

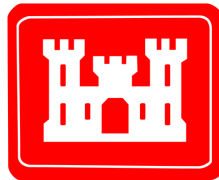
**Final**

**Radiological Site Assessment Report**

**1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (NM005)  
1300 West Brown Road, Las Cruces, New Mexico**

**Contract No. W912QR-12-D-0027  
Delivery Order No. 0003**

*Prepared For:*



**U.S. Army Corps of Engineers  
Louisville District**

*Prepared By:*

**Terranear****PMC**

**222 Valley Creek Blvd., Suite 210  
Exton, PA 19341**

**December 2014**

**Final  
Radiological Site Assessment Report**

**1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (NM005)  
1300 West Brown Road, Las Cruces, New Mexico**

*kshroff*

Authored By: \_\_\_\_\_

Date: 12/31/2014

Kinshuk Shroff, P.E., CHMM

**STATEMENT OF INDEPENDENT TECHNICAL REVIEW**

TerranearPMC (TPMC) has completed the Final Report on Radiological Site Assessment at the 1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (USARC) (NM005) located in Las Cruces, New Mexico.

Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps policy.

Significant concerns and the explanation of the resolution are as follows:

- Internal TPMC Technical Review comments are documented in the project file. Changes to the report addressing the comments have been verified by the Project Manager. As noted above, all concerns resulting from independent technical review of the project have been considered.

*Daniel F. Caputo*

\_\_\_\_\_  
Daniel F. Caputo, P.E., CHP  
Project Manager, TPMC

Date: 12/31/2014

*Donald Taylor*

\_\_\_\_\_  
Don Taylor  
Independent Technical Review Team Leader, TPMC

Date: 12/31/2014

**TABLE OF CONTENTS**

	<u><b>Page No.</b></u>
<b>ES 1.0 EXECUTIVE SUMMARY</b>	<b>1</b>
<b>ES 1.1 INTRODUCTION</b>	<b>1</b>
<b>ES 1.2 PROJECT OVERVIEW</b>	<b>1</b>
<b>ES 1.3 FINDINGS AND RECOMMENDATIONS</b>	<b>1</b>
<b>1.0 PROJECT BACKGROUND</b>	<b>3</b>
<b>1.1 SITE HISTORY, LOCATION AND FEATURES</b>	<b>3</b>
<b>1.2 AREAS OF CONCERN</b>	<b>3</b>
<b>2.0 OBJECTIVES AND RADIOLOGICAL ASSESSMENT METHODOLOGY</b>	<b>5</b>
<b>2.1 RADIOLOGICAL ASSESSMENT METHODOLOGY</b>	<b>5</b>
<b>2.2 FIELDWORK ACTIVITIES</b>	<b>5</b>
<b>2.2.1 Pre-Mobilization Activities</b>	<b>5</b>
<b>2.2.2 Field Activities</b>	<b>7</b>
<b>3.0 SAMPLE COLLECTION AND DATA ANALYSIS</b>	<b>10</b>
<b>3.1 REMOVABLE SMEAR SAMPLING</b>	<b>10</b>
<b>3.2 SAMPLE IDENTIFICATION</b>	<b>10</b>
<b>3.3 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES</b>	<b>10</b>
<b>3.4 ANALYTICAL METHODS</b>	<b>10</b>
<b>3.5 QUALITY ASSURANCE/QUALITY CONTROL</b>	<b>10</b>
<b>3.5.1 Instrument Use / Handling</b>	<b>10</b>
<b>3.5.2 Analytical Data Quality and Review</b>	<b>11</b>
<b>4.0 SUMMARY OF FIELD INVESTIGATION AND LABORATORY RESULTS</b>	<b>12</b>
<b>4.1 RESULTS SUMMARY</b>	<b>12</b>
<b>4.2 FIELD INVESTIGATION RESULTS</b>	<b>14</b>
<b>4.2.1 Site Interviews / Visual Inspection</b>	<b>14</b>
<b>4.2.2 Field Measurements</b>	<b>14</b>
<b>4.3 LABORATORY RESULTS</b>	<b>15</b>

<b>5.0</b>	<b>CONCLUSIONS</b>	<b>16</b>
<b>6.0</b>	<b>RECOMMENDATIONS</b>	<b>17</b>
<b>7.0</b>	<b>REFERENCES</b>	<b>18</b>

**LIST OF FIGURES**

<i>Figure 1-1</i>	<i>Site Aerial View</i>	<i>4</i>
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**LIST OF TABLES**

<i>Table 2-1</i>	<i>Portable Instrumentation</i>	<i>8</i>
<i>Table 4-1</i>	<i>Summary Results Table</i>	<i>13</i>
<i>Table 4-2</i>	<i>Site Assessment Criteria</i>	<i>14</i>

**LIST OF APPENDICES**

<i>Appendix A</i>	<i>Historical Review Checklist</i>	
<i>Appendix B</i>	<i>Visual Inspection Checklist</i>	
<i>Appendix C</i>	<i>Documentation of Survey Approach</i>	
<i>Appendix D</i>	<i>Quality Control Data</i>	
	<i>D.1 – Operating Range</i>	
	<i>D.2 – Instrument Daily Checks</i>	
	<i>D.3 – Instrument Calibration Sheets</i>	
<i>Appendix E</i>	<i>Survey Record Form</i>	
<i>Appendix F</i>	<i>Sample Description Log</i>	
<i>Appendix G</i>	<i>Survey Sketches</i>	
<i>Appendix H</i>	<i>High Results Narrative</i>	
<i>Appendix I</i>	<i>Site Photos</i>	
<i>Appendix J</i>	<i>Analytical Results</i>	

## **LIST OF ACRONYMS**

ASME	American Society of Mechanical Engineers
cm <sup>2</sup>	Square Centimeter
CFR	Code of Federal Regulations
CoC	Chain of Custody
DoD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
ECP	Environmental Condition of Property
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ft <sup>2</sup>	Square Feet
GEL	General Engineering Laboratories
gcpm	Gross counts per minute
hr	Hour
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
m <sup>2</sup>	Square Meter
MARSSIM	Multi Agency Radiation Survey and Site Investigation Manual
NBC	Nuclear Biological Chemical
NELAC	National Environmental Laboratory Accreditation Conference
NIST	National Institute of Standards Technology
NQA-1	Nuclear Quality Assurance Level -1
NRC	Nuclear Regulatory Commission
OMS	Organizational Maintenance Shop
PM	Project Manager
POC	Point of Contact
QA	Quality Assurance
QC	Quality Control
QSM	Quality Systems Manual
RADIAC	Radiation Detection, Indication and Computation
RL	Reporting Limit
RSAR	Radiological Site Assessment Report
RSC	Regional Support Command
RSO	Radiation Safety Officer
TPMC	TerranearPMC, LLC
μR	Micro Roentgen
USACE	U.S. Army Corps of Engineers
USARC	U.S. Army Reserve Center
USAR	U.S. Army Reserve
USEPA	U.S. Environmental Protection Agency

## **ES 1.0 EXECUTIVE SUMMARY**

### **ES 1.1 INTRODUCTION**

This radiological site assessment report (RSAR) describes objectives, procedures, and findings of the radiological assessment activities conducted at the 1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (USARC) (NM005) located in Las Cruces, New Mexico, hereafter referred to as the “Gallagher Site” or “the Site”.

This report was prepared by TerranearPMC, LLC (TPMC) of Exton, Pennsylvania, to fulfill the requirements of Contract W912QR-12-D-0027, Delivery Order No. 0003 with U.S. Army Corps of Engineers (USACE), Louisville District.

### **ES 1.2 PROJECT OVERVIEW**

Radiological assessment of the Site began with a review of available historical information prior to mobilization in the field. The Site has a low probability for being impacted by residual radioactive materials based on the following three criteria inherent to USARC operations: 1) only small quantities of radioactive materials are used, thus presenting an inherently low risk for release or exposure; 2) the radioactive sources used at these sites are typically sealed sources, thus minimizing release to the environment; and 3) standard Army protocols that require strict management, control, and reporting of radioactive material use. This historical information was used to develop the survey approach and methodology used by the field team in performing the radiological site assessment.

The radiological site assessment activities were performed on October 20, 2014. Upon arrival at the Site, the team performed visual inspections of the facility and conducted interviews with key Site personnel to obtain additional information used to refine the survey approach. Once the survey approach was defined, the team conducted radiological surveys for gamma and alpha/beta radiation using hand-held instruments. In addition, the field team obtained smear/wipe samples at various locations for off-site laboratory analysis to determine the presence of removable alpha, beta, and tritium radioactivity.

### **ES 1.3 FINDINGS AND RECOMMENDATIONS**

The U.S. Army Reserve (USAR) no longer has units stationed at the facility. After personnel interviews, site inspections, and a visual walk down, there is evidence that a small amount of radioactive materials/commodities are used/stored at the Gallagher Site in the form of nuclear, biological and chemical (NBC) detection equipment, Radiation Detection, Indication and Computation (RADIAC) meters, lensatic compasses, and wristwatches. Based on our findings, there is no evidence to suggest that radiological commodities were improperly managed at the Site, or that radiological material was released to the environment.

During the site visit, the survey team performed a comprehensive radiological survey of all locations where radioactive materials may have been used or stored based on historical evidence, interviews, and site inspection findings. The radiological survey included the following samples and data points: thirty (30) direct alpha and beta measurements, thirty (30) gamma radiation exposure rate measurements; ten (10) smear samples for removable alpha /beta radioactivity; and three (3) tritium wet smear samples. All smear samples were sent to an off-site laboratory for analysis. None of the survey results exceeded the most restrictive action

levels as established by the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide (Reg Guide) 1.86 Table-I limits.

The radiological assessment results documented in this report support the finding that the Gallagher Site does not currently contain residual radioactivity above the Reg Guide 1.86 Table-I limits.

Based on the historical information and supporting survey results, the site may be currently considered radiologically non-impacted, and available for unrestricted use, in accordance with NRC NUREG 1575/EPA 402-R-97-016, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Revision 1 guidance.

## **1.0 PROJECT BACKGROUND**

### **1.1 SITE HISTORY, LOCATION AND FEATURES**

The 1LT Francis W. Gallagher Memorial USARC (hereafter referred to as the “Gallagher Site” or “the Site”) is located at 1300 West Brown Road in Las Cruces, New Mexico. The property is an approximately 5.63 acre parcel of land. The parcel is improved with an administration/training building and, Organizational Maintenance Shop (OMS), and Military equipment parking (MEP) area is located west of the OMS and the Administration building. An asphalt publically-owned vehicle (POV) parking area is located east of and adjacent to the Administration Building. The hazardous material buildings southeast of OMS (as shown in aerial image of the site), have been removed from the site. The Gallagher USARC was last occupied by the 281<sup>st</sup> Transportation Company.

