number 062507-21 Page ______ Instrument SN: Calibration Due: 2224/ 170347 Site Name: Date: Time: GLERL 42707 Instrument SN: 1355 Calibration Due: 43-371 PR 117476 Location: 6/7/08 ROOM 505 Instrument SN: Calibration Due: 11/14 Purpose: F-55 Survey Performed By (Print): JOHFROY W Junes Survey Performed By (Signature): Z Battery OK **≤** HV OK K Source Grid Dimensions: Check OK □ meters □ inches F-feet ☐ centimeters n la 100 n 507 SINK. Fune HUND (غ) 65 (FD) (4) (6) 6 12 13 14 0000 16 17 Rowns 503,505A 18 Notes SCATINED 100% OF ROTURDOD HEAT POMDINGS NEFT. INCPINATA FLOUR (0/400 (2) 6/4KU 3 0/400 0/340

0/380 0/400

our e. Number 062507-22 Page ______ oil______ Instrument SN: Date Calibration Due: Site Name: Time 'te Yur 2224/ 116239 CILLIRL 10/13/07 1405 Instrument SN: Calibration Due. Location: 1200 4 5U5 43-681 PR 140483 1413/52 Calibration Due: Instrument SN F-55 Purpose Survey Performed By (Print): Survey Performed By (Signature). JUFFRLY W ♠ HV OK **∠**Uatter√OK **本** Source Grid Dimensions: Check OK meters = ⊒ inches Z contimeters **B**-feet - 2 100 × 507 SINE Fune Hour (FØ)

SCANNUD and FLOOR GRID AND SOME COINTERTOP. HIGHEST READING IN CPM 0/B/100 CAR

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RADIOLOGICAL SURVEY FORM Somes Number 062367-23

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Instrument SN 43-681 PR-150483	Calibration Due:		Location	ROUM S	ኔና		
Instrument SN 11/14	Calibration Due:	714	Purpose	(-55			
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Survey Number 062:507 - 2C

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Sur ex Number 062707-27 Page ______ or ___ Instrument SN: Date: Calibration Due: Site Name: Time: 10/13/09 2224/16239 CILLIPL Institutent SN Calibration Due Location Ruon 505A 43-68/PR 190483 1413/07 Calibration Due: E55 Instrument SN: Purpose: Survey Performed By (Print) Juffacy W Sun c.) Survey Performed By (Signature). **⊅**HV OK **∠**Battery OK **21** Source Gnd Dimensions. Check OK □ meters I inches Neet 2 centimeters 1 200 M 506 0004 RUUM 6UZ

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Instrument SV	Calibration Due:		Site Name.	Date: Fime:
7224/116235	(0/13/0)		CILIPL	12.40F 12A.2
Instrument 5\ 43-68/PR 140483	Cahbration Due:	,	Location Room 505 A	•
	10/13/5			
fustminent SN: PIA		114	Purpose: F55	
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room 505A	Ŀ
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KOOL	II JOJA	_
Surv	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	B+0.5, 1+1.5	0/195
2	A+3.5, 1+1.5	0/202
3	A+5.0, 0+5.5	0/199
4	B+0.5, 0+2.5	1/206
5	A+4.0, 0+2.5	1/201
6	A+1.0, 0+1.5, 2.5	1/203
7	A+1.0, 1+1.5, 2.0	1/205
8	A+3.5, 1+3.0, 4.0	1/200
9	B+2.0, 0+4.5, 4.0	0/207
10	A+3.0, 0+0.0, 6.0	0/201
11	A+0.0, 0+5.0, 6.0	1/197

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:27

SURVEY

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

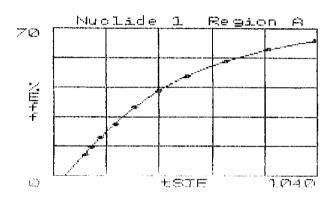
High Energy: 14C

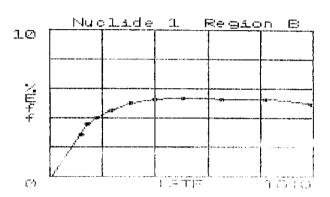
Background Subtract: 1st Vial

		LL	UL	LCR	25%	BKG
Region	Α:	0.0 -	12.0	0	0.0	9.69
Region	В:	12.0 -	156	0	0.0	13.01
Region	C:	0.0 -	0.0	0	0.0	0.00

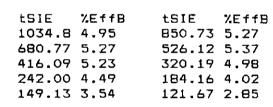
Room 505A

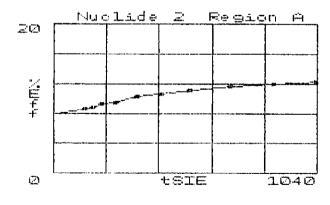
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

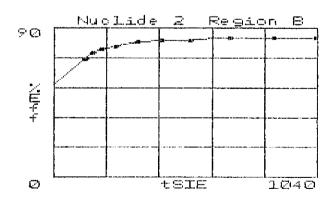




tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tSIE	ΖEffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
42 6. 87	10.70	329.70	10.31

%EffB	tSIE	%EffB
83.64	869.29	84.06
84.32	538.87	82.87
82.43	329.70	81.55
	83.64 84.32	83.64 869.29 84.32 538.87

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		4 9.55 3 8.76	188.56 122.56	9.32 B.60		239.94 152.93	188.56 122.58			
S# 1 2 3 4 5 6 7 8 9 10 11 12	TIME 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00	CPMA 9.69 1.71 1.39 1.09 1.03 1.67 2.85 0.00 1.65 1.91 2.58 1.61	CPMB 13.01 0.00 0.00 0.00 0.07 0.00 0.00 0.00 0	DPM1 3.06 2.52 1.96 1.84 3.02 5.16 0.00 2.96 3.33 4.63 2.60	0.00 0.00 0.00 0.00 0.00 0.00 0.38 0.00	74.632 0.000 0.000 131.54 27.100 88.589	723.36 748.41 734.00 736.21 734.92 731.30 730.83 728.99 740.06 731.85 749.60	FLAG B		

Survey Number 062207-24

DIOLOGICAL SURVEY FORM		
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Instrument/SN- 2224 / 116239	Calibration Due:	Site Name:	Date: Time:					
Instrument'SN:	Culibration Due:	Location:						
Instrument SN: 4/A	Calibration Due: NA	Purpose: F 55						
Survey Performed By (Print): J	K-RUY W June.	Survey Performed By (Signature)	10 18					
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roo	m 507	
Surv	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	B+3.5, 0+3.5	1/148
2	C+1.5, 2+0.5	0/159
3	A+3.5, 2+4.5, 3.0	1/152
4	A+4.5, 1+2.5	1/147
5	B+2.5, 1+4.5, 3.0	2/151
6	C+4.5, 1+3.5, 2.5	1/153
7	C+4.5, 1+5.5, 2.5	0/147
8	C+3.5, 2+3.5, 3.0	1/143
9	C+5.5, 2+4.0, 6.0	Smear only
10	B+5.5, 3+0.0, 4.0	2/144
11	A+0.0, 1+3.5, 4.0	1/156
12	A+5.5, 0+0.0, 2.0	1/157
13	D+0.0, 0+5.5, 6.0	0/153

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:18

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

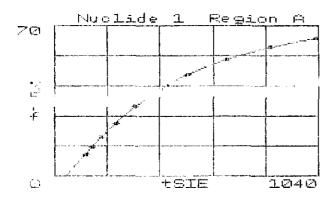
Low Energy: 3H

High Energy: 14C

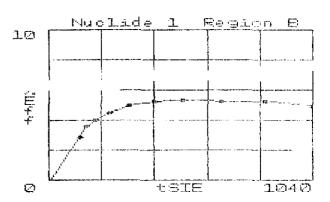
Background Subtract: 1st Vial

		LL		UL	LCR	25%	BKG
Region	Α:	0.0		12.0	0	0.0	11.62
Region	₿:	12.0	-	156	0	0.0	11.48
Region	C:	0.0	-	0.0	0	0.0	0.00

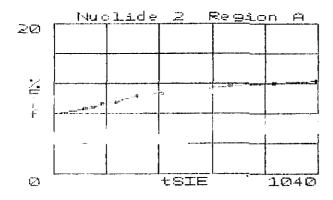
Quench Indicator: tSIE/AEC Ext Std Terminator: Count Rm 507



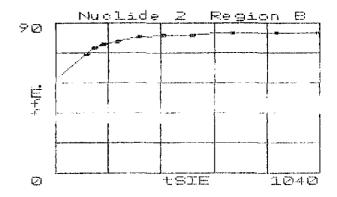
tSIE	%EffA	tSIE	%EffA
1034.8	63.94	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10



tSIE 1034.8	4.95	tSIE 850.73	5.27
6B0.77		526.12 320.19	
242.00		184.16	
149.13		121.67	



tSIE	%EffA	tsie	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31



tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

	n 2007			-CARB -	1.09	·		-	Page		
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	239.9	94 9.55	188.5	6 9.32		239.94	79.05	188.56	77.31		
	152.9	93 8. 76	122.5	8 8.59		152.93	75.21	122.58	71.52		
5#	TIME	CPMA	CPMB	DPM1	DPM2	SIS	tSIE	FLAG			
1	10.00	11.62	11.48	<u>.</u>	_ · · · · _	67.975		В			
2	10.00	0.00	2.49	0.00	3.00	117.46	727.88				
3	10.00	0.00	0.00	0.00	0.00	0.000	717.53				
4	10.00	0.39	0.01	0.71	0.00	13.000	727.71				
5	10.00	0.00	1.77	0.00	2.13	135.76	707.74				
6	10.00	0.00	2.53	0.00		279.54					
7	10.00	0.09	2.34	0.00	2.80	46.483	714.88				
8	10.00	0.00	2.54	0.00	3.06	178.86	713.45				
9	10.00	0.00	0.97	0.00	1.17		706.97				
10	10.00	0.87	1.73	1.16		73.444					
11	10.00	0.00	0.55	0.00							
12	10.00	0.00	0.23	0.00	0.28		722.16				
13	10.00	0.00	0.28	0.00	0.34		719.08				
14	10.00	0.62	3.14	0.33	3.70	58.829	712.02				

Survey Number 062207-22

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Survey Number 062207-30

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Numer Number 062207-29

Instrument SN 2224 116239	Calibration Due: 10/13/07	Site Name:	Date: Time: 1610
Instrument SN: 43-68 1PR190483	Calibration Due:	Location: RWM 509	
Instrument SN 514	Calibration Due: WIFF	Purpose: F55	
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis.

Second number indicates number starting point and number of additional feet along that axis.

Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room	509	
Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+3.5, 0+3.5	1/143
2	A+2.5, 1+3.5	0/147
3	B+1.5, 0+5.5	1/141
4	B+1.5, 0+1.5, 3.0	1/132
5	B+3.5, 1+2.5, 3.0	1/145
6	B+0.5, 1+3.0, 2.5	1/142
7	B+5.0, 1+0.0, 6.0	0/139
8	A+3.5, 1+4.0, 4.0	1/142
9	A+0.0, 0+5.5, 2.0	2/140
10	B+0.5, 0+0.0, 4.0	1/138

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

<u> Page #1</u>

Protocol #:26

SURVEY

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

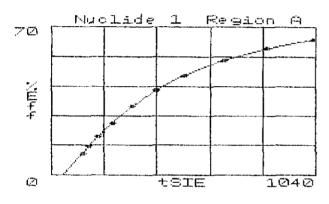
Low Energy: 3H

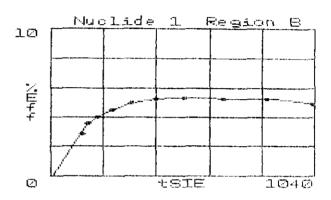
High Energy: 14C

Background Subtract: 1st Vial

LL ЦL LCR 25% BKG Region A: 0.0 - 12.00 0.0 10.95 12.0 - 156 Region B: 0 0.0 13.08 Region C: 0.0 - 0.0 0 0.0 0.00

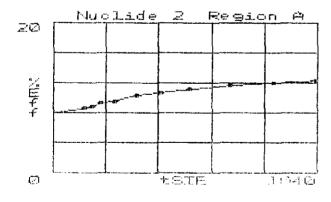
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

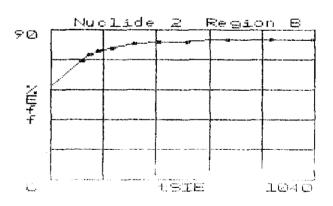




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tsie	ZETTA	tSIE	ZETTA
1034.8	63.95	850.73	59.B6
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

%EffB tSIE tSIE %EffB 1034.8 4.95 850.73 5.27 6B0.77 5.27 526.12 5.37 416.09 5.23 320.19 4.98 242.00 4.49 184.16 4.02 149.13 3.54 121.67 2.85





ESTE	%EffA	tsie	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	B4.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

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	239	94 9.55	188.56	9.32		239.94	79.05	188.56	77.31		
		93 8.76	122.58			152.93		122.58			
C#	TIME	COMA	COMD	DPM1	DPM2	SIS	tsie	ELAG			
S#	TIME	CPMA	CPMB	בויות	DEMZ			_			
1	10.00	10.95	13.08			· - · ·	732.53	В			
2	10.00	0.00	0.00	0.00	0.00	0.000	722.16				
3	10.00	0.00	0.00	0.00	0.00	0.000	715.38				
4	10.00	0.00	0.00	0.00	0.00	0.000	717.57				
5	10.00	0.00	0.00	0.00	0.00	0.000	719.00				
6	10.00	0.67	0.B9	1,00	0.99	56.335	727.55				
7	10.00	0.00	0.37	0.00	0.44	0.000	718.20				
8	10.00	0.83	0.00	1.53	0.00	0.000	711.52				
9	10.00	0.00	0.00	0.00	0.00	0.000	724.45				
10	10.00	0.00	0.32	0.00	0.38	0.000	716.50				
11	10.00	0.00	0.00	0.00	0.00	0.000	715.65				

Survey Number 062507-34

Survey Number <u>062507-34</u>			Page of
Instrument SN: 2224 116235	Calibration Due:	Site Name: GLERL	Date Time 1655.
Instrument SN 43-68/ PR14 0483	Calibration Due:	Location Reso n 511	1. 121 [183]
Instrument SN N/A	Calibration Due: 3/14	Purpose: (= 55	
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

511	
y Location	CPM α/β per 100 cm ² (total for 2 minute count)
A+4.5, 0+2.5	1/206
B+2.5, 0+4.5	0/202
B+2.5, 1+4.5	0/206
B+0.5, 2+3.5	1/198
A+2.5, 2+2.5	0/193
A+5.0, 2+0.0	0/204
A+5.0, 1+0.0	0/200
B+3.5, 2+3.5, 3.0	1/199
C+0.0, 2+4.0, 6.0	Smear only
A+1.5, 0+2.5	0/204
A+1.0, 0+5.0, 2.0	1/205
A+1.0, 1+0.5, 2.0	1/201
A+0.0, 2+1.5, 6.0	0/199
B+0.0, 3+0.0, 4.0	1/205
C+0.0, 1+2.5, 6.0	0/203
B+2.0, 0+0.0, 2.0	0/200
	B+2.5, 0+4.5 B+2.5, 1+4.5 B+0.5, 2+3.5 A+2.5, 2+2.5 A+5.0, 2+0.0 A+5.0, 1+0.0 B+3.5, 2+3.5, 3.0 C+0.0, 2+4.0, 6.0 A+1.5, 0+2.5 A+1.0, 0+5.0, 2.0 A+0.0, 2+1.5, 6.0 B+0.0, 3+0.0, 4.0 C+0.0, 1+2.5, 6.0

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:28

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

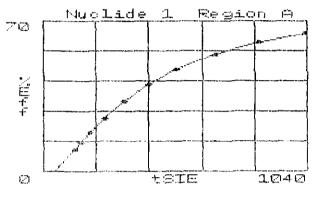
High Energy: 14C

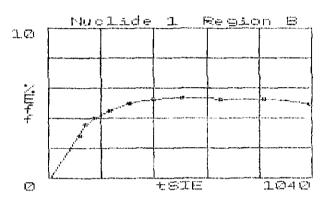
Background Subtract: 1st Vial

		LL		UL	LCR	25%	BKG
Region	A:	0.0	_	12.0	0	0.0	11.11
Region	B:	12.0	_	156	0	0.0	12.69
Region	C:	0.0		0.0	0	0.0	0.00

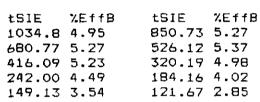
Room 511

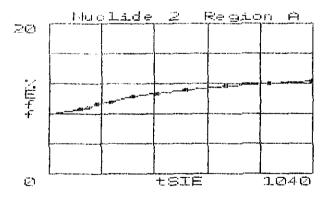
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

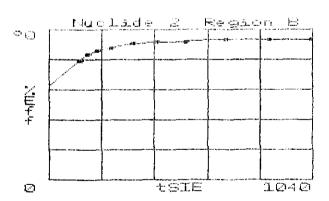




<i>tSIE</i>	%EffA	t51E	%EffA
1034.8	63.95	850.73	59.86
6B0.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tS1E	ХЕffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE %EffB tSIE %EffB 1035.1 83.64 869.29 84.06 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.55

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	239.	94 9.55	188.5	6 9.32		239.94		188.56	77.31	
	152.	93 8.76	122.5	8 8.59		152.93	75.21	122.58	71.52	
S#	TIME	CPMA	СРМВ	DPM1	DPM2	SIS	tsie	FLAG		
1	10.00	11.11	12.69			66.830	710.96	В		
2	10.00	0.00	0.00	0.00	0.00	0.000	712.90			
3	10.00	0.93	0.87	1.47	0.94	209.27	717.47			
4	10.00	0.00	0.86	0.00	1.03	517.08	717.31			
5	10.00	0.00	0.00	0.00	0.00	0.000	717.93			
6	10.00	3.06	0.00	5 .59	0.00	29.853	715.85			
7	10.00	0.00	1.20	0.00	1.45	0.000	710.47			
8	10.00	0.00	0.05	0.00	0.06	0.000	729.70			
9	10.00	0.00	0.26	0.00	0.32	0.000	718.54			
10	10.00	0.85	0.00	1.56	0.00	0.000	711.82			
11	10.00	0.68	0,00	1.23	0.00	0.000	723.25			
12	10.00	0.00	0.36	0.00	0.44	0.000	716.43			
13	10.00	0.20	0.00	0.35	0.00	0.000	726.22			
14	10.00	0.00	0.00	0.00	0.00	0.000	723.47			
15	10.00	0.00	0.00	0.00	0.00	0.000	736.40			
16	10.00	1.65	3.65	2.07	4.20	117.73	731.41			
17	10.00	0.00	1.35	0.00	1.62	52.965	716.76			

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2224 116239	10/13/07	acec	6/274 1610
Instrument SN	Calibration Due:	Location:	
43-68/ AR140483	14/13/07	Rew 511	
Instrument SN N/A	Calibration Due: 2/14	Purpose: (- 55	
Sur ey Performed By (Print) 30	44-Rey W Sunce	Survey Performed By (Signature)	12)7.
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RADIOLOGICAL SURVEY FORM Survey Number 06 2507 - 33

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RADIOLOGICAL SURVEY FORM

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Page 1 of 5 Survey Symber Ole 2 857-4 Calibration Due: Instrument SN Site Name: Time Date 42807 1413/07 GLERL 0970 Calibration Due: Location: ROOM 511A 43-681 PR14U483 10/13/07 Instrument SN: Calibration Due: Ритроѕе: F55 sur ev Performed By (Print) Survey Performed By (Signature): JOFFRON W Su #Matters OK ZHI OK **B**C Source Grid Dimensions: Check OK ☐ meters inches **E**viect Centimeters Room 60 B (1) 504 ٠, 20 2 MINUTE STATIC LEADINGS. RESULTS IN CPM 0/8/100 CMC TUUK TOOK SMOMES FOR LSC IN SAME LOCATIONS.

Static Count and Smear Locations

A+1.5, 0+3.5, 2.5

A+1.5, 0+2.5, 2.5

A+3.0, 0+0.0, 6.0

B+2.0, 0+1.5, 4.0

A+4.5, 1+5.0, 2.0

A+0.0, 1+0.5, 4.0

9

10

11

12

13

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room	1511A	
Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	B+0.0, 0+1.0	0/193
2	A+3.5, 0+1.5	0/204
3	A+3.5, 0+4.5	0/197
4	A+5.0, 1+5.0	1/200
5	A+2.5, 1+4.0	1/205
6	A+4.5, 0+5.5	0/203
7	A+1.5, 1+1.5, 3.0	0/198

1/202

2/204

0/200

0/196

1/204

1/201

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:18

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

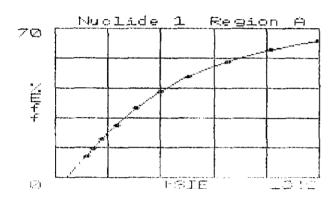
High Energy: 14C

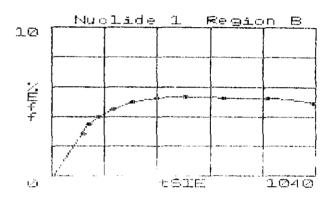
Background Subtract: 1st Vial

	LL		UL	LCR	25%	BKG
Region A	: 0.0	_	12.0	0	0.0	11.56
Region B	: 12.0		156	0	0.0	13.34
Region C	: 0.0	_	0.0	0	0.0	0.00

Room 51/A

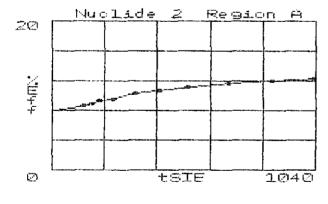
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

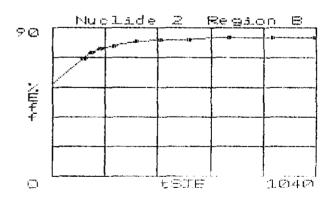




tSIE	%EffA	tSIE	%EffA
1034.8	63.94	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tSIE %EffB 850.73 5.27 1034.8 4.95 6B0.77 5.27 526.12 5.37 416.09 5.23 320,19 4.98 242.00 4.49 184.16 4.02 121.67 2.85 149.13 3.54





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

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		7 2007			~CARB	1.09				Page		
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		152.	93 B.76	122.5	8 B.59		152.93	75.21	122.58	71.52		
9	3#	TIME	CPMA	CPMB	DPM1	DPM2	SIS	tSIE	FLAG			
	1	10.00	11.56	13.34			71.248	719.55	В			
	2	10.00	0.06	0.00	0.11	0.00	0.000	729.19				
	3	10.00	0.00	0.00	0.00	0.00	0.000	718.07				
	4	10.00	0.00	0.00	0.00	0.00	0.000	737.21				
	5	10.00	0.00	0.00	0.00	0.00	-	706.9B				
	6	10.00	0.00	0.00	0.00	0.00		716.12				
	7	10.00	3.23	0.17	5.83	0.00		722.89				
	В	10.00	0.00	0.00	0.00	0.00		713.57				
	9	10.00	0.00	0.00	0.00	0.00		727.44				
1	ιó	10.00	1.24	0.00	2.26	0.00		724.87				
	11	10.00	0.00	0.00	0.00	0.00		730.83				
	12	10.00	0.00	0.00	0.00	0.00		724.19				
	13	10.00	0.00	0.00	0.00	0.00	0.000	723.45				
1	14	10.00	0.B5	0.00	1.55	0.00	0.000	715.55				

Surve, Number 062-217-4

Page 1 of 7

Instrument SN.	Calibration Due:	Site Name:	Date Time:
2224 116239 Instrument 88 43-681 PR-140483	10/13/07 Calibration Due: 10/13/07	Location RWM 600	159st 1000
Instrument N. P.A.	(alibration Due: مراه	Purpose: (~ 55)	
Survey Performed By (Print): John	<u> </u>	Survey Performed By (Signature)	10,5%
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13		3 6	
15			
	(AB) W(75)		
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u	STATIC COUNTS. RESUL		

Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roo	m 600	
Surv	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	B+4.5, 2+3.5	0/197
2	B+3.5, 1+2.5	1/206
3	B+3.5, 0+2.0	1/210
4	A+4.0, 1+0.0	0/202
5	A+4.5, 2+2.5	0/207
6	C+2.0, 2+0.5, 4.0	1/199
7	A+3.5, 0+0.0, 6.0	2/201
8	A+0.0, 1+4.5, 4.0	1/206
9	A+4.5, 3+0.0, 2.0	0/209
10	B+3.0, 0+5.0	1/193
11	C+0.5, 1+0.5, 2.0	1/207
12	C+0.5, 1+1.5, 2.0	0/210
13	B+5.5, 0+2.5, 3.0	1/198
14	C+2.0, 0+2.5, 6.0	Smear only
15	C+0.5, 1+4.5, 2.5	1/208
16	B+1.0. 1+4.5. 2.5	1/197