#### Administration Building

The administration/training building is an approximately 13,342 square foot (ft<sup>2</sup>) T shaped building. The building was constructed in 1959. The building contains administration offices, classrooms and storage rooms. An arms vault utilized for storage is located within one of the classrooms, and the door to the arms vault is located within the maintenance bay.

#### OMS

The OMS is a 5,395 ft<sup>2</sup>, one-story, two-bay building originally constructed in 1959 of concrete block. The interior of the shop has a concrete slab floor, offices, two service bays, and storage areas.

Based on available information, no radiological survey/assessment has been performed at the site.

An aerial image of the Site with an approximate boundary outline is provided in Figure 1-1.

### **1.2 AREAS OF CONCERN**

Site POC interviews indicated NBC detection equipment, RADIAC meters, lensatic compasses, and wristwatches were stored in the administration building at the Gallagher Site. There was no evidence found to suggest that radiological commodities were improperly managed at the Site or that radiological material was released.



**Figure 1-1**  
**Site Aerial View**



*1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (NM005)*  
*1300 West Brown Road, Las Cruces, New Mexico*

Note: Red outline shows approximate Site boundary.

## **2.0 OBJECTIVES AND RADIOLOGICAL ASSESSMENT METHODOLOGY**

The overall objectives of the Radiological Site Assessments are 1) to provide sufficient data to demonstrate areas with un-measurable or acceptable levels of radioactive contamination are suitable for release for unrestricted use in accordance with the criteria presented in Section 4.0; and 2) define the nature and extent of any identified contamination or residual radioactive materials. The intent is to provide the stakeholders with sufficient data to support the radiological unrestricted release of the specified facility or to define the nature and extent of any remaining radiological commodities or residual radioactive material.

### **2.1 RADIOLOGICAL ASSESSMENT METHODOLOGY**

The Site assessment was performed in accordance with the MARSSIM guidance document (NRC NUREG 1575) protocols. Survey action levels for alpha and beta radiation levels were obtained from NRC Reg Guide 1.86 Table-I. In accordance with industry practice, the area gamma radiation survey action limit was based on an “indistinguishable from background” determination that is typically 2 to 3 times ambient background radiation levels. The Site did not have a history of radiological releases, accidents, or radioactive waste disposal; and thus the survey was intended to support a MARSSIM non-impacted definition leading to an unrestricted radiological release determination. Survey design was intended to remain flexible to account for any real-time measurements or information that becomes available during the survey process.

For this project, radiological assessment methodology included reviewing available historical and current information; performing visual inspections; conducting interviews; conducting general radiation surveys; obtaining smear and wipe survey samples; laboratory analysis of smear/wipe samples; and evaluation /interpretation of the analytical results. Based on the historical reviews and interviews, no evidence was found to suggest that radiological commodities were improperly managed at the Site, or that radiological material was released. However, based on the fact that the historical record is often incomplete and the potential exists for loss or leakage of radiological commodities, a radiological site assessment is warranted. Based on the existing historical evidence and general USAR knowledge base, the Gallagher Site qualified for the simplified assessment procedure of Appendix B of MARSSIM. This determination is based on the small quantities of mostly sealed radioactive materials likely used and/or stored at the Site, and the fact that no evidence exists for inadvertent loss or release of radioactive materials from the Site.

### **2.2 FIELDWORK ACTIVITIES**

Fieldwork activities may be grouped into two categories:

1. Pre-mobilization Activities
2. Field Activities

#### **2.2.1 Pre-Mobilization Activities**

Pre-mobilization activities included those actions required to ensure the team was fully prepared to perform their job tasks upon arrival at the project site.

TPMC separated the pre-mobilization phase into the following activities:

1. Historical Due Diligence
2. Staffing and Training

3. Procurement Actions
4. Shipment of Equipment and Supplies

#### 2.2.1.1 *Historical Due Diligence*

TPMC initiated due diligence review by researching the available site assessment reports for the Site. In addition, available Army literature regarding radioactive commodity use and storage was reviewed (TB 43-0116). The Site review and associated documentation were logged and referenced for use in field activities.

The results of the historical due diligence review are documented in the Historical Review Checklist (Appendix A). The historical documentation does not specifically identify isotopes used at the Site; however, based on our experience, the following isotopes have the highest probability of being present at the Site based on our knowledge of radioactive sources found in the Army commodity inventory: H-3, Ra-226, Sr-90, Cs-137, Th-232, U-238, Pu-239, Ni-63, Pm-147, Co-60, Am-241. Typical types of radioactive commodities used/stored at USARC installations include RADIAC meters; chemical agent detectors; moisture density gauges (engineering units); lensatic compasses; night-vision goggles; radio-luminescent weapons sights and wristwatches; and armored vehicle dials and gauges.

#### 2.2.1.2 *Staffing and Training*

TPMC delegated full responsibility and authority to the Project Manager (PM) regarding project performance and management of project staff. The PM had direct access to top-level management of TPMC and the subcontractors so that contract, management, and staff needs were immediately met. In addition, key personnel were selected based on their expertise, credentials, relevant experience, communication skills, flexibility, and history/institutional knowledge.

TPMC management, technical support personnel, and field teams worked together as a fully integrated team. The infrastructure to accomplish this was in place and employed existing TPMC corporate processes and procedures. The TPMC corporate Radiation Safety Officer (RSO) conducted initial radiological, and health and safety training for field personnel. Project personnel received awareness training on the following topics:

- General Employee Training
- Hazardous Communications
- Personnel Protective Equipment
- Blood-Borne Pathogens
- Confined Space
- Applicable Site-Required Training, if required
- Radiological Field Procedures and related forms

#### 2.2.1.3 *Procurement Actions*

TPMC's Procurement Manager controlled the purchase, leasing and subcontracting for material, equipment, and manpower support required for this project. Procured items included, but were not limited to, the following items:

- Ludlum Model 19 MicroR survey meter (area gamma radiation)
- Ludlum Model 2360 scalar/rate meter with data logging capabilities
- Ludlum Model 43-93 Dual alpha/beta scintillation detector

- Instrumentation check sources (thorium-230, technetium-99 and cesium-137)
- Support tools (i.e. hand-tools, masslin mops, flashlights, tape measures, etc)
- Recording equipment/documents
- Communication devices
- Digital cameras with media storage cards
- Personnel Protective Equipment

#### 2.2.1.4 *Shipment of Supplies*

To expedite field activities while decreasing the amount of equipment and supplies carried by field staff during initial mobilization, TPMC shipped field supplies to the Site location via a common carrier. These materials and supplies included items listed in Section 2.2.1.3.

Radioactive check sources were transported in full compliance with Department of Transportation (DOT) 49 Code of Federal Regulations (CFR) Part 173 as excepted radioactive materials, instrument and article shipments.

#### 2.2.2 *Field Activities*

Field activities were grouped into the following categories:

- Site Walkdown
  - Interviews with key POCs
  - Visual Inspection of Site
- Documentation of Final Survey Approach
- Radiation Surveys
  - Area gamma radiation measurements
  - Direct alpha/beta measurements (total contamination)
  - Qualitative removable alpha/beta contamination (large area wipes)
  - Quantitative removable alpha/beta contamination (100 square centimeter (cm<sup>2</sup>) smear samples; dry for alpha /beta and wet for tritium analysis)
- Shipment of Samples to Off-site Laboratory

##### 2.2.2.1 *Site Walkdown including Visual Inspection and Interviews with key POCs*

Upon arrival on-site, the TPMC Team met with Site personnel to gather background information regarding the Site, and to receive site-specific training/indoctrination as required. The team conducted a visual inspection of the Site to identify any radioactive commodities, radiation use areas, or locations where radiation could be present. Results of the visual inspection survey are provided in Appendix B, and the personnel interviews are documented in Appendix C.

##### 2.2.2.2 *Documentation of Survey Approach*

The TPMC Field Team used historical due diligence reviews, visual inspections, and interviews to finalize the overall survey strategy ultimately implemented at the site. This Site was considered as one MARSSIM survey unit based on building surface area. The radiological evaluation included an area gamma radiation survey with a MicroR meter (minimum thirty (30) exposure rate measurements) and an alpha, beta, and tritium radiation contamination survey. Although these facilities would typically be considered MARSSIM Class 3 survey units with only judgmental survey and sampling required, the survey team designed the survey using modified Class 2 survey protocols for increased survey coverage – 30 survey points over 1000 m<sup>2</sup> and 10

sample locations. The Survey Approach Documentation Form for this Site is provided in Appendix C.

### 2.2.2.3 Radiation Surveys

The Field Team was equipped with the necessary instruments and supplies to perform the radiological assessment surveys in accordance with methodology previously defined. The types of analyses, instrumentation, and detection methods are detailed in Table 2-1 below.

**Table 2-1  
Portable Instrumentation**

Type of Measurement	Type of Instrument	Detection Method
Direct measurements for total alpha and beta contamination	Ludlum Model 2360 rate meter with Ludlum Model 43-89 or 43-93 probe	Scintillation/Dual Phosphor
Wipe tests for removable alpha and beta contamination	Ludlum Model 2360 rate meter with Ludlum Model 43-89 or 43-93 probe	Scintillation/Dual Phosphor
Low-level gamma radiation exposure rate survey	Ludlum Model 19 MicroR Meter (or equivalent)	Sodium Iodide (NaI) Scintillator

Prior to taking survey measurements, the team chose a background location(s) as a temporary base of operations to conduct instrument quality control and performance checks. This background or reference area was selected to have a very low probability of being impacted by radioactive materials use or storage, floor surfaces representative of the greater building/Site conditions, and in a location remote from any known or probable radioactive use or storage areas. This background reference area was also the location where smear/wipe samples were counted and instrument performance verified pre and post survey.

The radiological evaluation included an area gamma radiation survey and surveys to detect residual alpha and beta radioactivity. The area gamma radiation survey was performed using a highly sensitive Ludlum MicroR radiation meter (minimum thirty [30] exposure rate measurements) and the survey was focused primarily on identifying radioactive sources or areas of elevated radioactivity. The alpha/beta radiation survey consisting of three components: qualitative removable contamination using large area wipes to identify areas of gross removable contamination; total (fixed plus removal) contamination measurements (thirty [30] direct measurements); and quantitative removable contamination measurements for each survey unit. The alpha/beta radiation survey utilized a Ludlum Model 2360 Scalar/Ratemeter mated to a dual phosphor alpha/beta scintillation probe for direct measurements and field assessment of removable contamination. The qualitative removable contamination measurements were used to sample a large area to determine if any removable contamination was detectable above ambient background levels. If contamination was detected with a large area wipe or a direct measurement, the team expanded their survey area to determine the nature and extent of the contamination.