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

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Client Name: GL	ERL			IEM Project No.:	2005006.003		<u> </u>
Sample Collection Date: Sample Ship Da June 25, 2007 SAMPLE SAMPLE Ship Da			te:	Sample Analysis June 25, 2007	Sample Analysis Date: Report Date: June 25, 2007		
			DATA ACC	QUISITION			
Instrument Man Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008	****
Analysis Metho	d:			Instrument	Efficiency		-
■ IEM RSP (sp □ Other (specify		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2400-98	12700	43963	10	4396	0.35
■ Gross Alpha □ Gross Beta				Instrument I	Background		
□ Other (specif)	') :	Gross	Counts	Count Time (min)		Background (cp	
		4	11	6	0	1	
			RESU	JLTS			
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
1	1	2	-0.2	-0.5	0.5	1.4	a
2	1	2	-0.2	-0.5	0.5	1,4	8
3	0	2	-0.7	-2.0	0.0	1.4	a
4	2	2	0.3	0.9	0.7	1.4	a
5	1	2	-0.2	-0.5	0.5	1.4	
6	0	2	-0.7	-2.0	0.0	1.4	a
7	1	2	-0.2	-0.5	0.5	1,4	a
8	1	2	-0.2	-0.5	0.5	1.4	a
9	1	2	-0.2	-0.5	0.5	1.4	a
10	2	2	0.3	0.9	0.7	1,4	a
11	1	2	-0.2	-0.5	0.5	1.4	a
12	1	2	-0.2	-0.5	0.5	1.4	8
13	2	2	0.3	0.9	0.7	1.4	а
14	0	2	-0.7	-2.0	0.0	1.4	a
Codes: (8) - No correction for a (b) - Visible damage to (c) - Sample returned to (d) - Other (describe): (e) - Other (describe):	sample	Notes: Room 600.					
Analysis perform	ed by (print):		Analysis performe	ed by (signature):		License No.:	<u> </u>
Jeffrey W. Sumlin,	RRPT		1102	<u> </u>	MDE License No: MD-31-281-01		

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Client Name: G	LERL			IEM Project No.:	-		
Sample Collect June 25, 2007	ion Date:	Sample Ship Da N/A	ite:	Sample Analysis June 25, 2007	: Date:	Report Date:	
			DATA AC	QUISITION			
Instrument Man Ludium	rufecturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238	ll No.:	Calibration Due: April 2, 2008	
Analysis Metho	d:			Instrument	t Efficiency		
■ IEM RSP (specify): RSP-019 □ Other (specify):		Source Identifier/SN	Source Activity - 417 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2400-98	12700	43963	10	4396	0.35
■ Gross Alpha □ Gross Beta				Instrument i	Background		<u> </u>
□ Other (specifi	у):	Gross	Counts	Count Time (min)		Background Count Rate (cpm)	
		4	41	6	0	1	1
		<u></u>	RESI	ULTS			
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
15	1	2	-0.2	-0.5	0.5	1.4	a
16	0	2	-0.7	-2.0	0.0	1.4	a
							
 -							
Codes: (a) - No correction for : (b) - Visible damage to (c) - Sample returned to (d) - Other (describe): (e) - Other (describe):	sample to client	Notes: Room 600.					
Analysis perform	ned by (print):		Analysis perform	ed by (signature):		License No.:	
Jeffrey W. Sumlin	, RRPT		Analysis performed by (signature): License No.: MDE License No: MD-3				MD-31-281-01

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Client Name: G	LERL			IEM Project No.:	2005006.003				
Sample Collect June 25, 2007	Ion Date:	Sample Ship Da N/A	ite:	Sample Analysis June 25, 2007	Sample Analysis Date: Report Date: June 25, 2007				
			DATA AC	QUISITION					
Instrument Man Ludium	rufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238	il No.:	Calibration Due: April 2, 2008			
Analysis Metho	d:			Instrumeni	t Efficiency				
■ IEM RSP (sp □ Other (specif	pecify): RSP-019 fy):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)		
Analysis Type:		2399-98	20000	52492	10	5196	0.26		
□ Gross Alpha ■ Gross Beta				Instrument I	Background	<u> </u>			
□ Other (specify):		Gross	Counts		Count Time (min)		Background Count Rate (cpm)		
		31	186	6	C	55	3		
			RESI	ULTS					
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes		
1	111	2	2.4	9.2	5.3	6.6	а		
2	104	2	-1.1	-4.2	5.1	6.6	а		
3	107	2	0.4	1.5	5.2	6.6	а		
4	99	2	-3.6	-13.9	5.0	6.6	a		
5	103	2	-1.6	-6.2	5.1	6.6	a		
6	106	2	-0.1	-0.4	5.1	6.6	a		
7	105	2	-0.6	-2.3	5.1	6.6	а		
8	97	2	-4.6	-17.7	4.9	6.6	a		
9	109	2	1.4	5.4	5.2	6.6	a		
10	112	2	2.9	11.2	5.3	6.6	а		
11	104	2	-1.1	-4.2	5.1	6.6	a		
12	104	2	-1.1	-4.2	5.1	6.6	a		
13	110	2	1.9	7.3	5.2	6.6	8		
14	106	2	-0.1	-0.4	5.1	6.6	a		
Codes: (a) No correction for (b) Visible damage to (c) Sample returned (d) Other (describe): (e) Other (describe):	o sample to dient	Notes: Room 600.							
Analysis perform	ned by (print):		Analysis perform	ed by (signature):		License No.:			
Jeffrey W. Sumlin	i, RRPT		10/01.	/ <u></u>		MDE License No: MD-31-2			

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Client Name: Gl	ERL			IEM Project No.:	2005006.003			
Sample Collecti June 25, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 25, 2007	Date:	Report Date:		
			DATA AC	NOITIBIUD				
Instrument Manufacturer: Instrument Mo Ludium 2929 Scaler w/4				instrument Seria 126126/132238	il No.:	Calibration Due: April 2, 2008		
Analysis Method	Analysis Method:			Instrument	Efficiency		· · · · · · · · · · · · · · · · · · ·	
■ IEM RSP (sp □ Other (specify	ecify): RSP-019 /):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)	
Analysis Type:		2399-98	20000	52492	10	5196	0.26	
□ Gross Alpha ■ Gross Beta				instrument i	Background			
다 Other (specify):		Gross	Counts	Count (m	t Time (n)	Background Count Rate (cpm)		
		31	86	6	0	5	3	
			RESI	ULTS				
Smear No.	Smear No. Gross Counts Count Time (min) Net Count Rate (cpm)		Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes		
15	104	2	-1.1	-4.2	5.1	6.6	a	
16	101	2	-2.6	-10.0	5.0	6.6	8	
								
	 		<u> </u>					
		<u> </u>	ļ				·	
	L	<u> </u>						
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (a) - Other (describe):		Notes: Room 500.						
Analysis perforn	ned by (print):			ed by (signature):		License No.:		
Jeffrey W. Sumlin, RRPT			1407 MDE License No: MD-31-281-01				MD-31-281-01	

TRI-CARB - 1.09

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H~14C

Quench Sets

Law Energy: 3H

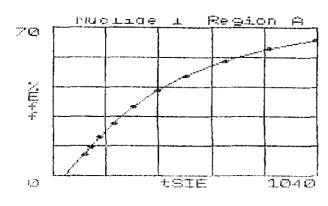
High Energy: 14C

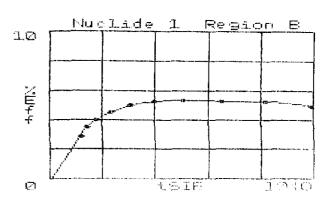
Background Subtract: 1st Vial

		LL		UL	LCR	25%	BKG
Region .	A:	0.0	-	12.0	0	0.0	11.11
Region	B:	12.0	-	156	0	0.0	14.19
Region (C:	0.0	-	0.0	0	0.0	0.00

Room 600

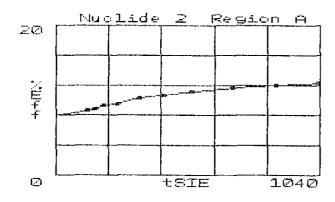
Guench Indicator: tSIE/AEC
 Ext Std Terminator: Count

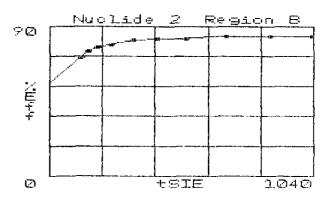




tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tSIE %EffB 1034.8 4.95 850.73 5.27 680.77 5.27 526.12 5.37 416.09 5.23 320.19 4.98 242.00 4.49 184.16 4.02 149.13 3.54 121.67 2.85





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	B3.64	869,29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.54

26 Ju	n 2007	15:25	TRI	-CARB -	1.09				QUF9 Page	#2
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		94 9.55 93 8.76		6 9.32 8 8.59		239.94 152.93		188.56 122.58		
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3	10.00	0.00	0.00	0.00	0.00	0.000	691.58			
4	10.00	0.00	0.00	0.00	0.00	0.000	695.23			
5	10.00	0.00	0.00	0.00	0.00	0.000	695.41			
6	10.00	0.00	0.00	0.00	0.00	0.000	707.B1			
7	10.00	0.65	0.00	1.18	0.00	0.000	715.94			
8	10.00	0.00	0.00	0.00	0.00	0.000	704.B2			
9	10.00	1.38	0.00	2.52	0.00	0.000	713.53			
10	10.00	1.22	0.00	2.23	0.00	0.000	706.51			
11	10.00	0.00	0.00	0.00	0.00	0.000	716.01			
12	10.00	0.00	0.00	0.00	0.00	0.000	717.98			
13	10.00	3.32	0.00	6.06	0.00	0.000	717.66			
14	10.00	0.00	0.00	0.00	0.00	0.000	700.65			
15	10.00	0.00	0 .9 3	0.00	1.12	3.611	700.04			
16	10.00	0.00	0.00	0.00	0.00	0.000	706.13			
17	10.00	0.47	0.00	0.85	0.00	0.000	721.05			

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RADIOLOGICAL SURVEY FORM Survey Number 062507-2

Survey Number <u>062501-2</u>	RADIOLOGIC	CAL SURVEY	FORM		Page of
Instrument SN 2 224 / 1/6239	Calibration Due:		Site Name: GLe	RL	Date: Time:
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RADIOLOGICAL SURVEY FORM

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RADIOLOGICAL SURVEY FORM Narves Number (062507 - 10

Strument SN. Calibration Due: BICRUM B 29666 10/10/07 Strument SN. Calibration Due:	Site Name:	16 !-
Strument SN Calibration Due	altel	Date Time:
い / t	Location Room 602	7
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Roo	m 602					
Surv	vey Location	CPM α/β per 100 cm ² (total for 2 minute count)				
1	A+2.5, 2+4.5	0/214				
2	A+4.5, 2+0.5	1/197				
3	A+1.5, 1+3.5	2/209				
4	A+3.0, 0+5.5	0/211				
5	A+4.5, 0+1.5	0/207				
6	B+1.0, 1+2.5, 6.0	1/202				
7	A+2.5, 0+0.0, 4.0	1/206				
8	A+0.0, 2+2.5, 4.0	0/199				
9	A+3.5, 3+0.0, 2.0	1/203				

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:29

SURVEY

Page #1 User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

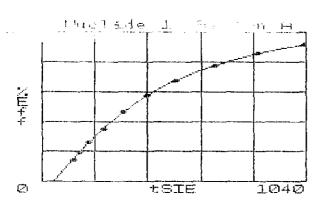
Low Energy: 3H

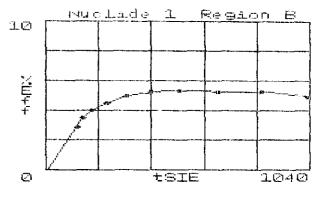
High Energy: 14C

LCR LL UL 25% BKG Region A: 0.0 - 12.00.0 0 9.85 Region B: 12.0 - 156 0 0.0 15.25 Region C: 0.0 - 0.0 0 0.0 0.00

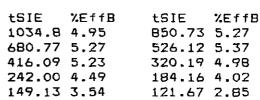
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

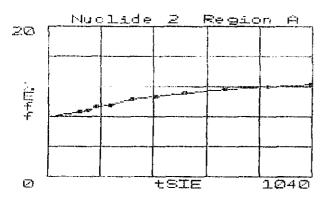
Background Subtract: 1st Vial

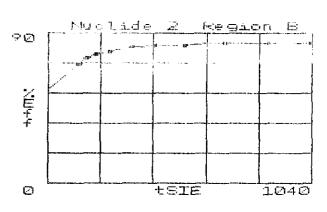




tSIE	%EffA	tSIE	%EffA
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680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tsie	%EffB
1035.1	83.64	869.29	84.06
697.16	B4.32	538.87	82.87
426.87	82.43	329.70	81.54

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RADIOLOGICAL SURVEY FORM Page _____ of ____ Survey Number 0625257-11 Instrument SN: Calibration Due: Date: 42-707 Site Name: Time: 2224 1 170 347 GLORG 10/13/07 ilUU Instrument 8N Calibration Due: Location: 43-37/PR 177476 RWM 604 10/13/07 Instrument SN. Calibration Due: Purpose: F55 211 Survey Performed By (Print): JOFFREY W Survey Performed By (Signature): ZBattery OK **≱**HV OK **Ճ** Source Gnd Dimensions: Check OK ☐ meters 🗆 inches **Ki**cet ☐ centimeters tA. 9 0 p a Roux 606 CHAINALS Lorda Code 0 द्रु ٠, 4) ٠, 13 14 15 : 9 20 NOW SUNNIND LUUGE OF FLOOR. TOOK ROMPINGS ~ 6 FT. RESULTS IN CPM a/B 0/ 340 @ 0/360

3 0/ 360

0/ 360

survey Sumber 062507-12

Instrument SN	Calibration Due:		Site Name:	Date: Time:					
2724 116239	(0)	13/07	GLORL	417UZ 1110					
Instrument Si 43-68/PR 190483	Calibration Due:	113/07	Location. Rum 604						
Instrument SV - 214-	Calibration Due:	4 (4	Purpose: (=55						
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Survey Norther 067-17-13

Page 1 of 1

Instrument SN:	Calibration Due:	Site Name:	Date: Time:									
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RADIOLOGICAL SURVEY FORM

Survey Number 062307- 14

Page / of 5

Instrument SN	Calibration D	Ite:		Site Nan	14:		Date:	Time of			
2224/ 1/6239		10/13/07	L ,	1	LORL		41-577	Time: 1/50			
Instrument SN	Calibration D			Location							
43-681 PR 140483		W/13/07			RUM (204					
Instituted SV	Calibration D	ue: PIA		Purpose. PSS							
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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room 604

Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+5.5, 1+2.5	1/209
2	B+1.5, 1+1.5	1/211
3	A+2.5, 0+5.5	0/204
4	A+5.5, 0+2.5	0/212
5	A+3.0, 0+1.0	1/206
6	B+1.0, 0+4.5	2/200
7	B+4.0, 0+1.5, 2.0	1/207
8	B+4.0, 1+2.0, 2.5	1/202
9	A+1.5, 0+5.5, 2.5	1/210
10	A+0.0, 0+5.0, 4.0	0/198
11	B+1.5, 0+0.0, 4.0	1/203
12	C+0.0, 0+4.5, 4.0	0/197
13	A+2.5, 1+4.0, 2.0	1/209

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Protocol #:32

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

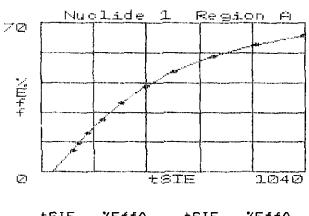
High Energy: 14C

Background Subtract: 1st Vial

	<u>L</u> L	UL	LCR	25%	BKG
Region A:	0.0 -	12.0	0	0.0	11,25
Region B:	12.0 -	156	О	0.0	12.35
Region C:	0.0 -	0.0	0	0.0	0.00

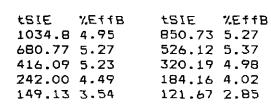
Room 604

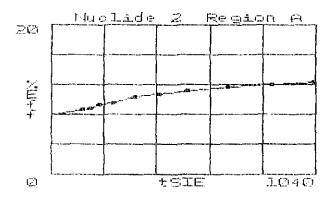
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

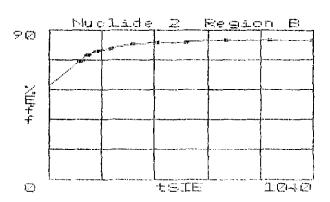


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tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







%EffA	tSIE	%EffA
12.29	869.29	12.00
11.63	538.87	11.13
10.70	329.70	10.31
	12.29 11.63	12.29 869.29 11.63 538.87

tSIE %EffB tSIE %EffB 1035.1 83.64 869.29 84.06 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.55

26 Ju	n 2007	20:21	TRI-	CARB -	1.09				Page	
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		94 9.55 93 8.76	188.56 122.58			239.94 152.93		188.56 122.58		
S# 1 2 3 4 5 6 7 8 9 11 12	TIME 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00	CPMA 11.25 1.52 0.00 0.00 0.00 0.26 1.03 1.05 0.00 0.25 5.06 3.56	CPMB 12.35 0.58 0.33 0.42 0.48 0.35 1.07 0.00 0.00 0.85 0.64	DPM1 2.64 0.00 0.00 0.00 0.39 1.60 1.70 0.00 0.25 7.08 6.31	DPM2 0.52 0.40 0.50 0.57 0.38 1.17 0.00 0.00 0.99 0.19 0.60	0.000 0.000 0.000 0.000 14.845 0.000 0.000 0.000	716.08 712.22 702.93 708.61 711.22 713.90	FLAG B		
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Page 1 of 5

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Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

TRI-CARB - 1.09

SURVEY

User : KIM

Time: 10.00

Region A:

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

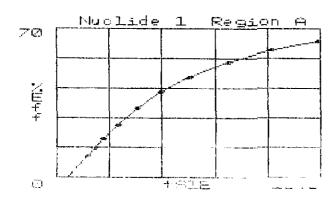
High Energy: 14C

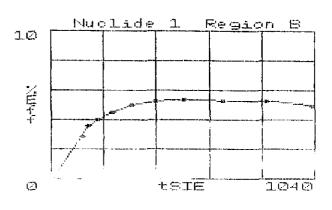
Background Subtract: 1st Vial

LL UL LCR 25% BKG 0.0 - 12.0 0 0.0 11.04 12.0 - 156 0.0 0 11.B6

Region B: 0.0 -Region C: 0.0 0.0 0 0.00 from 606

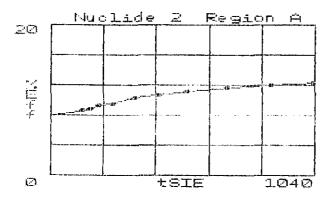
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

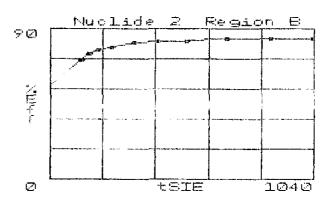




tSIE	%EffA	<i>t</i> SIE	%EffA
1034.B	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tSIE "EffB 850.73 5.27 1034.8 4.95 680.77 5.27 526.12 5.37 416.09 5.23 320.19 4.99 184.16 4.02 242.00 4.49 149.13 3.54 121.67 2.85





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE %EffB tSIE %EffB 1035.1 83.64 869.29 84.06 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.55

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	152.	93 8.76	122.5	8 8.59		152.93	75.21	122.58	71.52		
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2	10.00	0.00	0.77	0.00	0.92	0.000	721.65				
3	10.00	0.00	1.03	0.00	1.24	299.81	726.29				
4	10.00	0.00	1.15	0.00	1.38	397.72	708.00				
5	10.00	0.00	0.50	0.00	0.60	0.000	698.21				
6	10.00	0.00	0.00	0.00	0.00	0.000	707.45				
7	10.00	0.00	0.01	0.00	0.01	0.000	710,28				
8	10.00	0.50	0.00	0.91	0.00	0.000	711.18				
9	10.00	1.50	0.80	2.55	0.79	94.172	711.79				
10	10.00	1.18	0.02	2.17	0.00	266.16	703.49				
11	10.00	0.75	0.00	1.37	0.00	0.000	723.9 7				
12	10.00	0.00	3.9 3	0.00	4.72	206.46	708.11				
13	10.00	0.67	0.96	0.99	1.08	165.49	714.91				
14	10.00	1.06	0.00	1.94	0.00	0.000	715.B4				
15	10.00	1.79	1.51	2.88	1.61	64.672	716.56				
16	10.00	0.00	0.47	0.00	0.56	1104.2	731.09				
17	10.00	0.00	2.12	0.00	2.55	0.000	726.63				
18	10.00	0.00	2.95	0.00	3.54	257.07	708.70				

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Nurves Number 062517-16

Instrument SN:	Calibration Due:		Site Name:		Date:	Time:
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Instrument SN 43-37/PR 177476	Calibration Due:	/08	Location:	ROOM LOC		
Instrument SN: W/W-	Calibration Due:		Purpose:	F55		
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RADIOLOGICAL SURVEY FORM

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Instrument SN	Calibration Due	Location:
43.681 PR 140483	10/13/07	ROUM 606
Instrument SN PLA	Calibration Due: PIA	Purpose: FSS
Survey Performed By (Print).		Survey Performed By (Signature) 445/-
Battery OK SHV OK	≪ Source Check OK	Gind Dimensions: 2 x 2 □ meters □ inches 2 feet □ centimeters
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Survey Number 062207-19

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room (50	8
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y Location	CPM α/β per 100 cm ² (total for 2 minute count)
A+2.5, 2+2.5	2/203
A+2.5, 1+0.5	1/206
A+5.5, 0+2.5	0/211
B+1.5, 1+4.0	1/207
B+5.5, 2+2.5, 3.0	1/204
B+4.5, 0+3.5, 2.5	1/210
B+4.5, 0+4.5, 2.5	0/211
C+0.0, 1+3.5, 4.0	1/203
A+4.5, 0+0.0, 6.0	1/197
A+0.0, 1+3.0, 4.0	1/202
B+0.0, 2+5.0, 2.0	1/209
	A+2.5, 1+0.5 A+5.5, 0+2.5 B+1.5, 1+4.0 B+5.5, 2+2.5, 3.0 B+4.5, 0+3.5, 2.5 B+4.5, 0+4.5, 2.5 C+0.0, 1+3.5, 4.0 A+4.5, 0+0.0, 6.0 A+0.0, 1+3.0, 4.0

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

25 Jun 2007 21:43

TRI-CARB - 1.09

Protocol #:32

SURVEY

Yucて Page #1 User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

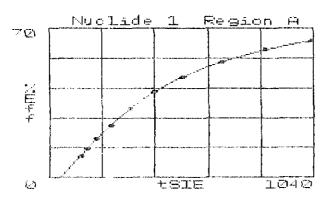
High Energy: 14C

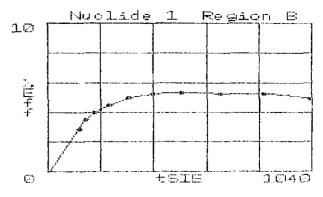
Background Subtract: 1st Vial

25% LL UL LCR BKG 0.0 - 12.0Region A: 0 0.0 10.61 Region B: 12.0 - 156 0 0.0 13.69 0.0 - 0.0 Region C: 0 0.0 0.00

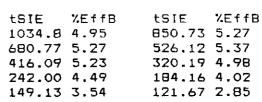
Room 608

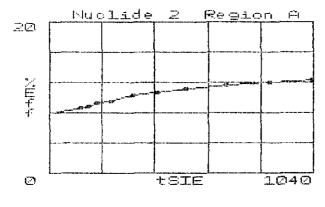
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

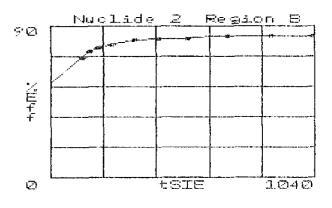




tSIE	/EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







%EffA	tSIE	%EffA
12.29	869.29	12.00
11.63	538.87	11.13
10.70	329.70	10.31
	12.29 11.63	12.29 869.29 11.63 538.87

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	379.70	B1.55

		94 9.55 93 8.76	188.56 122.58			239.94 152.93		188 122
S#	TIME	CPMA	СРМВ	DPM1	DPM2	SIS	tSIE	FLAG
1	10.00	10.61	13.69			76.819	711.13	В
2	10.00	0.38	0.00	0.69	0.00	0.000	723.94	
3	10.00	0.00	0.00	0.00	0.00	0.000	715.67	
4	10.00	0.00	0.00	0.00	0.00	0.000	709.75	
5	10.00	2.00	0.00	3.63	0.00	0.000	725.21	
6	10.00	0.95	0.00	1.75	0.00	0.000	704.16	
7	10.00	1.40	0.00	2.57	0.00	0.000	711.76	
8	10.00	0.35	0.00	0.64	0.00	0.000	702.88	
9	10.00	0.18	0.00	0.33	0.00	0.000	711.92	
10	10.00	1.10	0.00	2.01	0.00	0.000	711.10	
11	10.00	2.12	1.18	3.59	1.17	84.652	713.61	
12	10.00	0.88	0.00	1.62	0.00	0.000	708.32	