Since field instruments may not have the required sensitivity to effectively measure the removable contamination at the Reg Guide 1.86 action levels, the field measurements of the dry smear samples are considered qualitative measurements, and the definitive/quantitative results

removable alpha/beta radioactive measurements are provided by the Department of Defense (DoD) ELAP approved off-site laboratory. The field team uses this qualitative field data to identify significantly elevated radiation levels, in order to direct additional survey, and to prevent shipping samples with elevated radioactivity to the laboratory without proper notice. While on-site, direct measurements and dry qualitative smear samples results were compared to applicable Reg Guide 1.86 Table-I Limits. Radiation exposure rate levels were compared to Site ambient background levels. Radiological surveys were documented on a standardized survey form that included information on the instrumentation, background levels, measurement type, survey location (maps and/or photos), and survey results.

Wet and dry smears samples were shipped by overnight express shipment to the selected off-site independent DoD Environmental Laboratory Accreditation Program (ELAP) Accredited laboratory, GEL (located in Charleston, South Carolina), for quantitative radiological (gross alpha, beta, and tritium) analysis. Chain of Custody (CoC) forms were completed for all samples, and samples were shipped by traceable means.

#### 2.2.2.4 *Sample Custody and Control*

The handling and transport of samples destined for analysis at GEL was coordinated by the Team Lead. As a result, each sample was properly labeled and tracked/controlled on a CoC form provided by the laboratory.

Tritium samples were placed inside plastic vials containing a small quantity of de-ionized water, which in turn were placed inside plastic bags to ensure the smears remained moist during transit per GEL instructions. The alpha/beta smears were placed into a plastic bag and sealed. All sample containers were sealed with a tamper resistant label to ensure no tampering during shipment. The samples were then packaged in a Federal Express (FedEx) overnight pouch with air bills completed for shipment and overnight delivery to the GEL laboratory facility. Since the sample media were not suspected of being a hazardous material per DOT, the shipment was handled as non-regulated sample media.

### **3.0 SAMPLE COLLECTION AND DATA ANALYSIS**

#### **3.1 REMOVABLE SMEAR SAMPLING**

A total of thirteen (13) quantitative smear samples (100 cm<sup>2</sup> smear tests) were taken at the Site. This included ten (10) dry smear samples that were collected and analyzed for removable alpha/beta contamination, and three (3) wet smear samples analyzed for tritium contamination. The following sections provide details of the sample collection and analytical methods.

#### **3.2 SAMPLE IDENTIFICATION**

The sample identification (ID) numbers were documented on sample field sheets. Sample ID numbers were used on sample labels or tags, field data sheets and/or logbooks and CoC.

#### **3.3 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES**

Gross alpha/beta smear samples were placed in plastic bags per GEL direction. Tritium smears were placed in plastic vials containing a small quantity of de-ionized water per GEL instructions. Preservation and holding times did not apply to these samples.

#### **3.4 ANALYTICAL METHODS**

Samples sent to GEL were analyzed for the following parameters, using the corresponding methods:

- Tritium by Liquid Scintillation: GL-RAD-A-002
- Gross alpha/beta by Gas-Flow Proportional Counting: EPA 900.0/SW846 9310/SM 7110B Modified

#### **3.5 QUALITY ASSURANCE/QUALITY CONTROL**

Quality Control (QC) was maintained on this project at all stages including portable instrument use / handling, sample integrity, and analytical laboratory data. Requested laboratory reporting limits (RL) were one tenth (1/10) of the action limits in Reg Guide 1.86 Table-I.

##### **3.5.1 Instrument Use / Handling**

The team was equipped with hand-held, portable survey instruments, each of which was calibrated by a National Institute of Standards & Technology (NIST) certified off-site facility. Copies of the calibration certificates used for this project are included as Appendix D.3, "Instrument Calibration Sheets". In addition, each day on-site the team performed Instrument Checks (pre- and post-survey) to ensure the instruments were operating within their established ranges.

As data was collected by the field team, the Team Lead provided oversight with regard to the survey methods used, as well as the data sheets generated during execution of the field work. Essentially the Team Lead functioned as first-line reviewer for the project.

### **3.5.2 Analytical Data Quality and Review**

GEL Laboratories has a mature Quality Assurance (QA) program that has been audited and certified by recognized organizations including: DoD Quality Systems Manual (QSM) ELAP, National Environmental Laboratory Accreditation Conference (NELAC), American Society of Mechanical Engineers Nuclear Quality Assurance, Level -1 (ASME/NQA-1), and International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) Guide 17025. The high standards built as part of GEL's QA program were directly applied to the handling, analysis, and data reporting associated with the smear samples generated by this project.

In addition, TPMC personnel routinely reviewed all data packages to ensure the completeness and accuracy of each of the sample reports. This review was performed with the goal to ensure that the sample results received accurately and completely matched the parameters of the Site's sample locations.



#### **4.0 SUMMARY OF FIELD INVESTIGATION AND LABORATORY RESULTS**

This section provides a summary of field and laboratory observations, results, data, and interpretation results associated with the radiological site assessment. Summarized results of both field and laboratory activities are provided in Table 4-1. This is followed by a brief discussion of the supporting data obtained during this project.

#### **4.1 RESULTS SUMMARY**

Table 4-1 provides a summary record of the data obtained in the field along with the corresponding analytical results from the GEL off-site analytical laboratory. As presented in the table, all survey data and analytical results were either less than the ambient background radiation levels, less than instrument detection limits, or below the conservative NRC Reg Guide 1.86 Table-I limits. The detailed survey results are provided in Appendix E, and sample location details are provided in Appendix F. A survey sketch identifying sample locations is provided in Appendix G.

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**Table 4-1  
Summary Results Table**

Survey Location Number	Contamination					Exposure Rate	
	Direct Field		Removable / Smear			Surface Contact	One meter Above Surface
	(dpm / 100 cm <sup>2</sup> )		Lab (dpm /100 cm <sup>2</sup> )			(μR/hr)	(μR/hr)
	α	β	α	β	Tritium		
<b>Location / Area :1LT Francis W. Gallagher Memorial USARC (NM005) : SU1</b>							
1	<BKG	<BKG	ND	ND	ND	17.0	16.5
2	<BKG	<BKG	ND	ND	-	15.5	16.0
3	<BKG	<BKG	-	-	-	17.0	17.0
4	<BKG	<BKG	-	-	-	15.5	16.0
5	<BKG	<BKG	-	-	-	18.0	17.0
6	<BKG	<BKG	0.943	ND	-	15.5	15.0
7	<BKG	<BKG	-	-	-	17.0	16.0
8	<BKG	<BKG	-	-	-	16.0	15.0
9	<BKG	<BKG	-	-	-	17.0	16.5
10	<BKG	<BKG	ND	ND	-	16.0	16.0
11	<BKG	445.8	ND	0.737	ND	24.0	26.0
12	<BKG	442.5	ND	ND	-	26.0	26.0
13	<BKG	4.0	ND	ND	-	19.0	18.5
14	<BKG	4.0	-	-	-	17.0	16.0
15	<BKG	277.6	ND	ND	-	19.0	15.5
16	<BKG	<BKG	ND	ND	ND	14.5	12.5
17	<BKG	<BKG	-	-	-	11.0	11.0
18	<BKG	30.3	-	-	-	12.5	13.0
19	<BKG	<BKG	-	-	-	11.0	11.0
20	<BKG	<BKG	-	-	-	17.0	16.0
21	<BKG	<BKG	-	-	-	15.0	14.0
22	<BKG	<BKG	-	-	-	17.0	17.0
23	<BKG	231.5	-	-	-	15.5	16.0
24	<BKG	280.9	ND	1.25	-	17.0	16.0
25	<BKG	152.3	-	-	-	16.0	15.5
26	<BKG	<BKG	-	-	-	14.5	14.5
27	<BKG	<BKG	-	-	-	9.0	9.5
28	<BKG	178.7	-	-	-	16.0	15.0
29	<BKG	307.3	-	-	-	20.0	19.0
30	<BKG	168.8	-	-	-	19.0	18.5
<b>Notes:</b>							

ND - Analyte was analyzed for, but not detected above the laboratory detection limit. Detection limit is lower than the site assessment criteria shown in Table 4-2. Laboratory data package is provided in Appendix J. <span style="float: right;">BKG - Background</span>			
dpm – disintegrations per minute, cm <sup>2</sup> – square centimeters, μR – micro-Roentgen, hr - hour			
Site-specific Background Measurements			
Location/Area	α (dpm / 100 cm <sup>2</sup> )	β (dpm / 100 cm <sup>2</sup> )	γ(μR/hr)
1LT Francis W. Gallagher Memorial USARC (NM005)	42.8	915.9	15.2

The data in Table 4-1 was compared to the site assessment criteria which was extracted from Reg Guide 1.86 Table-I. The Reg Guide 1.86 Table-I criteria are summarized in Table 4-2 and for this survey; all measurements were below this established criteria.

**Table 4-2  
Site Assessment Criteria**

	Direct Measurements	Removable / Smear Measurements	Ambient Exposure Rates
Alpha (dpm/100 cm <sup>2</sup> )	<b>100</b>	<b>20</b>	-
Beta (dpm/100 cm <sup>2</sup> )	<b>1000</b>	<b>200</b>	-
Tritium (dpm/100 cm <sup>2</sup> )	<b>5000</b>	<b>1000</b>	-
Gamma (μR/hr)	-	-	<b>&gt; 2 x Average Background</b>
Note: Alpha, beta, and tritium values extracted from NRC Regulatory Guide 1.86 Table-I dpm – disintegrations per minute cm <sup>2</sup> – square centimeters μR/hr – micro-Roentgen per hour			

## 4.2 FIELD INVESTIGATION RESULTS

### 4.2.1 Site Interviews / Visual Inspection

Visual inspections and site POC interviews indicated that some low-level radioactive commodities were used and stored in the Administration building. The result of the visual inspection is documented in Appendix B, “Visual Inspection / Site Survey Checklist”.

In addition to the visual inspection, the Team Lead conducted an interview with on-site POC. The results of this interview are recorded in the Survey Approach Documentation Form provided in Appendix C. The interview resulted in no areas requiring additional survey or investigation.

### 4.2.2 Field Measurements

All field measurements obtained by the survey team are included in Appendix E of this report. The following data was recorded:

- Total (fixed and removable) alpha (cpm and dpm/100 cm<sup>2</sup>)
- Total (fixed and removable) beta (cpm and dpm/100 cm<sup>2</sup>)
- Removable / Smear (cpm/100 cm<sup>2</sup> and dpm/100 cm<sup>2</sup>)
  - Note: This was a qualitative measurement performed and used by field personnel that is superseded by analytical data received by GEL Laboratories.
- Removable Large Area Wipes (cpm)
- Area gamma radiation exposure rate measurements on contact and at one meter vertically off the floor (μR/hr)

The survey record tool was set up to convert “cpm” values to “dpm” using instrument specific calibration sheets, enabling the Field Team to see in real-time the corresponding field measurements in disintegrations per minute (dpm) for direct comparison with the Reg Guide 1.86 Table-I criteria (Table 4-2).

In addition to the Survey Record, the Sample Description Log is included in Appendix F. This document provides supplementary descriptions of the survey locations in addition to the information provided in the Survey Record. Survey Sketches (Appendix G) provide pictorial representations of the specific locations where direct measurements and smear samples were taken.

All survey results were found to be indicative of background radiation levels and were less than Reg Guide 1.86 Table-I limits.

### **4.3 LABORATORY RESULTS**

All laboratory results are provided in Appendix J. In addition to the analytical results, this appendix includes: Certificate of Analysis Report, QC Summary, copy of CoC, Sample Receipt and Review Form, and a listing of GEL’s current certifications.

These results, received from GEL Laboratories, support the initial field team findings that there are no areas displaying radioactivity in excess of the respective actions levels. All sample results were less than the most restrictive Reg Guide 1.86 removable contamination limits of 20 dpm/100 cm<sup>2</sup> alpha, 200 dpm/100 cm<sup>2</sup> beta, or 1000 dpm/100 cm<sup>2</sup> tritium. As a result, no additional investigation was warranted.

## **5.0 CONCLUSIONS**

All data collected and survey results support the conclusion that there is no evidence of radiological contamination or radioactive material present at the Gallagher Site. In accordance with the MARSSIM guidance document and based on the data presented in this report, the Gallagher Site can be considered radiologically non-impacted and available for unrestricted use with respect to radiological hazards.

## **6.0 RECOMMENDATIONS**

TPMC recommends using the results of this Site Radiological Assessment as evidence that the Gallagher Site is free of residual radiological contamination and unsecured radioactive material. Thus the Site can be considered radiologically non-impacted and available for unrestricted use relative to radiological hazards.

## 7.0 REFERENCES

DoD, DOE, USEPA, and Nuclear Regulatory Commission (NRC), 2000, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, NUREG-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, DOE/EH-0624, Rev. 1, August.

ECP, 2013, Final Environmental Condition of Property (ECP) Report for Gallagher Memorial USARC, Las Cruces, NM, Nov 18, 2013

TB 43-0116 "Identification of Radioactive Items in the Army"

U.S. Atomic Energy Commission Regulatory Guide, NRC Reg Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, June 1974

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***APPENDIX A***  
*HISTORICAL REVIEW CHECKLIST*

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# **SITE HISTORICAL DATA REVIEW**

## **Validation of MARSSIM Appendix B Approach**

**Site:** 1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (NM005)

**Team Lead / Reviewer:** Joe Green

**Date reviewed:** 10/17/14

### **Documents reviewed:**

All historical documents provided by 63rd Regional Support Command (RSC) Point of Contact (POC) were reviewed to guide radiological assessment at the site.

### **Site summary:**

The 1LT Francis W. Gallagher Memorial USARC (hereafter referred to as the “Gallagher Site” or “the Site”) is located at 1300 West Brown Road in Las Cruces, New Mexico. The property is an approximately 5.63 acre parcel of land. The parcel is improved with an administration/training building and, Organizational Maintenance Shop (OMS), and Military equipment parking (MEP) area is located west of the OMS and the Administration building. An asphalt publically-owned vehicle (POV) parking area is located east of and adjacent to the Administration Building. The hazardous material buildings southeast of OMS (as shown in aerial image of the site), have been removed from the site. The Gallagher USARC was last occupied by the 281<sup>st</sup> Transportation Company.

### **Administration Building**

The administration/training building is an approximately 13,342 square foot (ft<sup>2</sup>) T shaped building. The building was constructed in 1959. The building contains administration offices, classrooms and storage rooms. An arms vault utilized for storage is located within one of the classrooms, and the door to the arms vault is located within the maintenance bay.

### **OMS**

The OMS is a 5,395 ft<sup>2</sup>, one-story, two-bay building originally constructed in 1959 of concrete block. The interior of the shop has a concrete slab floor, offices, two service bays, and storage areas.

Based on available information, no radiological survey/assessment has been performed at the site.

### **Potential for radioactive commodity use, handling, or storage:**

As documented in Section 2.2.3.15 of the ECP, *“Interviews with onsite personnel confirmed the presence of chemical agent detectors, IM-93s, radiological meters, lensatic compasses, and wristwatches. These items were secured in a caged storage area inside the USAR Center Administration Building”*. There is no evidence to suggest that any radiological commodities were ever improperly used or stored at the site or that any radioactive materials were released to the environment.

**Findings, if any:**

No specific radiological concerns exist.

**Conclusion:**

There is no evidence to suggest that radioactive commodities were ever improperly managed at the site, or that any radionuclides within seal-source items were ever released. Therefore, the site qualifies for the simplified assessment procedure of Appendix B of MARSSIM.

**References:**

ECP, 2013, Final Environmental Condition of Property (ECP) Report for Gallagher Memorial USARC, Las Cruces, NM, Nov 18, 2013

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***APPENDIX B***  
***VISUAL INSPECTION CHECKLIST***

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# VISUAL INSPECTION CHECKLIST

**Site Location:** 1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (NM005)  
**Date:** 10/20/14      **Team Lead:** Joe Green

Item #	Areas for Review	YES	NO	OBSERVED		NOT OBSERVED		N/A	COMMENTS
<b>Key Indicators to look for</b>									
1	Stain spots in vault, storage, supply room. Could be indication of an instrument or equipment that broke at some point in the past					X			
2	Presence of stored liquids		X						
3	Signs that may have radioactive material. (Exit Signs, smoke detector etc.)		X						
4	Any areas marked, or previously marked, with RAD signs		X						
5	Identified any radioactive commodities? (What are they, condition, etc.)		X						
6	Problems accessing site? (Can't contact POC, scheduling conflict, etc.)		X						
7	Any areas at site not accessible? (Locked Connex, area, storage cabinet, etc.)		X						
8	Any radioactive signage? (Is the radioactive commodity there or is it historical in nature)	X							
<b>Areas with higher potential of radiological components</b>									
9	Rooms that may have previously stored ammunition or explosives (Could be an indication of potential DU)	X							Vault
10	Medical rooms where x-ray equipment was stored or used – typically only radioactive signage/no RAM		X						
11	Areas that CBRN detecting equipment may have been stored (Storage, supply, vault)	X							Caged Storage Area in administrative building (See Survey Sketch)
12	Maintenance areas, especially where radioactive components/commodities may have managed		X						
13	Areas where Engineer/Construction units used/stored soil moisture/density gauges		X						
14	Small arms storage areas (Indication of radio-luminescent aiming sights or night vision equipment use and storage)	X							Vault
15	Depleted Uranium munitions use or storage NOTE: these items are only used in large caliber guns such as Bradley Fighting Vehicle, Mini Gun Systems, and Main Battle Tanks. Normally not found at USARCs.		X						

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***APPENDIX C***  
***DOCUMENTATION OF SURVEY APPROACH***

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# Survey Approach Documentation Form

**Site Location:** 1LT Francis W. Gallagher Memorial U.S. Army Reserve Center (NM005)

**Date:** 10/20/14      **Team Lead:** Joe Green

**Personnel Interviewed:**

Chuck Eichensehr, Facility Manager	Mr. Eichensehr provided access to facility. He provided overview of the facility and showed the locations of vault and radiological commodities storage area. He was not aware of any radiological spill or incident at the site.
Mike Halbert, Area Facility Operations Specialist	Mr. Halbert assisted with access to the facility. He was not aware of any radiological incident or mismanagement of radiological commodities.

**Narrative Documenting Preliminary Survey Approach:**

In designing the survey, the survey team initially assume that the site has a low probability for being impacted by residual radioactive materials based on the following three criteria inherent to Army Reserve operations: 1) only small quantities of radioactive materials were used thus presenting an inherently low risk for release or exposure; 2) the radioactive sources used at these sites are typically sealed sources thus minimizing release to the environment; and 3) standard Army protocols that require strict management, control, and reporting of radioactive material use. Based on the low probability of residual radioactive materials remaining at Army Reserve sites, initial survey approach is to follow the MARSSIM simplified survey approach as outlined in MARSSIM Appendix B. This simplified survey approach allows use of a more streamlined and flexible survey strategy incorporating historical process knowledge and data with radiation survey results to determine whether the site is impacted by residual radioactive material above the Nuclear Regulatory Commission (NRC) Regulatory Guide (Reg Guide) 1.86 Table-I limits.

After review of the related site historical documents, personnel interviews, site inspections, visual walk downs, and radiological surveys, there is evidence that a small amount of radioactive materials/commodities was used or stored at the Site in the form of NBC detection equipment, RADIAC meters, lensatic compasses, and wristwatches.

This site will be considered as one survey unit. The radiological evaluation will include an area radiation survey with a MicroR meter (minimum thirty (30) exposure rate measurements) and a contamination survey consisting of three components for each survey unit:

- Fixed contamination [minimum thirty (30) direct measurements]
- Qualitative removable contamination (large area wipes, as appropriate)
- Quantitative removable contamination [100 cm<sup>2</sup> smear tests; minimum ten (10) dry wipes for gross alpha/beta and minimum three (3) wet smears for Tritium].

Before collecting the samples; the survey team will perform exposure dose measurement readings. Biased sample locations were then determined based on the exposure dose measurements if required. Systematic random samples will then be collected so as to obtain

good distribution of sampling location throughout the site. The administrative areas and offices will be provided only a few sample/survey locations due to the reduced probability of radioactive materials storage or use in these areas.

**Amended Survey Approach as Needed During Real-Time Survey Findings:**

Not required.