TRI CARB 1.09

SURVEY

SYSTEM NORMALIZED

25 Jun 2007 21:43

Protocol #:32

C14 IPA DATA PROCESSED - 25-Jun-2007 23:53
 C14 Eff (0-156 keV) = 96.36 %

C14 CHI SQUARE IPA DATA PROCESSED - 26-Jun-2007 00:03
 C14 Chi Square = 19.64

H3 IPA DATA PROCESSED - 26-Jun-2007 00:05
 H3 Eff (0-18.6 keV) = 59.72 %

H3 CHI SQUARE IPA DATA PROCESSED - 26-Jun-2007 00:15
 H3 Chi Square = 31.11

BKG IPA DATA PROCESSED - 26-Jun-2007 01:16
 Bkg (0-18.6 keV) = 13.27 cpm
 Bkg (0+156 keV) = 20.10 cpm
 C14 E^2/B (1-156 keV) = 555.61
 H3 E^2/B (1 10.6 keV) = 270.53

Survey Number 062607-8

NOLOGICAL SURVEY FORM	. 1	of	2
	Page 1	of	_

Instrument SN. 2124/170347										Calibration Due:										Site Name: GUCRU							D:	ate: 24/д		Tim 134									
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Survey Number 062607-9

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RADIOLOGICAL	SURVEY	FURIVI	

Page 1 of 5

Instrument SN 2224 116239									Calibration Due:									Site Name: Date: Time: GLCRL Pure 13/5							
lnsi 4	rumer 3-6 8	n SN 17-P	n.	14	04	83		Ca	libra	tion E		113/	d7			Location: ROUM 801									
lnst	rumer	ii SN	. :	ل) M-	-		Ca	Calibration Due: און טג									Purpose: F55							
Sur	vey Po	rton	med	By (Prin	t):	J (FRIYW June 1								Survey Performed By (Signature):									
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Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

27 Jun 2007 04:47 TRI-CARB - 1.09 4085 Page #1 Protocol #:27 SURVEY User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

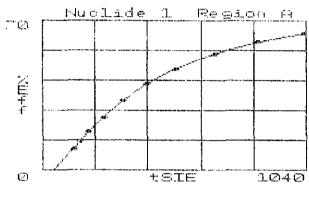
High Energy: 14C

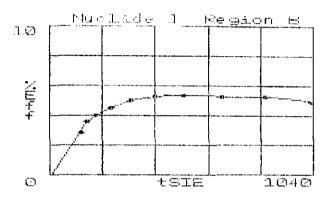
Background Subtract: 1st Vial

LL UL LCR 25% BKG Region A: 0.0 - 12.00 0.0 11.45 Region B: 12.0 -0.0 156 0 11.45 Region C: 0.0 -0 0.0 0.0 0.00

Ram 801

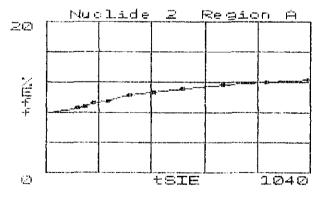
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

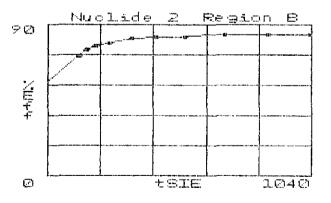




tSIE tSIE %EffA %EffA 850.73 59.86 1034.8 63.94 680.77 54.36 526.12 47.53 416.09 40.43 320.19 32.62 242.00 24.70 184.16 18.16 149.13 13.67 121.67 10.10

tSIE %EffB tSIE %EffB 1034.8 4.95 850.73 5.27 680.77 5.28 526.12 5.37 416.09 5.24 320.19 4.99 242.00 4.49 184.16 4.02 121.67 2.85 149.13 3.54





tSIE %EffA tSIE %EffA 1035.1 12.29 869.29 12.00 697.16 11.63 538.87 11.13 426.87 10.70 329.70 10.31

tSIE %EffB tSIE %EffB 869.29 84.06 1035.1 83.64 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.55

27 Ju	n 2007	04:47	TRI	-CARB -	1.09	_		SUFS	Page	#2
Proto	col #:2	7	SUR	VEY					User	: KIM
	239.9	74 9.55	188.5	6 9.32		239.94	79.05	188.56	77.31	
	152.9	73 8.76	122.5	8 8.59		152.93	75.21	122.58	71.52	
S#	TIME	CPMA	CPMB	DPM1	DPM2	SIS	tSIE	FLAG		
1	10.00	11.45	11.45			80.485	736.30	В		
2	10.00	0.00	0.13	0.00	0.16	0.000	734.02			
3	10.00	0.87	0.63	1.40	0.66	0.000	749.77			
4	10.00	0.52	2.08	0.42	2.44	0.000	744.36			
5	10.00	0.80	1.00	1.20	1.11	0.000	727.77			
6	10.00	0.66	1.14	0.71	1.29	0.000	749.03			

SYSTEM NORMALIZED

C14 IPA DATA PROCESSED - 27-Jun-2007 05:45 C14 Eff (0-156 keV) = 96.54 %

Page ______ of ____

RADIOLOGICAL SURVEY FORM

Instrument SN 2224 176347	Cahbration Due		Site Name: GLURL	Date: Time:						
Instrument SN: 43-371 PR 177476	Calibration Du	e: H08	Location ROUM SULA							
Instrument SN: U/A	Calibration Du	-	Purpose: FSS							
	FREY W		Survey Performed By (Signature	HUZ						
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RADIOLOGICAL SURVEY FORM

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2224 116239	14al										
Instrument SN U/A Calibration Due: W/A Purpose: F55											
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Saries Number 062607-11

Survey Number 062607-12

RADIOLOGICAL SURVEY FORM

Page ______ of ____

Instrument SN: 2224 1/6239										T	Calibration Due:											Site Name:									Da	ile: 437	Tin 14	- 11		
Instrument SN 43-681 PR 190483										Calibration Due: /U/13/UT-											Location: ROUM 801A															
Instrument SN: און ש										Calibration Due: جراب									Purpose: C-55																	
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3-Battery OK 2-HV OK										Ø Source Check OK									Gnd Dimensions: 2 r Z ☐ meters ☐ inches ☐ centimeters																	
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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. nine Number 062607-14

RADIOLOGICAL SURVEY FORM

Page _______of ____

Bichow Bighw								Calibr	ation (<i>ن إن</i>	7-	7		Site	Nan C		· KL	Date 'Ay	e (~4	Tim i4					
Instrument SN:							Calibr	ation [ue:	<u> </u>				Location: Roum SCIA												
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Survey Number 062607-13

Instrument SN	Calibration Due:	Site Name: Date Time: 4244 1430
2224/ 1/6235 Instrument SN	Calibration Due.	Location
43-681 12 140483	10/13/07	ROUM BUIA
Instrument SN OJA	Calibration Due: w/#	Purpose: F55
Sur ex Performed By (Print) 30	GREY LY JUNEOU	Survey Performed By (Signature) 1905
ZBattery OK ► MIN'OK	≯Source Check OK	Grid Dimensions /x/ ⊇ meters □ inches **Zfeet □ inches
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SMEANS FOR	LIC IS TAME LOCATIO	IN CPM A/B/100 CAR, TOUT

Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room	80	1A
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Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+2.0, 1+3.0	1/172
2	B+3.0, 1+3.0	1/178
3	B+3.0, 0+2.0	2/1 7 9
4	A+2.0, 0+2.0	0/181
5	B+0.0, 1+0.0	0/174
6	A+0.0, 0+5.0, 4.0	1/183
7	B+1.0, 0+0.0, 4.0	2/180
8	C+0.0, 1+0.0, 4.0	0/174
9	B+0.0, 2+0.0, 4.0	1/174

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

Page #1

Protocol #:18

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

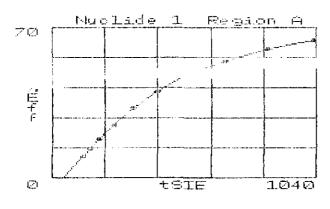
High Energy: 14C

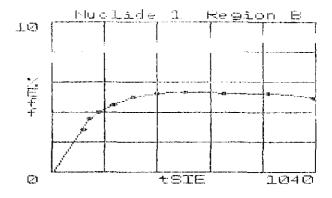
Background Subtract: 1st Vial

LL UL LCR 25% BKG 0.0 - 12.0Region A: 0 0.0 10.59 Region B: 12.0 - 156 0 0.0 11.21 Region C: 0.0 - 0.0 0.0 0.00

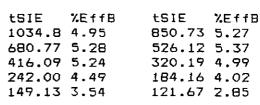
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

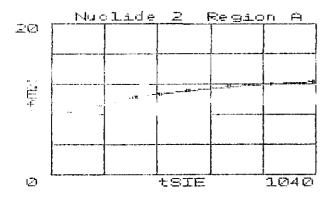
Room 801A

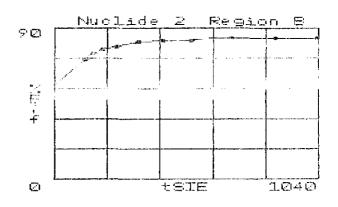




%EffA	tSIE	%EffA
63.95	B50.73	59.86
54.36	526.12	47.53
40.44	320.19	32.62
24.70	184.16	18.16
13.67	121.67	10.10
	63.95 54.36 40.44 24.70	63.95 B50.73 54.36 526.12 40.44 320.19 24.70 184.16







tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	B4.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.55

27 Ju	n 2007	06:06	TRI-	CARB -	1.09				Page	#2	
Proto	col #:1	8	SURV	ΕY						: KI	M
	239.	94 9.55	188.56	9.32		239.94	79.05	188.56	77.31		
	152.	93 8.76	122.58	8.59		152.93	75.21	122.58	71.52		
5#	TIME	CPMA	CPMB	DPM1	DPM2	SIS	tSIE	FLAG			
1	10.00	10.59	11.21			72.665	734.77	В			
2	10.00	0.00	1.43	0.00	1.72	68.012	734.04				
3	10.00	0.32	2.98	0.00	3.55	83.436	725.49				
4	10.00	0.00	1.20	0.00	1.44	2472.5	712.14				
5	10.00	0.00	0.00	0.00	0.00	0.000	718.37				
6	10.00	0.00	1.13	0.00	1.36	181.23	730.01				
7	10.00	1.19	1.11	1.88	1.21	0.000	720.80				
8	10.00	0.50	1.40	0.55	1.63	93.010	722.29				
9	10.00	0.00	2.65	0.00	3.19	85.097	719.70				
10	10.00	0.17	0.73	0.12	0.86	49.273	718.05				

Survey Number	mr 71	(7-15
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Page _____ of ____

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Static Count and Smear Locations

First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Room 801B

Surve	y Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+2.0, 1+0.0	2/198
2	B+3.0, 1+0.0	1/204
3	A+3.0, 0+2.0	2/212
4	A+2.0, 0+2.0	1/201
5	B+0.0, 0+4.0	1/209
6	B+0.0, 1+2.0, 4.0	0/196
7	C+0.0, 0+4.0, 4.0	1/178
8	B+0.0, 0+0.0, 4.0	0/181
9	A+0.0, 0+4.0, 4.0	1/176

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

27 Jun 2007 07:56 Protocol #:26

TRI-CARB - 1.09

SURVEY

Page #1

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

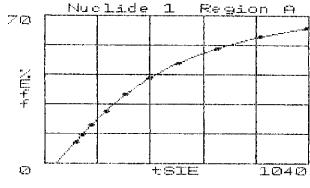
Low Energy: 3H

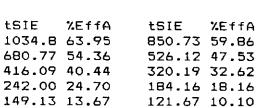
High Energy: 14C

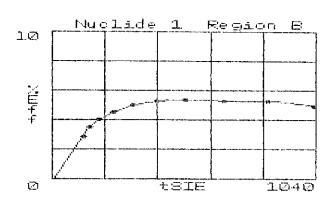
Background Subtract: 1st Vial

LCR LL UL 25% BKG Region A: 0.0 - 12.0 0.0 0 10.79 Region B: 12.0 -156 0 0.0 13.28 Region C: 0.0 -0.0 0 0.0 0.00