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***APPENDIX D***  
***QUALITY CONTROL DATA***

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D.1 – Operating Range

D.2 – Instrument Daily Checks

D.3 – Instrument Calibration Sheets



**Initial Alpha, Beta-Gamma and Exposure Rate Operating Range  
1LT Francis W. Gallagher Memorial USARC (NM005)**

Team   JG/AM  

<b>BETA Instrument</b>			
Date	10/20/14	Technician / Initials	JG
Instrument Model #	Ludlum 2360	Detector Model #	Ludlum 43-93
Instrument Serial #	287657	Detector Serial #	PR323034
Instrument Cal Due	02/16/15	Detector Cal Due	02/16/15
Source Isotope	Po-210	Det Active Area (cm <sup>2</sup> )	100
Source ID #	5-2013	Source Activity (μCi)	0.1
Background cpm 1	10	Source gcpm 1	2642
Background cpm 2	6	Source gcpm 2	2579
Background cpm 3	6	Source gcpm 3	2544
Background cpm 4	7	Source gcpm 4	2636
Background cpm 5	6	Source gcpm 5	2565
Background cpm 6	10	Source gcpm 6	2630
Background cpm 7	19	Source gcpm 7	2571
Background cpm 8	10	Source gcpm 8	2581
Background cpm 9	13	Source gcpm 9	2607
Background cpm 10	12	Source gcpm 10	2550
Average Bckgrd cpm	9.9	Average Source gcpm	2,590.5
Average Bckgrd dpm/100 cm <sup>2</sup>	42.8		
Detector Efficiency	0.2315	Lower Range (gcpm) -20%	2072
Cable Length (ft)	3	Upper Range (gcpm) +20%	3109
Direct Alpha Action Level (gcpm)	<b>33.05</b>		

<b>BETA Instrument</b>			
Date	10/20/14	Technician / Initials	JG
Instrument Model #	Ludlum 2360	Detector Model #	Ludlum 43-93
Instrument Serial #	287657	Detector Serial #	PR323034
Instrument Cal Due	02/16/15	Detector Cal Due	02/16/15
Source Isotope	Sr-90	Det Active Area (cm <sup>2</sup> )	100
Source ID #	4-2013	Source Activity (μCi)	0.1
Background cpm 1	277	Source gcpm 1	74220
Background cpm 2	265	Source gcpm 2	73832
Background cpm 3	295	Source gcpm 3	74088
Background cpm 4	319	Source gcpm 4	73903
Background cpm 5	305	Source gcpm 5	74578
Background cpm 6	277	Source gcpm 6	74371
Background cpm 7	273	Source gcpm 7	73434
Background cpm 8	240	Source gcpm 8	73768
Background cpm 9	250	Source gcpm 9	73784
Background cpm 10	277	Source gcpm 10	73679
Average Bckgrd cpm	277.8	Average Source gcpm	73,965.7
Average Bckgrd dpm/100 cm <sup>2</sup>	915.9		
Detector Efficiency	0.3033	Lower Range (gcpm) -20%	59173
Cable Length (ft)	3	Upper Range (gcpm) +20%	88759
Direct Beta Action Level (gcpm)	<b>581.1</b>		

<b>Gamma/Exposure Rate Instrument</b>			
Date	10/20/14	Technician / Initials	JG
Instrument Model #	Ludlum 19	Source Isotope	Cs-137
Instrument Serial #	296424	Source ID #	292
Instrument Cal Due	02/13/15	Source Activity (μCi)	1.00
Background μR/hr 1	15	Source μR/hr 1	385
Background μR/hr 2	15.5	Source μR/hr 2	390
Background μR/hr 3	14	Source μR/hr 3	395
Background μR/hr 4	14.5	Source μR/hr 4	395
Background μR/hr 5	16.5	Source μR/hr 5	390
Background μR/hr 6	16	Source μR/hr 6	390
Background μR/hr 7	16.5	Source μR/hr 7	390
Background μR/hr 8	15	Source μR/hr 8	390
Background μR/hr 9	14	Source μR/hr 9	390
Background μR/hr 10	15	Source μR/hr 10	395
Average Bkg μR/hr	15.2	Average Source μR/hr	391.0
		Lower Range (μR/hr) -20%	312.8
		Upper Range (μR/hr) +20%	469.2

**DAILY INSTRUMENT PERFORMANCE CHECK LOG**

Team No. :                      JG/AM

**1LT Francis W. Gallagher Memorial USARC (NM005)**

Exposure Rate Meter		Ludlum		Model #	<u>          Ludlum 19          </u>	Serial #	<u>          296424          </u>	Cal Due Date	<u>          2/13/15          </u>
Manufacturer									
Detector / Probe		Ludlum		Model #	<u>          Ludlum 43-93          </u>	Serial #	<u>          PR323034          </u>	Cal Due Date	<u>          2/16/15          </u>
Manufacturer									
Instrument / Meter		Ludlum		Model #	<u>          Ludlum 2360          </u>	Serial #	<u>          287657          </u>	Cal Due Date	<u>          2/16/15          </u>
Manufacturer									
Alpha	Source #	<u>          5-2013          </u>	Isotope	<u>          Po-210          </u>	Activity (μCi)	<u>          0.1          </u>	± 20% Range	<u>          2072-3109          </u>	
Beta	Source #	<u>          4-2013          </u>	Isotope	<u>          Sr-90          </u>	Activity (μCi)	<u>          0.1          </u>	± 20% Range	<u>          59173-88759          </u>	
Gamma	Source #	<u>          292          </u>	Isotope	<u>          Cs-137          </u>	Activity (μCi)	<u>          1.00          </u>	± 20% Range	<u>          313-469          </u>	
Detector/ Probe Efficiency ( α ) :		<u>          0.2315          </u>		Detector/Probe Efficiency ( β ) :		<u>          0.3033          </u>			

Date	Time Pre / Post	Instrument Physical Check Sat	Instrument & Detector in Calibration	Battery Check Sat	Background Alpha	Background Beta	Background Gamma	Source Alpha	Source Beta	Source Gamma	Response Chk – Init	Response Chk – End	Response Check
		(Y / N)	(Y / N)	(Y / N)	(cpm)	(cpm)	(μR/hr)	(cpm)	(cpm)	(μR/hr)	Net Value (cpm, μR)	Net Value (cpm, μR)	Technic. Initials
10/20/14	9:00	Y	Y	Y	9.9	277.8	15.2	2590.5	73965.7	391	ok	ok	JG
	13:35	Y	Y	Y	16.0	283.0	20.0	2699.0	73899.0	400	ok	ok	JG

Alpha and beta background and source counts are measured for one minute



Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

# CERTIFICATE OF CALIBRATION

## LUDLUM MEASUREMENTS, INC.

501 Oak Street  
325-235-5494  
Sweetwater, TX 79556, U.S.A.

10744 Dutchtown Road  
865-392-4601  
Knoxville, TN 37932, U.S.A.

CUSTOMER TERRANEAR PMC LLC

ORDER NO. 20252912/411311

Mfg. Ludlum Measurements, Inc. Model 2360 Serial No. 287657  
Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR323018  
Cal. Date 23-Sep-14 Cal Due Date 23-Sep-15 Cal. Interval 1 Year Meterface 202-855

Check mark  applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 32 % Alt 692.8 mm Hg

- New Instrument     Instrument Received     Within Toler. +10%     10-20%     Out of Tol.     Requiring Repair     Other-See comments
- Mechanical ck.     Meter Zeroed     Background Subtract     Input Sens. Linearity  
 F/S Resp. ck     Reset ck.     Window Operation     Geotropism  
 Audio ck.     Alarm Setting ck.     Batt. ck. (Min. Volt) 2.2 VDC     RS-232 Port OK  
 Calibrated in accordance with LMI SOP 14.8 rev 12/05/89.     Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 750 V

HV Readout (2 points) Ref./Inst. 500 / 502 V Ref./Inst. 2000 / 2004 V

Firmware Version: 39010224  
Alpha Threshold: 120 mv  
Beta Threshold: 3.5 mv  
Beta Window: 30 mv  
Overload SET TO SIMULATE LIGHT LEAK.  
Instrument calibrated with a 39" cable.  
High voltage set with detector NOT CONNECTED.

(EEPROM Settings)  
User Time: 0.1  
Alpha Alarm: 999999  
Beta Alarm: 999999  
A/B Alarm: 999999  
Model 2360 Date: 9/23/2014  
Calibration Date Due: 9/23/2015

### COMMENTS:

Po-210 ~0.1µCi check source reads ~3kcpm with source placed on screen of 43-93 (SN:PR323034) and 2360 in alpha position.  
Sr-90 ~0.1µCi check source reads ~80kcpm with source placed on screen of 43-93 (SN:PR323034) and 2360 beta position.  
Po-210 ~0.1µCi check source reads ~3kcpm with source placed on screen of 43-93 (SN:PR323018) and 2360 in alpha position.  
Sr-90 ~0.1µCi check source reads ~80kcpm with source placed on screen of 43-93 (SN:PR323018) and 2360 beta position.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400k cpm	<u>400</u>	<u>400</u>
x1000	100k cpm	<u>100</u>	<u>100</u>
x100	40k cpm	<u>400</u>	<u>400</u>
x100	10k cpm	<u>100</u>	<u>100</u>
x10	4k cpm	<u>400</u>	<u>400</u>
x10	1k cpm	<u>100</u>	<u>100</u>
x1	400 cpm	<u>400</u>	<u>400</u>
x1	100 cpm	<u>100</u>	<u>100</u>

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

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	<u>40026(0)</u>			
	40kcpm	<u>4002</u>			
	4kcpm	<u>400</u>			
	400cpm	<u>40</u>			
	40cpm	<u>4</u>			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.  
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N:  059  2171CP  2281CP  720  734  781  1131  1616  1696  1909  1916CP  5105  5717CO  
 5719CO  60646  70897  73410  E552  G112  M565  S-394  S-1054  T10081  T10082 Neutron Am-241 Be S/N:  T-304 Ra-226 S/N:  Y982

Alpha S/N Pu239 SN:7053     Beta S/N Tc99SN:5280, SrY90SN:5281     Other \_\_\_\_\_  
 m 500 S/N 190566     Oscilloscope S/N \_\_\_\_\_     Multimeter S/N 86250390

Calibrated By: [Signature] Date 23-SEP-14

Reviewed By: [Signature] Date 24 Sep 14



*Bench Test Data For Detector*

Detector 43-93 Serial No. PR 323018

Order #. 20252912/411311

Customer TERRANEAR PMC LLC

Alpha Input Sensitivity 120 mV

Counter 2360 Serial No. 287657

Beta Input Sensitivity 3.5 mV

Count Time 1Minute

Beta Window 30 mV

Other \_\_\_\_\_

Distance Source to Detector Surface

High Voltage	Background		Isotope <u>Pu239</u> Size <u>24900cpm</u>		Isotope <u>Tc99</u> Size <u>93200cpm</u>		Isotope <u>Sr90</u> Size <u>94422cpm</u>	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
700	0	106	5324	257	25	10181	1	20068
725	1	137	5841	260	25	14593	0	26550
750	0	229	6104	301	27	17744	0	30736
775	0	290	6176	384	28	20684	0	34588
800	1	341	6102	507	31	24261	4	34795

- Gas Proportional detector count rate decreased  $\leq$  10% after 15 hour static test using 39" cable.
- Gas proportional detector count rate decreased  $\leq$  10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature *Jana Fle* Date 23. Sept. 14



*Bench Test Data For Detector*

Detector 43-93 Serial No. PR 323034  
 Customer TERRANEAR PMC LLC  
 Counter 2360 Serial No. 287657  
 Count Time 1Minute  
 Other \_\_\_\_\_