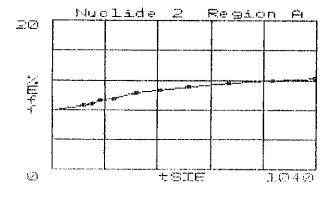
Quench Indicator: tSIE/AEC Ext Std Terminator: Count Room 801 B



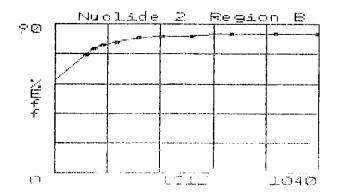




tSIE	%EffB	tSIE	%EffB
1034.8	4.95	850.73	5.27
680.77	5.27	526.12	5.37
416.09	5.23	320.19	4.98
242.00	4.49	184.16	4.02
149.13	3.54	121.67	2.85



tSIE	%EffA	ESTE	%EffA
1035.1	12.29	B69.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31



tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	B4.32	538.87	82.87
426.87	82.43	329.70	81.55

<u>27 Ju</u>	un 2007	07:56	TRI-	CARB -	1.09				Page	#2	
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1	10.00	10.79	13.28			72.255	723.03	В			
2	10.00	0.00	0.00	0.00	0.00	0.000	708.10				
3	10.00	0.00	0.00	0.00	0.00	0.000	703.07				
4	10.00	0.00	0.10	0.00	0.12	0.000	698.86				
5	10.00	0.39	0.00	0.71	0.00	0.000	713.26				
6	10.00	0.30	0.33	0.47	0.37	79.715	698.89				
7	10.00	0.00	0.00	0.00	0.00	0.000	709.57				
8	10.00	0.00	0.00	0.00	0.00	0.000	709.65				
9	10.00	1.42	0.00	2.59	0.00	73.429	713.44				
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Static Count and Smear Locations

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First number indicates letter starting point and number of additional feet along that axis. Second number indicates number starting point and number of additional feet along that axis. Third number, if present, indicates height above floor in feet. If no number present, assume 0.

Waste	e Storage Building	
Surve	ey Location	CPM α/β per 100 cm ² (total for 2 minute count)
1	A+1.0, 1+2.5	2/206
2	A+4.0, 1+2.5	1/217
3	B+2.0, 1+2.5	2/208
4	B+2.0, 1+0.5	1/198
5	A+5.0, 1+0.5	3/216
6	A+2.0, 1+0.5	2/214
7	A+1.0, 0+4.0	3/202
8	A+4.0, 0+4.0	2/212
9	B+2.0, 0+4.0	3/208
10	B+3.0, 0+2.5	3/202
11	B+0.0, 0+2.5	2/216
12	A+2.5, 0+2.5	0/219
13	A+1.0, 0+0.5	3/204
14	A+4.0, 0+0.5	1/212
15	B+2.0, 0+0.5	1/215
16	B+3.0, 0+3.5, 4.0	2/187
17	B+3.0, 1+1.5, 6.0	3/193
18	B+1.0, 1+4.0, 2.0	2/201
19	A+2.0, 1+4.0, 4.0	1/198
20	A+0.0, 1+0.5, 4.0	2/193
21	A+0.0, 0+2.5, 6.0	2/189
22	A+2.0, 0+0.0, 2.0	0/192

2/197

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

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Client Name: GL	ERL			IEM Project No.: 2005006.003							
Sample Collecti June 21, 2007	on Date:	Sample Ship Dai	te:	Sample Analysis Date: Report Date: June 21, 2007							
			DATA ACC	QUISITION		<u>,</u>					
Instrument Man Ludium	ufacturer:	instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008					
Analysis Method	d:	1		Instrument	Efficiency						
■ IEM RSP (sp □ Other (specify		Source Identifier/SN	Source Activity - 471 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)				
Analysis Type:		2400-98	12700	43478	10	4347	0.34				
■ Gross Alpha □ Gross Beta				Instrument I	Background						
☐ Other (specify	y):	Gross	Counts	Coun (m	t Time in)	Background (cp					
		3	8	6	0	1					
· <u> </u>		<u> </u>	RES	ULTS							
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes				
1	1	2	-0.1	-0.4	0.5	1.4	8				
2	1	2	-0.1	-0.4	0.5	1.4	a				
3	2	2	0.4	1.1	0.7	1.4	a				
4	1	2	-0.1	-0.4	0.5	1.4	a				
5	0	2	-0.6	-1.9	0.0	1.4	a				
6	1	2	-0.1	-0.4	0.5	1.4	a				
7	2	2	0,4	1,1	0.7	1.4	8				
8	3	2	0,9	2.5	0.9	1.4	a				
9	1	2	-0.1	-0.4	0.5	1.4	a				
10	0	2	-0.6	-1.9	0.0	1,4	a				
11	1	2	-0.1	-0.4	0.5	1.4	а				
12	0	2	-0.6	-1.9	0.0	1.4	a				
13	1	2	-0.1	-0.4	0.5	1.4	8				
14	1	2	-0.1	-0.4	0.5	1.4	8				
Codes: (a) - No correction for (b) - Visible demage it (c) - Sample returned (d) - Other (describe): (e) - Other (describe)	sample to client	Notes: Waste Storage	Building.								
Analysis perfor	med by (print):		Analysis perform	ned by (signature):	License No.:						
Jeffrey W. Sumiir	ı, RRPT		MDE License No: MD-31-281-01								

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC. Copyright © Integrated Environmental Management, 2003 RSP-019 (Rev. 003) - Attachment 4

Client Name: GL	ERL			IEM Project No.: 2005006.003							
Sample Collecti June 21, 2007	on Date:	Sample Ship Da N/A	ite:	Sample Analysis June 21, 2007	Date:	Report Date:					
			DATA AC	QUISITION							
Instrument Man Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238	il No.:	Calibration Due: April 2, 2008					
Analysis Method	f:			Instrument	t Efficiency						
■ IEM RSP (sp □ Other (specify	ecify): RSP-019 /):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)				
Analysis Type:		2400-98	12700	43478	10	4347	0.34				
■ Gross Alpha □ Gross Beta			- L	Instrument I	Background	<u>,</u> _					
□ Other (specify):	Gross	Counts		t Time in)	Background (cp					
			38	6	0	1	1				
		·	RESI	JLTS							
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes				
15	0	2	-0.6	-1.9	0.0	1.4	a				
16	2	2	0.4	1.1	0.7	1.4	a				
17	2	2	0.4	1.1	0.7	1.4	a				
18	1	2	-0.1	-0.4	0.5	1.4	8				
19	0	2	-0.6	-1.9	0.0	1.4	a				
20	1	2	-0.1	-0.4	0.5	1.4	а				
21	2	2	0.4	1.1	0.7	1.4	а				
22	0	2	-0.6	-1.9	0.0	1.4	а				
23	1	2	-0.1	-0.4	0.5	1.4	a				
Codes: (a) • No correction for a (b) • Visible damage to (c) • Sample returned to (d) • Other (describs): (a) • Other (describs):	semple	Notes: Waste Storage	rage Building								
Analysis perform	ed by (print):		Analysis perform	ed by (signature):	License No.:						
Jeffrey W. Sumlin,	RRPT		MDE License No: MD-31-281-01								

Copyright © Integrated Environmental Management, 2003 RSP-019 (Rev. 003) - Attachment 4

Cilent Name: Gl	.ERL			EM Project No.: 2005006.003						
Sample Collecti June 21, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 21, 2007	Date:	Report Date:				
			DATA AC	QUISITION						
Instrument Man Ludium	ufacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008				
Analysis Metho	d:			Instrumeni	Efficiency					
■ IEM RSP (sp □ Other (specif		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)			
Analysis Type:		2399-98	20000	52618	10	5210	0.26			
□ Gross Alpha ■ Gross Beta			<u> </u>	instrument i	Background					
□ Other (specif	y):	Gross	Counts		t Time in)	Background (cp	Count Rate			
		31	100	6	0	5	2			
		0.000	RESI	ULTS						
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes			
1	104	2	0.3	1.3	5.1	6.5	а			
2	111	2	3.8	14.7	5.3	6.5	B			
3	113	2	4.8	18.6	5.3	6.5	a			
4	102	2	-0.7	-2.6	5.1	6.5	а			
5	99	2	-2.2	-8.3	5.0	6.5	a			
6	110	2	3.3	12.8	5.2	6.5	а			
7	105	2	0.8	3.2	5.1	6.5	a			
8	103	2	-0.2	-0.6	5.1	6.5	8			
9	110	2	3.3	12.8	5.2	6.5	a			
10	97	2	-3.2	-12.2	4.9	6.5	a			
11	104	2	0.3	1.3	5.1	6.5	a			
12	108	2	2.3	9.0	5.2	6.5	а			
13	111	2	3.8	14.7	5.3	6.5	а			
14	109	2	2,8	10.9	5.2	6.5	а			
Codes: (a) - No correction for (b) - Visible damage to (c) - Sample returned (d) - Other (describe): (e) - Other (describe)	o sample to client	Notes: Waste Storage	s Building.							
Analysis perfor	med by (print):			ned by (signature):	License No.:					
Jeffrey W. Sumlin	n, RR <u>PT</u>		19W72			MDE License No: MD-31-281-01				

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Cilent Name: GLI	ERL			IEM Project No.:	2005006.003			
Sample Collection June 21, 2007	on Date:	Sample Ship Dat N/A	ie:	Sample Analysis June 21, 2007	Date:	Report Date:		
			DATA ACC	ANISITION				
Instrument Manu Ludium	ıfacturer:	Instrument Mode 2929 Scaler w/43-		Instrument Serial 126126/132238	l No.:	Calibration Due: April 2, 2008		
Analysis Method	l:			Instrument	Efficiency			
■ IEM RSP (spe □ Other (specify)		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)	
Analysis Type:		2399-98	20000	52618	10	5210	0.26	
□ Gross Alpha Gross Beta				Instrument E	3ackground			
☐ Other (specify)):	Gross	Counts	Count (mi		Background (cp		
		31	100	60	0	52	2	
		<u> </u>	RESU	ULTS				
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes	
15	111	2	3.8	14.7	5.3	6.5	a	
16	102	2	-0.7	-2.6	5.1	6.5	8	
17	104	2	0.3	1.3	5.1	6.5	a	
18	113	2	4.8	18.6	5.3	6.5	8	
19	106	2	1.3	5.1	5.1	6.5	a	
20	104	2	0.3	1.3	5.1	6.5	8	
21	103	2	-0.2	-0.6	5.1	6.5	a	
22	93	2	-5.2	-19.8	4.8	6.5	a	
23	106	2	1.3	5.1	5.1	6.5	a	
Codes: (a) - No correction for s (b) - Visible demage to (c) - Sample returned to (d) - Other (describe): (e) - Other (describe):	sample	Notes: Waste Storage	Building.					
Analysis perform	red by (print):		Analysis perform	ied by (signature):	License No.:			
Jeffrey W. Sumlin,	. RRPT	MDE License No: MD-3						

21 Jun 2007 21:07 TRI-CARB - 1.09 Page #1
Protocol #:28 SURVEY User: KIM

Time: 10.00

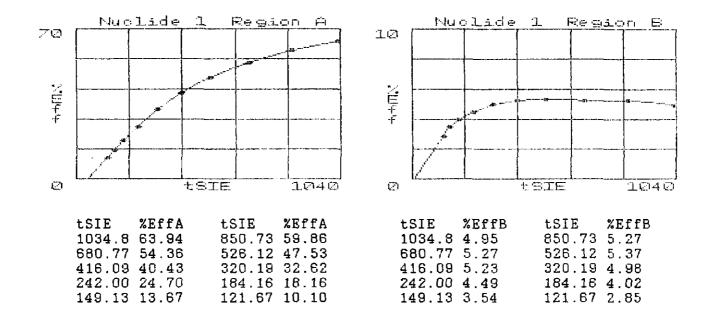
Data Mode: Dual DPM Nuclides: 3H-14C Quench Sets

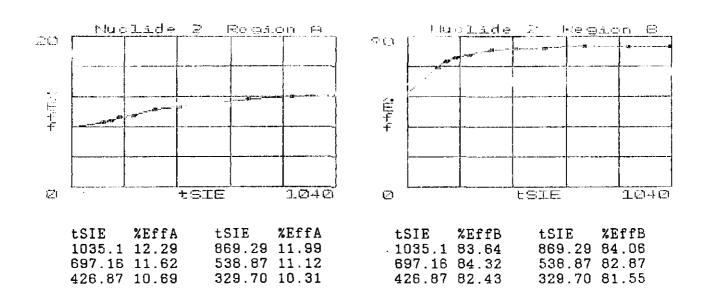
Background Subtract: 1st Vial Low Energy: 3H High Energy: 14C

LLUL LCR 2S% BKG 0.0 - 12.014.02 Region A: 0 0.0 12.0 - 156 Region B: 0 0.0 13.18 0.0 - 0.0Region C: 0 0.0 0.00

Region C: 0.0 - 0.0 0.0 0.00 0.00

Quench Indicator: tSIE/AEC
Ext Std Terminator: Count





56 77.31 58 71.52

User : KIM

	n 2007 col #:28		TRI- SUR	-CARB - /EY	1.09			
		94 9.55 93 8.75		3 9.31 3 8.59		239.94 152.93		188.9 122.9
S# 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 6 17 18 19 20 21 22 23 24	TIME 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00	CPMA 14.02 0.00 0.00 0.00 0.00 0.00 0.00 0.00	CPMB 13.18 1.54 1.10 0.27 0.30 0.21 0.00 0.00 0.00 0.00 0.50 0.00 0.00 0.0	DPM1 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	DPM2 1.85 1.32 0.33 0.36 0.25 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	711.52 714.05 727.30 715.66 703.19 697.51 717.62 699.78 703.74 699.42 688.50 661.98 689.06 688.92 707.19 700.18 712.56 695.85 704.87 694.96 678.12 708.18 716.26	FLAG B

SYSTEM NORMALIZED

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C14 IPA DATA PROCESSED - 22-Jun-2007 01:31
    C14 Eff (0-156 keV) = 96.14 %
C14 CHI SQUARE IPA DATA PROCESSED - 22-Jun-2007 01:41
    C14 Chi Square = 21.23
H3 IPA DATA PROCESSED - 22-Jun-2007 01:43
    H3 Eff (0-18.6 keV) = 60.01 %
H3 CHI SQUARE IPA DATA PROCESSED - 22-Jun-2007 01:53
    H3 Chi Square = 14.38
BKG IPA DATA PROCESSED - 22-Jun-2007 02:54
Bkg (0-18.6 keV) = 14.72 cpm
Bkg (0-156 keV) = 22.23 cpm
C14 E^2/B (1-156 keV) = 522.97
H3 E^2/B (1-18.6 keV) = 243.74
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RADIOLOGICAL SURVEY FORM

or . Scarte 062607 - 7

Page ___ | __ at __ **3**__

Instrument SN	~_ <u></u>		Cali	brato	on D	ue		,			Site	. Nar	ne:			•		Dat		Tim	ic
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Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

TRI-CARB - 1.09

Protocol #:28

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

Low Energy: 3H

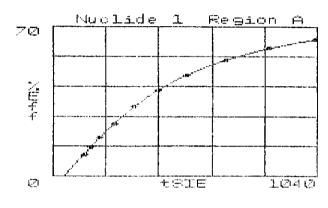
High Energy: 14C

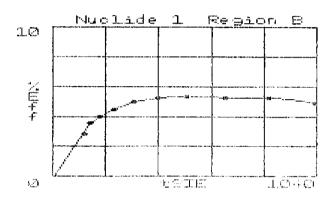
Background Subtract: 1st Vial

LL UL LCR 25% BKG Region A: 0.0 - 12.00 0.0 10.56 Region B: 12.0 -156 0 0.0 11.64 Region C: 0.0 -0 0.0 0.00

CULPIDOFS

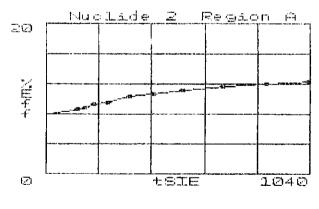
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

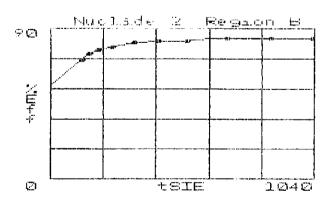




tSIE	%EffA	tSIE	%EffA
1034.8	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10

tSIE %EffB tSIE %EffB 1034.8 4.95 850.73 5.27 680.77 5.27 526.12 5.37 416.09 5.23 320.19 4.99 242.00 4.49 184.16 4.02 149.13 3.54 121.67 2.85





tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE %EffB tSIE %EffB 1035.1 83.64 869.29 84.06 697.16 84.32 538.87 82.87 426.87 82.43 329.70 81.55

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	col #:2		SUR		1.07					: KIM
		_	2011							
	239.	94 9.55	188.5	6 9.32		239.94	79.05	188.56	77.31	
	152.	93 8.76	122.5	B 8.60		152.93	75.21	122.58	71.52	
S#	TIME	CPMA	СРМВ	DPM1	DPM2	SIS	tSIE	FLAG		
1	10.00	10.56	11.64	_,,,_		71.605		В		
2	10.00	0.00	0.00	0.00	0.00	0.000	715.82			
3	10.00	0.37	0.23	0.60	0.24	0.000	729.88			
4	10.00	0.50	0.00	0.91	0.00	567.37				
5	10.00	0.28	0.12	0.47	0.11	32.100	729.82			
6	10.00	0.00	1.25	0.00	1.50	62.194	726.44			
7	10.00	0.61	1.54	0.71	1.78	82.588	729.24			
8	10.00	0.00	0.66	0.00	0.79	723.05	—			
9	10.00	0.70	0.00	1.28	0.00		721.71			
10	10.00	0.52	1.68	0.51		155.35				
11	10.00	0.67	0.00	1.22	0.00		727.71			
12	10.00	0.00	0.00	0.00	0.00		729.79			
13	10.00	1.05	1.65	1.49		53.103				
. 14	10.00	1.38	1.32	2.17		92.861				
15	10.00	0.00	0.00	0.00	0.00		735.05			
16	10.00	0.68	0.00	1.23		223.44				
17	10.00	0.00	1.96	0.00		112.26				
18	10.00	0.00	0.15	0.00	0.18	0.000				
19	10.00	1.13	1.57	1.67		104.35	"			
20	10.00	0.39	0.00	0.70	0.00					
21	10.00	0.00	1.22	0.00		94.963				
22	10.00	0.00	0.26	0.00	0.32	0.000	723.29			

23

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2.80 88.415 732.92

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Instrument/SN:	mrvev >	vumh	w <u>O</u>	620	07-	Z																		Page _	4	_ of	<i></i>
Instrument/SN:					27	<u></u>			Cal	ibrat			e/											Dat	e: /		
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Survey Number 062007-1

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INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.

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CERTIFICATE OF ANALYSIS - SMEARS

Client Name: GL	ERL			IEM Project No.: 2005006.003						
Sample Collecti June 20, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis June 20, 2007	s Date:	Report Date:				
	·		DATA AC	QUISITION	- 					
Instrument Man Ludium	ufacturer:	Instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238	il No.:	Calibration Due: April 2, 2008				
Analysis Method	d:			Instrumen	t Efficiency					
■ IEM RSP (sp □ Other (specify		Source Identifier/SN	Source Activity - 4π (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)			
Analysis Type:		2400-98	12700	43161	10	4316	0.34			
☐ Gross Alpha ☐ Gross Beta	а.			Instrument	Background		•			
□ Other (specify	<i>r</i> y:	Gross	Counts		t Time in)	Background (cp	I Count Rate om)			
			36	6	0	1				
		•	RESI	JLTS		<u> </u>				
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes			
1	1	2	-0.1	-0.3	0.5	1.3	8			
2	1	2	-0.1	-0.3	0.5	1.3	8			
3	0	2	-0.6	-1.8	0.0	1.3	a			
4	2	2	0.4	1.2	0.7	1.3	a			
5	1	2	-0.1	-0.3	0.5	1.3	a			
6	0	2	-0.6	-1.8	0.0	1.3	a			
7	1	2	-0.1	-0.3	0.5	1.3	8			
8	1	2	-0.1	-0.3	0.5	1.3	a			
9	2	2	0.4	1.2	0.7	1.3	а			
10	0	2	-0.6	-1.8	0.0	1.3	8			
11	3	2	0.9	2.6	0.9	1.3	8			
12	0	2	-0.6	-1.8	0.0	1.3	a			
13	1	2	-0.1	-0.3	0.5	1.3	а			
14	1	2	-0.1	-0.3	0.5	1.3	а			
Codes: (a) - No correction for a (b) - Visible damage to (c) - Sample returned to (d) - Other (describe): (e) - Other (describe):	sample	Notes: Background sm	ears taken in corridor 2							
Analysis perform	ed by (print):		Analysis perform	ed by (signature):		License No.:				
Jeffrey W. Sumlin,	RRPT		14WZ		MDE License No: MD-31-281-01					

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.

3048

Client Name: GLERL				IEM Project No.:	2005006.003		
Sample Collection June 20, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis Date: June 20, 2007		Report Date:	
			DATA AC	QUISITION			
instrument Mani Ludium	ufacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 128126/132238	l No.:	Calibration Due: April 2, 2008	
Analysis Method	j:			Instrument	t Efficiency		
■ IEM RSP (spi □ Other (specify	ecify): RSP-019 /):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2400-98	12700	43161	10	4316	0.34
☐ Gross Alpha ☐ Gross Beta				Instrument i	Background		
□ Other (specify	7):	Gross	Counts		t Time in)	Background (cp	
		3	96	6	0	1	,
			RESU	JLTS			
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
15	1	2	-0.1	-0.3	0.5	1.3	8

							<u> </u>
							_ .
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (e) - Other (describe)		nears taken in comidor 2					
Analysis perform	ed by (print):	:	Analysis perform	ed by (signature):		License No.:	
Jeffrey W. Sumlin, RRPT			1401	<u></u>		MDE License No:	MD-31-281-01

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Client Name: Gl	.ERL		-	IEM Project No.:	2005006.003		
Sample Collecti June 20, 2007	on Date:	Sample Ship Da N/A	te:	Sample Analysis Date: June 20, 2007		Report Date:	
			DATA AC	QUISITION			
Instrument Man Ludium	ufacturer:	instrument Mod 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008	
Analysis Metho	d:			Instrumen	t Efficiency		
■ IEM RSP (sp □ Other (specifi		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2399-98	20000	52406	10	5187	0.26
□ Gross Alpha ■ Gross Beta		" " "		Instrument	Background	• · · · · · · · · · · · · · · · · · · ·	<u>. </u>
Other (specify	/):	Gross	Counts		Count Time (min)		I Count Rate om)
		31	97	6	0	5	3
	<u>-</u>		RESI	ULTS	_		
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
1	113	2	3.2	12.4	5.3	6.6	8
2	111	2	2.2	8.5	5.3	6.6	a
3	119	2	6.2	24.0	5.5	6.6	a
4	104	2	-1.3	-4.9	5.1	6.6	a
5	99	2	-3.8	-14.6	5.0	6.6	a
6	103	2	-1.8	-6.9	5.1	6.6	a
7	107	2	0.2	0.8	5.2	6.6	8
8	104	2	-1.3	-4.9	5.1	6.6	a
9	102	2	-2.3	-8.8	5.1	6.6	а
10	107	2	0.2	0.8	5.2	6.6	a
11	115	2	4.2	16,3	5.4	6.6	a
12	112	2	2.7	10.5	5.3	6.6	a
13	119	2	6.2	24.0	5.5	6.6	а
14	96	2	-5.3	-20.4	4.9	6.6	а
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (e) - Other (describe):		Notes: Background sn	nears teken in corridor 2				
Analysis perform	ned by (print):		Analysis performed by (signature):			License No.:	
Jeffrey W. Sumlin, RRPT			NW L		MDE License No: MD-31-281-01		

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Client Name: GLERL				IEM Project No.: 2005006.003			
Sample Collection June 18, 2007	on Date:	Sample Ship Date: N/A		Sample Analysis Date: June 19, 2007		Report Date:	
			DATA ACC	NOITIBIUE			
Instrument Manu Ludium	Ifacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008	
Analysis Method	:			Instrument	Efficiency		
■ IEM RSP (spe □ Other (specify		Source (dentifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2399-98	20000	52406	10	5187	0.26
☐ Gross Alpha ☐ Gross Beta	۸.			Instrument I	Background		
☐ Other (specify) .	Gross Counts		Count (m		Background (cp	
		31	97	6	0	5:	3
			RESU	JLTS			
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Activity (dpm)	+/- (dpm)	MDA (dpm)	Codes
15	114	2	3.7	14.3	5.3	6.6	а
_							
							_
			<u>.</u>				
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to chent (d) - Other (describe): (e) - Other (describe):			neers taken in corridor 2				
Analysis perform	ed by (print):		Analysis perform	ed by (signature):		License No.:	
Jeffrey W. Sumlin, RRPT				<u>.</u>		MDE License No:	MD-31-281-01