Order #. 20252912/411311

Alpha Input Sensitivity 120 mV

Beta Input Sensitivity 3.5 mV

Beta Window 30 mV

Distance Source to Detector Surface

High Voltage	Background		Isotope <u>Po239</u> Size <u>24900cpm</u>		Isotope <u>Po239</u> Size <u>93200cpm</u>		Isotope <u>SI490</u> Size <u>94422cpm</u>	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
<u>725</u>	<u>0</u>	<u>153</u>	<u>5619</u>	<u>304</u>	<u>16</u>	<u>12655</u>	<u>2</u>	<u>23999</u>
<u>750</u>	<u>0</u>	<u>201</u>	<u>5830</u>	<u>306</u>	<u>26</u>	<u>15388</u>	<u>2</u>	<u>28843</u>
<u>775</u>	<u>0</u>	<u>267</u>	<u>6073</u>	<u>389</u>	<u>20</u>	<u>18996</u>	<u>0</u>	<u>32466</u>
<u>800</u>	<u>1</u>	<u>320</u>	<u>6060</u>	<u>462</u>	<u>18</u>	<u>21267</u>	<u>1</u>	<u>34311</u>

- Gas Proportional detector count rate decreased  $\leq$  10% after 15 hour static test using 39" cable.
- Gas proportional detector count rate decreased  $\leq$  10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature *John F. ...*

Date 27-SEP-14

# Attachment

## Efficiencies taken with 43-93 SN:323034

**SrY90 SN:5281**

Size: 94422dpm

Background: 201cpm

Counts: 28843cpm

4pi Eff: 30.33%

**Am241 SN:C3-880**

Size: 232828dpm

Background: 0cpm

Counts: 53922cpm

4pi Eff: 23.15%

## 43-93 SN:323018

**SrY90 SN:5281**

Size: 94422dpm

Background: 229cpm

Counts: 30736cpm

4pi Eff: 32.30%

**Am241 SN:C3-880**

Size: 232828dpm

Background: 0cpm

Counts: 55185cpm

4pi Eff: 23.70%



Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

# CERTIFICATE OF CALIBRATION

**LUDLUM MEASUREMENTS, INC.**  
501 Oak Street 10744 Dutchtown Road  
325-235-5494 865-392-4601  
Sweetwater, TX 79556, U.S.A. Knoxville, TN 37932, U.S.A.

CUSTOMER TERRANEAR PMC LLC ORDER NO. 20252913/411312

Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 296424

Mfg. \_\_\_\_\_ Model \_\_\_\_\_ Serial No. \_\_\_\_\_

Cal. Date 16-Sep-14 Cal Due Date 16-Sep-15 Cal. Interval 1 Year Meterface 202-1070

Check mark  applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 32 % Alt 696.8 mm Hg

- New Instrument     Instrument Received     Within Toler. +-10%     10-20%     Out of Tol.     Requiring Repair     Other-See comments
- Mechanical ck.     Meter Zeroed     Background Subtract     Input Sens. Linearity
- F/S Resp. ck     Reset ck.     Window Operation     Geotropism
- Audio ck.     Alarm Setting ck.     Batt. ck. (Min. Volt) 2.2 VDC
- Calibrated in accordance with LMI SOP 14.8 rev 12/05/89.     Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 685 V Input Sens. 27 mV Det. Oper. \_\_\_\_\_ V at \_\_\_\_\_ mV Threshold Dial Ratio \_\_\_\_\_ = \_\_\_\_\_ mV

HV Readout (2 points) Ref./Inst. 500 / 502 V Ref./Inst. 1000 / 996 V

## COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
5000	4000µR/hr	4000	4000
5000	1000µR/hr	1000	1000
500	400µR/hr = 77000cpm	420	400
500	100µR/hr	105	100
250	200µR/hr = 37600cpm	210	200
250	100µR/hr	105	100
50	7700 cpm	42	40
50	1920 cpm	10.5	10
25	3760 cpm	21	20
25	940 cpm	5.2	5

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

Range(s) Calibrated Electronically

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N:  059  2171CP  2261CP  720  734  781  1131  1616  1696  1909  1916CP  5105  5717CO  5719CO  60646  70897  73410  E552  G112  M565  S-394  S-1054  T10081  T10082 Neutron Am-241 Be S/N:  T-304 Ra-226 S/N:  Y982

Alpha S/N \_\_\_\_\_  Beta S/N \_\_\_\_\_  Other \_\_\_\_\_

m 500 S/N 190566  Oscilloscope S/N \_\_\_\_\_  Multimeter S/N 86250390

Calibrated By: [Signature] Date 16-Sept-14

Reviewed By: [Signature] Date 16 Sep 14

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

---

***APPENDIX E***  
***SURVEY RECORD FORM***

---



<b>Radiological Survey Record Form</b>	Date :	10/20/14	Team No. :	JG/AM
	Site Name :	1LT Francis W. Gallagher Memorial USARC (NM005)		Location

Survey Description : Direct, wet and dry wipe, micorR, and large area wipe surveys to determine the radiological condition  
Location / Area : Survey Unit 1

Meter/Probe Model	Meter/Probe Serial #	Probe Active Area (cm <sup>2</sup> )	Cal. Due Date	Efficiency (c/d)		Background (dpm/100cm <sup>2</sup> or µR/hr)			MDA (dpm/1
				α	β	α	β	γ	α
Ludlum 43-93	PR323034	100	02/16/15	0.2315	0.3033	42.8	915.9	N/A	58.6
Ludlum 19	296424	N/A	02/13/15	N/A	N/A	N/A	N/A	15.2	N/A

Instrument Notes: For MDA calculations, the background count time is assumed to be 10 minutes and sample count time 1 minute, so the formula combined the different sampling/background count times into a factor of 1.1, that equates to  $\{[bkg\ cpm/sample\ count\ time + bkg\ cpm/bkg\ count\ time]\}$  which is the same as  $\{(1/1min+1/10min)\} * bkg\ cpm\}$   
Ludlum 43-93 with Ludlum 2360 Instrument background measurements taken on like survey surfaces (poured concrete surface)

Reg Guide 1.86 Action Level (gcpm/100 cm <sup>2</sup> )	
α	β
33.1	581.1

	Contamination														Expos
	Direct Field (gcpm)		Direct Field (dpm / 100 cm <sup>2</sup> )		Removable / Smear Field (cpm / 100 cm <sup>2</sup> )		Removable / Smear Field (dpm / 100 cm <sup>2</sup> )		Removable Lg Area Wipe Field (cpm)		Removable / Smear Lab Data (dpm / 100 cm <sup>2</sup> )			Contact (µR/hr)	
	α	β	α	β	α	β	α	β	α	β	α	β	Tritium		
1	3	237	-29.8	-134.5	6	278	-16.8	0.7	-	-	0.0951	U	0.276 U	-7.76 U	17.0
2	3	255	-29.8	-75.2	11	275	4.8	-9.2	-	-	0.0305	U	0.338 U	-	15.5
3	4	264	-25.5	-45.5	-	-	-	-	-	-	-	-	-	-	17.0
4	3	253	-29.8	-81.8	-	-	-	-	5	261	-	-	-	-	15.5
5	0	277	-42.8	-2.6	-	-	-	-	-	-	-	-	-	-	18.0
6	4	262	-25.5	-52.1	8	309	-8.2	102.9	-	-	0.943	-	0.372 U	-	15.5
7	2	265	-34.1	-42.2	-	-	-	-	3	274	-	-	-	-	17.0
8	4	197	-25.5	-266.4	-	-	-	-	-	-	-	-	-	-	16.0
9	7	264	-12.5	-45.5	-	-	-	-	-	-	-	-	-	-	17.0
10	0	242	-42.8	-118.0	8	275	-8.2	-9.2	-	-	0.106	U	0.337 U	-	16.0
11	6	413	-16.8	445.8	9	272	-3.9	-19.1	-	-	0.234	U	0.737	2.38 U	24.0
12	3	412	-29.8	442.5	8	283	-8.2	17.1	-	-	0.141	U	-0.242 U	-	26.0
13	2	279	-34.1	4.0	6	277	-16.8	-2.6	-	-	0.0231	U	0.206 U	-	19.0
14	2	279	-34.1	4.0	-	-	-	-	-	-	-	-	-	-	17.0
15	8	362	-8.2	277.6	7	282	-12.5	13.8	-	-	0.101	U	0.429 U	-	19.0

Survey Notes: Large area wipes should be approximately 1 m<sup>2</sup> or greater in area. Ludlum 43-89/93 w/ active area of 100 cm<sup>2</sup> is assumed in direct field dpm/100cm<sup>2</sup> calculations. Dose rates were collected in every room.  
\* Removable/Smear Field values are qualitative measurements.  
U - Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. (Non-detect)  
Negative results occur when a previously determined counting instrument background value is subtracted from a sample value that is less than the background value. Negative values represent a portion of the statistical distribution of negative and positive values around zero for samples containing very little or no detectable radioactivity.

Surveyed by: Joe Green

**Radiological Survey Record Form**  
(continuation sheet)

Date : 10/20/14

Team No. : JG/AM

Site Name : 1LT Francis W. Gallagher Memorial USARC (NM005)

Location : Las Cruces, NM

Survey Description : Direct, wet and dry wipe, micorR, and large area wipe surveys to determine the radiological condition

Location / Area : Survey Unit 1

	Contamination													Expos
	Direct (cpm)		Direct Field (dpm / 100 cm <sup>2</sup> )		Removable / Smear (cpm / 100 cm <sup>2</sup> )		Removable / Smear Field (dpm / 100 cm <sup>2</sup> )		Removable Lg Area Wipe Field (cpm)		Removable / Smear Lab Data (dpm / 100 cm <sup>2</sup> )			Contact (µR/hr)
	α	β	α	β	α	β	α	β	α	β	α	β	Tritium	
16	2	231	-34.1	-154.3	4	255	-25.5	-75.2	-	-	0.267 U	0.337 U	-2.57 U	14.5
17	6	206	-16.8	-236.7	-	-	-	-	1	287	-	-	-	11.0
18	3	287	-29.8	30.3	-	-	-	-	-	-	-	-	-	12.5
19	5	221	-21.2	-187.3	-	-	-	-	-	-	-	-	-	11.0
20	1	259	-38.4	-62.0	-	-	-	-	-	-	-	-	-	17.0
21	1	270	-38.4	-25.7	-	-	-	-	-	-	-	-	-	15.0
22	0	254	-42.8	-78.5	-	-	-	-	-	-	-	-	-	17.0
23	8	348	-8.2	231.5	-	-	-	-	-	-	-	-	-	15.5
24	4	363	-25.5	280.9	5	261	-21.2	-55.4	-	-	0.0295 U	1.25	-	17.0
25	5	324	-21.2	152.3	-	-	-	-	-	-	-	-	-	16.0
26	4	231	-25.5	-154.3	-	-	-	-	-	-	-	-	-	14.5
27	4	260	-25.5	-58.7	-	-	-	-	-	-	-	-	-	9.0
28	5	332	-21.2	178.7	-	-	-	-	3	260	-	-	-	16.0
29	6	371	-16.8	307.3	-	-	-	-	-	-	-	-	-	20.0
30	7	329	-12.5	168.8	-	-	-	-	-	-	-	-	-	19.0
31														
32														
33														
34														
35														
36														
37														

Survey Notes:

Large area wipes should be approximately 1 m<sup>2</sup> or greater in area.  
 Ludlum 43-89/93 w/ active area of 100 cm<sup>2</sup> is assumed in direct field dpm/100cm<sup>2</sup> calculations.  
 Dose rates were collected in every room.  
 \* Removable/Smear Field values are qualitative measurements.  
 U - Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. (Non-detect)  
 Negative results occur when a previously determined counting instrument background value is subtracted from a sample value that is less than the background value. Negative values represent a portion of the statistical distribution of negative and positive values around zero for samples containing very little or no detectable radioactivity.

Surveyed by: Joe Green

---

***APPENDIX F***  
***SAMPLE DESCRIPTION LOG***

---

**SAMPLE LOCATION DESCRIPTION LOG**

Survey Location: 1LT Francis W. Gallagher Memorial USARC (NM005)

Survey Unit 1

No.	Survey Location	Data Type (Large Area Wipe (LAW), Wipe Test (100 cm <sup>2</sup> )(Wipe) Direct)	Lab Sample ID	Sample Location (Starting Point is SE Corner)	Description of Location
1	Admin Bldg.	Direct,Wipe	1ABT	15 ' N 30 ' W	Cage Storage Area NBC,Linoleum tile
2	Admin Bldg.	Direct,Wipe	2AB	14 ' N 22 ' W	Cage Storage Area NBC,Linoleum tile
3	Admin Bldg.	Direct	-	12 ' N 7 ' W	Cage Storage Area,Linoleum tile
4	Admin Bldg.	Direct,LAW	-	40 ' N 12 ' W	Cage Storage Area,Linoleum tile
5	Admin Bldg.	Direct	-	3 ' N 4 ' W	Cage Storage Area,Linoleum tile
6	Admin Bldg.	Direct,Wipe	6AB	28 ' N 13 ' W	Cage Storage Area,Linoleum tile
7	Admin Bldg.	Direct,LAW	-	4 ' N 5 ' W	Entryway,Linoleum tile
8	Admin Bldg.	Direct	-	4 ' N 8 ' W	Office,Linoleum tile
9	Admin Bldg.	Direct	-	3 ' N 3 ' W	Office,Linoleum tile
10	Admin Bldg.	Direct,Wipe	10AB	14 ' N 8 ' W	Office,Linoleum tile
11	Admin Bldg.	Direct,Wipe	11ABT	2 ' N 3 ' W	Vault,Concrete
12	Admin Bldg.	Direct,Wipe	12AB	6 ' N 12 ' W	Vault,Concrete
13	Admin Bldg.	Direct,Wipe	13AB	3 ' N 7 ' W	Office,Linoleum tile
14	Admin Bldg.	Direct	-	3 ' N 28 ' W	Office,Carpet
15	Admin Bldg.	Direct,Wipe	15AB	2 ' N 4 ' W	Janitor Closet,Concrete
16	Admin Bldg.	Direct,Wipe	16ABT	2 ' N 4 ' W	Old Vault room,Linoleum tile
17	Admin Bldg.	Direct,LAW	-	4 ' N 4 ' W	Drill Hall,Linoleum tile
18	Admin Bldg.	Direct	-	5 ' N 3 ' W	Storage Area,Concrete
19	Admin Bldg.	Direct	-	47 ' N 7 ' W	Drill Hall,Linoleum tile
20	OMS	Direct	-	7 ' N 12 ' W	Office,Linoleum tile
21	OMS	Direct	-	5 ' N 4 ' W	Office,Linoleum tile
22	OMS	Direct	-	4 ' N 14 ' W	Office,Linoleum tile
23	OMS	Direct	-	24 ' N 15 ' W	Cage Storage Area,Concrete
24	OMS	Direct,Wipe	24AB	8 ' N 2 ' W	Cage Storage Area,Concrete
25	OMS	Direct	-	2 ' N 3 ' W	Janitor Closet,Concrete
26	OMS	Direct	-	4 ' N 6 ' W	Office,Linoleum tile
27	OMS	Direct	-	36 ' N 5 ' W	Bay,Concrete
28	OMS	Direct,LAW	-	3 ' N 35 ' W	Bay,Concrete
29	OMS	Direct	-	14 ' N 7 ' W	Storage Area,Concrete
30	OMS	Direct	-	1 ' N 4 ' W	Storage,Concrete

---

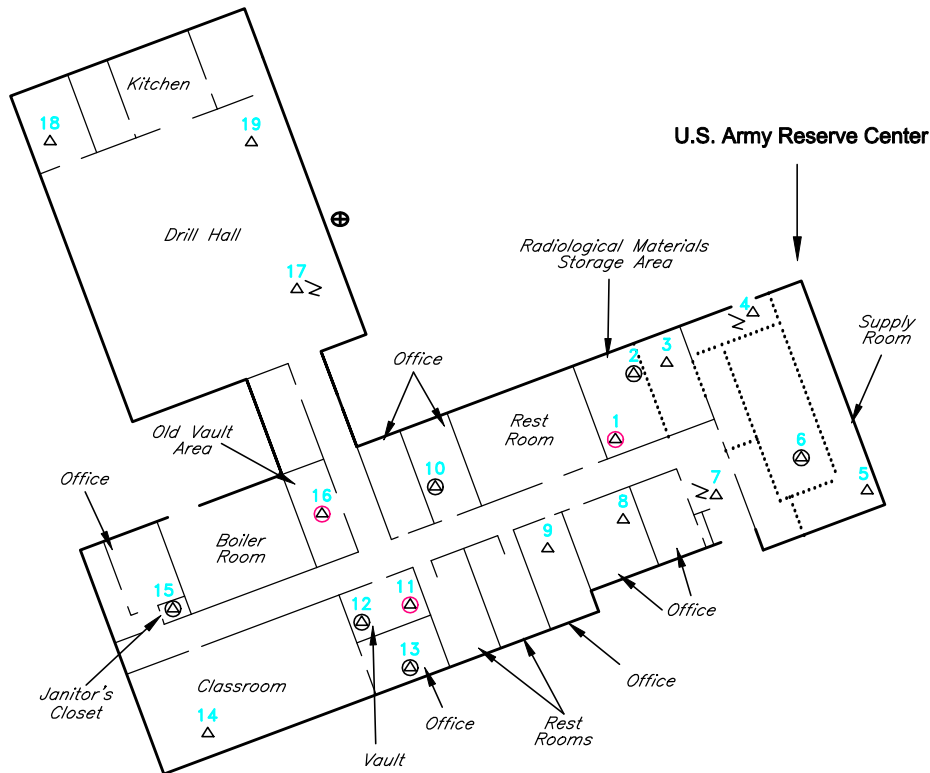
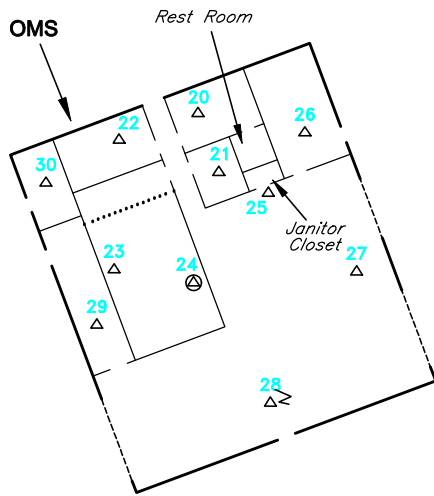
***APPENDIX G***  
***SURVEY SKETCH***

---

# Radiological Survey Record

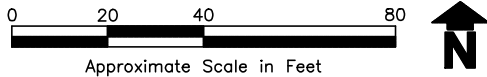
## Survey Locations

### 1LT Francis W. Memorial Gallagher Memorial U.S. Army Reserve Center (NM005) Las Cruces, New Mexico



**Legend**

- Large Area Wipe (LAW)
- Wipe Test (100 cm<sup>2</sup>) (alpha and beta)
- Wipe Test (100 cm<sup>2</sup>) (alpha, beta and tritium)
- Direct Reading (1 min)
- Background Survey Location
- 13** Survey Data Number
- Roll up Door
- Cages



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***APPENDIX H***  
***HIGH RESULTS NARRATIVE***

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## HIGH RESULTS NARRATIVE

Site : 1LT Francis W. Gallagher Memorial USARC (NM005)

Sample Location	Remarks
	There were no results that exceeded site assessment criteria.



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***APPENDIX I***  
***SITE PHOTOS***

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Gallagher\_USARC\_Front\_View



Gallagher\_USARC\_Sample\_1ABT



Gallagher\_USARC\_Sample\_2AB



Gallagher\_USARC\_Sample\_6AB



Gallagher\_USARC\_Sample\_10AB



Gallagher\_USARC\_Sample\_11ABT



Gallagher\_USARC\_Sample\_13AB



Gallagher\_USARC\_Sample\_16ABT



Gallagher\_USARC\_Sample\_24AB



Gallagher\_USARC\_Sample\_30

---

***APPENDIX J***  
*ANALYTICAL RESULTS*

---



October 29, 2014

Daniel F. Caputo  
TerranearPMC, LLC  
222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341

Re: TerranearPMC (Project No.46143) GALLAGHER MEMORIAL USARC  
Work Order: 359455

Dear Daniel Caputo:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 21, 2014. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4505.

Sincerely,

Heather Shaffer  
Project Manager

Enclosures





## GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 – (843) 556–8171 – www.gel.com

### Certificate of Analysis Report for

TPMC006 TPMC–TerranearPMC, LLC (Project No. 46143 )

Client SDG: 359455 GEL Work Order: 359455

**The Qualifiers in this report are defined as follows:**

- \* Indicates that a quality control analyte recovery is outside of specified acceptance criteria.
- \*\* Indicates the analyte is a Tracer compound.
- \*\* Indicates the analyte is a surrogate compound.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Heather Shaffer.