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

7048

09

20 Jun 2007 14:45 TRI-CARB - 1.09
Protocol #:18 SURVEY

cullione 2

Page #1 User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

Quench Sets

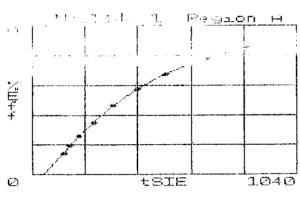
Low Energy: 3H

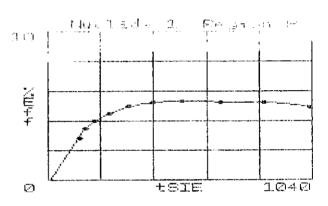
High Energy: 14C

LL \mathtt{UL} LCR 2S% BKG 0.0 - 12.00 0.0 15.16 Region A: 12.0 - 156 Region B: 0 0.0 14.74 0.0 - 0.0 Region C: 0 0.0 0.00

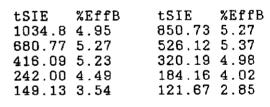
Quench Indicator: tSIE/AEC
Ext Std Terminator: Count

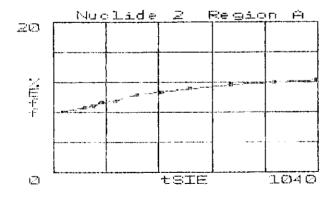
Background Subtract: 1st Vial

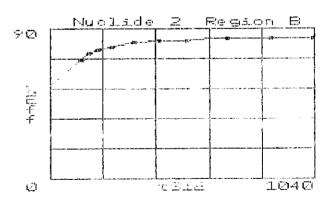




tSIE	%EffA	tSIE	%EffA
1034.8	63.94	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.43	320.19	32.62
242.00	24.69	184.16	18.16
149.13	13.67	121.67	10.10







%EffA	t SIE	%EffA
12.29	869.29	11.99
11.62	538.87	11.12
10.69	329.70	10.31
	%EffA 12.29 11.62 10.69	12.29 869.29 11.62 538.87

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	82.43	329.70	81.54

0.00

0.00

15

16

10.00

10.00

0.00

0.00

0.00

0.00

0.00

0.00

0.000 759.23

0.000 765.63

Survey Number 062607-6

Page _____of__6

Instrument/SN:	Calibration Due:	Site Name:	Date: Time:
MIN	m 14	GLERL	6/2407 1045
Instrument/SN:	Calibration Due:	Location: 51 NK AND FINE NOWD	DRMS
Instrument/SN: U/K	Calibration Due: مرد	Purpose: (- 55	
Survey Performed By (Print):		Survey Performed By (Signature):	140%
□ Battery OK □ HV OK	□ Source Check OK	Grid Dimensions:/ □ meters □ incl	hes timeters
A B C D E F G	H I J K L M N D	P Q R S T U V	w x y 2
1 N Roon 305 512	2) 0	CON 511 SOUR RICHT	<u> </u>
2) ROUN 35 MA		The property	
3) RUUM 307 512		cush 5114 time Get	
4) ROUM 307 HOUD		PWM 511/1 3,216 1216	1 1 ! !
S) POUM BUT HOUD		our LUB SINK LIN	
2 1001 304 51N		ROOM GOK TINK	
* 8 RUOM 305 HOU		Room LUL HOUD	
9) 9004 B11 JUL		2004 604 5/2/C	
10 W) ROUM 408 5,N	1 1 1 1 1 1 1 17 1	Para was sink for	7
11 ROUM 408 HOD		RUOM GOV TIME RICH	7
12 12) NOUM 505 SINK	4011 32	ROOM GOV HOUD	
13 Ban 505 Smill	RICHT 33)	RUUM 51 ULD 510	CORNIN
" M) ROUM SOS HOW		THAT HAO BOD	RUMONUS
15 15 Barn 2024 2121			
16 ROOM 507 SIN			
17) ROWN 507 5W			{
18 18) ROUM 507 Ma			
16 19 ROOM 519 51A	1		1
			15 SC1 SC
	IN ABOVE LUCTIONS,		13 100
aloss a/B 12	POUR 305 SINK MUD	reso.	
			Ŷ

Smears counted on Ludlum 2929/43-10-1 are in sequential order.

Smears counted on the LSC unit are as follows:

Smear Result 1 is from a clean smear used as a background for the LSC counter.

Smear Results 2 to the end of that run are one number higher than the corresponding location on the survey map.

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Client Name: GL	ERL			IEM Project No.:	2005006.003		
Sample Collection June 26, 2007	on Date:	Sample Ship Dat N/A	te:	Sample Analysis Date: June 26, 2007		Report Date:	
	··· —	-	DATA ACC	QUISITION		<u> </u>	
instrument Manu Ludium	ifacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008	
Analysis Method	<u> </u>			Instrument	Efficiency		
■ IEM RSP (spe □ Other (specify		Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)
Analysis Type:		2400-98	12700	44014	10	4401	0.35
■ Gross Alpha □ Gross Beta	•			Instrument I	Background		
□ Other (specify) :	Gross	Counts	Count (m		Background (cp	
		37		6	0	1	
			RESU	JLTS		<u> </u>	
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	te Activity +/- (dpm) (dpm)		MDA (dpm)	Codes
1	0	2	-0.6	-1.8	0.0	1.4	a
2	0	2	-0.6	-1.8	0.0	1.4	а
	-						
				- · · · · · · · · · · · · · · · · · · ·			
			<u></u>			<u> </u>	<u> </u>
				<u>-</u>		_	-
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (e) - Other (describe):							
Analysis perform	ed by (print):		Analysis perform	ed by (signature):	· -	License No.:	
Jeffrey W. Sumlin, RRPT						MDE License No:	MD-31-281-01



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Client Name: Gl	ERL			IEM Project No.:	2005006.003			
Sample Collecti June 20, 2007	on Date:	Sample Ship Dat N/A	te:	Sample Analysis Date: June 20, 2007		Report Date:		
	= .		DATA AC	QUISITION				
Instrument Man Ludium	ufacturer:	Instrument Mode 2929 Scaler w/43		Instrument Seria 126126/132238	l No.:	Calibration Due: April 2, 2008		
Analysis Metho	d:			Instrument	Efficiency			
■ IEM RSP (sp □ Other (specify	ecify): RSP-019 y):	Source Identifier/SN	Source Activity - 411 (dpm)	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Efficiency (cpm/dpm)	
Analysis Type:		2399-98	20000	52627	10	5209	0.26	
□ Gross Alpha ■ Gross Beta			<u>-</u>	Instrument	Background		<u>. </u>	
" □ Other (specif	□ Other (specify):		Gross Counts		Count Time (min)		Background Count Rate (cpm)	
		32	203	60		5	3	
			RES	ULTS				
Smear No.	Gross Counts	Count Time (min)	Net Count Rate (cpm)	Rate Activity +/- MDA (dpm) (dpm)			Codes	
1	106	2	-0,4	-1.5	5.1	6.6	8	
2	103	2	-1.9	-7.2	5.1	6.6	А	
		<u> </u>						
	·	 						
					· · · · · · · · · · · · · · · · · · ·			
			_					
	<u> </u>		<u> </u>			<u> </u>		
Codes: (a) - No correction for self-absorption (b) - Visible damage to sample (c) - Sample returned to client (d) - Other (describe): (e) - Other (describe):			efore counting. Smears	from Room 305				
Analysis perform	ned by (print):		Analysis perform	ned by (signature):		Licensa No.:		
Jeffrey W. Sumlin. RRPT			•		MDE License No:	MD-31-281-01		

SURVEY

User : KIM

Time: 10.00

Data Mode: Dual DPM

Nuclides: 3H-14C

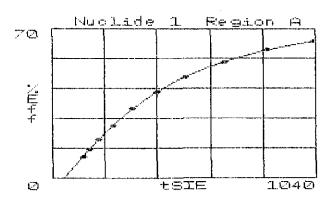
Guench Sets

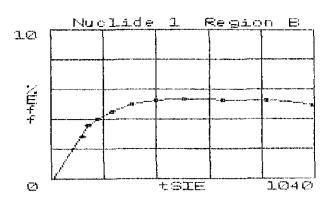
Background Subtract: 1st Vial

Low Energy: 3H High Energy: 140

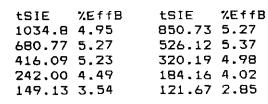
LL UL LCR 25% BKG Region A: 0.0 - 12.00 0.0 10.01 12.0 -Region B: 12.59 156 0 0.0 Region C: 0.0 -0.00 0.0 0 0.0

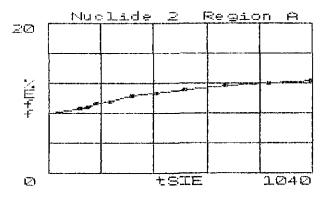
Quench Indicator: tSIE/AEC Ext Std Terminator: Count

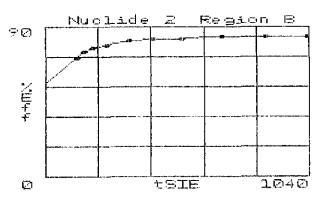




tSIE	%EffA	tSIE	%EffA
1034.B	63.95	850.73	59.86
680.77	54.36	526.12	47.53
416.09	40.44	320.19	32.62
242.00	24.70	184.16	18.16
149.13	13.67	121.67	10.10







tSIE	%EffA	tSIE	%EffA
1035.1	12.29	869.29	12.00
697.16	11.63	538.87	11.13
426.87	10.70	329.70	10.31

tSIE	%EffB	tSIE	%EffB
1035.1	83.64	869.29	84.06
697.16	84.32	538.87	82.87
426.87	B2.43	329.70	81.55

User : KIM

 239.94 9.55
 188.56 9.32
 239.94 79.05
 188.56 77.31

 152.93 8.76
 122.58 8.60
 152.93 75.21
 122.58 71.52

S#	TIME	CPMA	СРМВ	DPM1	DPM2	SIS	tSIE	FLAG
1	10.00	10.01	12.59			82.537		В
2	10.00	1.34	0.00	2.49	0.00		682.26	
3	10.00	0.00	1.13	0.00	1.37		642.14	
4	10.00	1.14	2.56	1.46	2.95		690.63	
5	10.00	0.00	1.14	0.00	1.38		658.50	
6	10.00	0.00	0.00	0.00	0.00		679.18	
7	10.00	0.54	0.46	0.88	0.49		702.14	
8	10.00	2.09	0.00	3. 69	0.00		770.41	
9	10.00	2.99	2.51	5.19	2.67		624.25	
10	10.00	0.07	0.00	0.13	0.00	0.000	744.59	
11	10.00	2.65	1.55	4.45	1.56	32.864	716.25	
12	10.00	2.98	1.71	5.05	1.72	42.637	699.16	
13	10.00	1.22	1.78	1.78	2.00	55.640	711.40	
14	10.00	1.29	3.61	1.46	4.19	52.397	710.12	
15	10.00	0.00	0.56	0.00	0.67	0.000	691.68	
16	10.00	0.02	0.38	0.00	0.45	0.000	719.39	
17	10.00	1.22	2.58	1.58	2.97	0.000	703.62	
18	10.00	0.25	0.00	0.46	0.00	0.000	697.12	
19	10.00	0.00	0.09	0.00	0.11	0.000	662.43	
20	10.00	0.00	0.00	0.00	0.00	0.000	633.21	
21	10.00	0.83	0.00	1.50	0.00		728.69	
22	10.00	1.30	0.40	2.22	0.34		751.00	
23	10.00	0.14	0.76	0.07	0.90		717.39	
24	10.00	1.73	0.00	3.18	0.00		700.37	
25	10.00	1.94	0.00	3.54	0.00		716.79	
26	10.00	2.31	0.00	4.19	0.00		728.13	
27	10.00	0.00	2.60	0.00	3.13		703.48	
28	10.00	0.09	1.86	0.00	2.23		708.28	
29	10.00	0.16	0.54	0.15	0.63	-	755.65	
30	10.00	0.43	0.00	0.79	0.00		700.67	
31	10.00	0.00	0.00	0.00	0.00		711.01	
32	10.00	2.01	1.59	3.31	1.68		697.63	
33	10.00	0.00	0.00	0.00	0.00		657.34	
34	10.00	2.35	0.00	4.34	0.00	0.000	697.29	

This report was prepared under the direction of BMT Entech

by

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