Reviewed by

*Heather Shaffer*

---

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

---

Client Sample ID: 1AB Project: TPMC00600  
Sample ID: 359455001 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:10  
Receive Date: 21-OCT-14  
Collector: Client

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.0951	0.476	0.500	dpm/Filter		JAOC	10/27/14	1235	1430753	1
Beta	U	0.276	0.678	2.00	dpm/Filter						

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 2AB Project: TPMC00600  
Sample ID: 359455002 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:12  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.0305	0.493	0.500	dpm/Filter		JAOC	10/27/14	1228	1430753	1
Beta	U	0.338	0.588	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 6AB Project: TPMC00600  
Sample ID: 359455003 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:30  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha		0.943	0.488	0.500	dpm/Filter		JAOC	10/27/14	1233	1430753	1
Beta	U	0.372	0.611	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

---

Client Sample ID: 10AB Project: TPMC00600  
Sample ID: 359455004 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:45  
Receive Date: 21-OCT-14  
Collector: Client

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.106	0.486	0.500	dpm/Filter		JAOC	10/27/14	1233	1430753	1
Beta	U	0.337	0.653	2.00	dpm/Filter						

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

---

Client Sample ID: 11AB Project: TPMC00600  
Sample ID: 359455005 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:50  
Receive Date: 21-OCT-14  
Collector: Client

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.234	0.491	0.500	dpm/Filter		JAOC	10/27/14	1233	1430753	1
Beta		0.737	0.570	2.00	dpm/Filter						

The following Analytical Methods were performed:

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Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

---

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 12AB Project: TPMC00600  
Sample ID: 359455006 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:52  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.141	0.488	0.500	dpm/Filter		JAOC	10/27/14	1233	1430753	1
Beta	U	-0.242	0.538	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 13AB Project: TPMC00600  
Sample ID: 359455007 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:54  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.0231	0.497	0.500	dpm/Filter		JAOC	10/27/14	1234	1430753	1
Beta	U	0.206	0.520	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	



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## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 15AB Project: TPMC00600  
Sample ID: 359455008 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 11:05  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.101	0.499	0.500	dpm/Filter		JAOC	10/27/14	1234	1430753	1
Beta	U	0.429	0.622	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

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## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 16AB Project: TPMC00600  
Sample ID: 359455009 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 11:10  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.267	0.486	0.500	dpm/Filter		JAOC	10/27/14	1233	1430753	1
Beta	U	0.337	0.566	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

# GEL LABORATORIES LLC

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## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

Client Sample ID: 24AB Project: TPMC00600  
Sample ID: 359455010 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 12:00  
Receive Date: 21-OCT-14  
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting GFPC, Gross A/B, filter "As Received"											
Alpha	U	0.0295	0.479	0.500	dpm/Filter		JAOC	10/27/14	1236	1430753	1
Beta		1.25	0.703	2.00	dpm/Filter						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0/SW846 9310/SM 7110B Modified	

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## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

---

Client Sample ID: 1T Project: TPMC00600  
Sample ID: 359455011 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:10  
Receive Date: 21-OCT-14  
Collector: Client

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
LSC, Direct Tritium, Filter "As Received"											
Tritium	U	-7.76	16.5	100	dpm/Filter		BYS1	10/27/14	1858	1430968	1

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	

---

# GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

---

Client Sample ID: 11T Project: TPMC00600  
Sample ID: 359455012 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 10:50  
Receive Date: 21-OCT-14  
Collector: Client

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
LSC, Direct Tritium, Filter "As Received"											
Tritium	U	2.38	16.4	100	dpm/Filter		BYS1	10/27/14	1914	1430968	1

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	

---

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Report Date: October 29, 2014

Company : TerranearPMC, LLC  
Address : 222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania 19341  
Contact: Daniel F. Caputo  
Project: TerranearPMC (Project No.46143)GALLAGHER MEMORIAL USARC

---

Client Sample ID: 16T Project: TPMC00600  
Sample ID: 359455013 Client ID: TPMC006  
Matrix: Swipe  
Collect Date: 20-OCT-14 11:10  
Receive Date: 21-OCT-14  
Collector: Client

---

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
LSC, Direct Tritium, Filter "As Received"											
Tritium	U	-2.57	15.7	100	dpm/Filter		BYS1	10/27/14	1930	1430968	1

The following Analytical Methods were performed:

---

Method	Description	Analyst Comments
1	GL-RAD-A-002	

---

# GEL LABORATORIES LLC

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## QC Summary

Report Date: October 29, 2014

Page 1 of 2

TerranearPMC, LLC  
222 Valley Creek Blvd.  
Suite 210  
Exton, Pennsylvania

Contact: Daniel F. Caputo

Workorder: 359455

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rad Gas Flow</b>											
Batch	1430753										
QC1203195928	359455001	DUP									
Alpha	U	0.0951	U	-0.0387	dpm/Filter	N/A		N/A	JAOC	10/27/14	14:10
Beta	U	0.276	U	0.403	dpm/Filter	N/A		N/A			
QC1203195927	MB										
Alpha			U	-0.199	dpm/Filter					10/27/14	12:36
Beta			U	-0.387	dpm/Filter						
<b>Rad Liquid Scintillation</b>											
Batch	1430968										
QC1203196620	LCS										
Tritium	211			238	dpm/Filter		113	(75%-125%)	BYS1	10/27/14	20:03
QC1203196621	LCSD										
Tritium	211			220	dpm/Filter	7.74	104	(0%-20%)		10/27/14	20:19
QC1203196619	MB										
Tritium			U	-9.66	dpm/Filter					10/27/14	19:47

### Notes:

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMP Result > MDC/CL and < RDL
- N/A RPD or %Recovery limits do not apply.

# GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

## QC Summary

Workorder: 359455

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
N1	See case narrative										
ND	Analyte concentration is not detected above the detection limit										
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.										
R	Sample results are rejected										
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.										
UI	Gamma Spectroscopy--Uncertain identification										
UJ	Gamma Spectroscopy--Uncertain identification										
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.										
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier										
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.										
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.										
h	Preparation or preservation holding time was exceeded										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



**There are no "Data Exception Reports" associated with this analytical report.**

GEL Laboratories, LLC  
 2040 Savage Road  
 Charleston, SC 29407  
 Phone: (843) 556-8171  
 Fax: (843) 766-1178

GEL Work Order Number: **309455**  
 Client Name: **Tennessee PMC** Phone #: **215 586-1092**  
 Project/Site Name: **Gallagher USAAC (NMP005)** Fax #: \_\_\_\_\_  
 Address: \_\_\_\_\_

Sample Analysis Requested (6) (Fill in the number of containers for each test)  
 Total number of containers: \_\_\_\_\_  
 Should this sample be considered: \_\_\_\_\_  
 TSCA Regulated \_\_\_\_\_  
 Radioactive \_\_\_\_\_

Collected by: **Joe Decker**  
 Send Results To: **K Schwab & Associates**  
 Sample ID: \_\_\_\_\_  
 \*For composites - indicate start and stop date/time

Sample ID	Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (b)	Sample Matrix (4)	Total number of containers	Comments
Gallagher USAAC 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 11A, 12A, 13A, 14A, 15A, 16A, 17A, 18A, 19A, 20A	10-20-14		N	NA	P	5 X	Note: extra sample is required for sample specific QC
Gallagher USAAC 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 11A, 12A, 13A, 14A, 15A, 16A, 17A, 18A, 19A, 20A	10-20-14		N	NA	P	5 X	
Gallagher USAAC 15, 11, 16 T	10-20-14		N	NA	P	3 X	

TAT Requested: Normal: **10** Rush: \_\_\_\_\_ Specify: (Subject to Surcharges) Fax Results: Yes / No  
 Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4  
 Sample Collection Time Zone: Eastern Pacific Other \_\_\_\_\_  
 Mountain

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards  
**Sampling to verify existing conditions**

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
<b>Joe Decker</b>	<b>10-20-14</b>	<b>1415</b>	<b>P. Wont</b>	<b>10/11/14</b>	<b>0905</b>

Chain of Custody Signatures  
 GEL PM: **Heather Shaffer**  
 Method of Shipment: **Fedex** Date Shipped: **10-20-14**  
 Airbill #: **8645 5530 3283**  
 Airbill #: \_\_\_\_\_  
 Sample Shipping and Delivery Details

For Lab Receiving Use Only  
 Custody Seal Intact? YES / NO  
 Cooler Temp: C

1.) Chain of Custody Number = Client Determined  
 2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite  
 3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.  
 4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Soil, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Faecal, N=Nasal  
 5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).  
 6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, if no preservative is added = leave field blank  
**WHITE = LABORATORY YELLOW = FILE PINK = CLIENT**



SAMPLE RECEIPT & REVIEW FORM

Client:		SDG/AR/COC/Work Order: <u>359455 359454 HS 10/21/14</u>	
Received By: <u>P. Went</u>		Date Received: <u>10/21/14</u>	
Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
COC/Samples marked as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0 cpm</u>
Classified Radioactive II or III by RSO?		<input checked="" type="checkbox"/>	If yes, Were swipes taken of sample containers < action levels?
COC/Samples marked containing PCBs?		<input checked="" type="checkbox"/>	
Package, COC, and/or Samples marked as beryllium or asbestos containing?		<input checked="" type="checkbox"/>	If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.
Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		<input checked="" type="checkbox"/>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		<input checked="" type="checkbox"/>		Preservation Method: Ice bags Blue ice Dry ice <u>None</u> Other (describe) *all temperatures are recorded in Celsius <u>a/c</u>
2a Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable): <u>130532792</u>
3 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
4 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 VOA vials free of headspace (defined as < 6mm bubble)?		<input checked="" type="checkbox"/>		Sample ID's and containers affected:
7 Are Encore containers present?			<input checked="" type="checkbox"/>	(If yes, immediately deliver to Volatiles laboratory)
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?			<input checked="" type="checkbox"/>	Sample ID's affected: <u>SEE Continuation Sheet</u>
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected:
12 Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
14 Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>8645 5530 3283 a/c</u>

Comments (Use Continuation Form if needed):



Client: TPMC Received By: P. Went Date Received: 10/20/14 SDG/AR/COC/Work Order: 359455

USARC	1T	10/20/14	10:10
	11"	"	10:50
	16"	"	11:10
USARC	1AB	"	10:10
	2AB		10:12
	6AB		10:30
	10AB		10:45
	11AB		10:50
	12AB		10:52
	13AB		10:54
	15AB		11:05
	16AB		11:10
	24AB		12:00

PM (or PMA) review: Initials DS Date 10/21/14 Page 1 of 1

**List of current GEL Certifications as of 29 October 2014**

<b>State</b>	<b>Certification</b>
Alaska	UST-110
Arkansas	88-0651
CLIA	42D0904046
California NELAP	01151CA
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC000122013-10
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-12-00283, P330-12-00284
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC000122013-10
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA130005
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC000122013-10
Nebraska	NE-OS-26-13
Nevada	SC000122014-1
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
Oklahoma	9904
Pennsylvania NELAP	68-00485
Plant Material Permit	PDEP-12-00260
South Carolina Chemistry	10120001
South Carolina GVL	23611001
South Carolina Radiochemi	10120002
Tennessee	TN 02934
Texas NELAP	T104704235-14-9
Utah NELAP	SC000122014-16
Vermont	VT87156
Virginia NELAP	460202
Washington	C780-12
Wisconsin	999887790