DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

RECEIVED
MAY 30 2002
DNMS

24 May 2002

MEMORANDUM FOR U.S. NRC, REGION IV
(Mr. Tony Gaines)

FROM: AFMOA/SGZR
110 Luke Avenue, Room 405
Bolling AFB DC 20332-7050

SUBJECT: Review of Decommissioning Plan, Eglin AFB, FL.

Enclosed is the decommissioning plan for Test Area C-74L, Eglin AFB, Florida. Test Area C-74L is a range on the Eglin reservation in Walton County, Florida, approximately 14 miles northwest of the City of Niceville. Depleted Uranium munitions testing occurred at C-74L from 1974-1978. The range was licensed under the NRC and the Atomic Energy Commission.

Upon NRC approval, an AF Radioactive Material Permit will be issued for this decommissioning project. Please note that Eglin AFB has requested that this project be given special attention due to funding constraints (atch 1). If you have any questions, please contact me at 202-767-4307 or e-mail, david.pugh@pentagon.af.mil.

DAVID L. PUGH, Capt, USAF, BSC
Health Physicist, Radiation Protection Division
USAF Radioisotope Committee Secretariat
Air Force Medical Operation Agency
Office of the Surgeon General

Attachment

Memorandum For AFMOA/SGZR, Subject: Request for Expeditious Review of Installation Restoration Program Site, RW-41, Range C-74L, Eglin AFB, FL.

469166

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR ARMAMENT CENTER (AFMC)
EGLIN AIR FORCE BASE, FLORIDA

RECEIVED
15 MAY 2002

9 May 2002

MEMORANDUM FOR AFMOA/SGZR

FROM: AAC/EMR
207 N. Second Street Bldg 216
Eglin AFB, FL 32542-5133

Subject: Request for Expeditious Review of Installation Restoration Program Site RW-41, Range C-74L, Eglin AFB, FL.

The Environmental Management Restoration (EMR) Division at Eglin AFB requests that the Decommissioning plan for the subject site be reviewed as soon as practically possible. We understand every office has constraints upon their resources. We are requesting this process be expedited due to several factors. The funding for restoration projects have their two-year time limits for execution enforced at this time. Range C-74L is adjacent to other active ranges and within the safety footprint of other ranges. Range activity and use is high due to the September 11th attacks. Access to the range for restoration work is limited. Optimal windows of opportunity are November through early January when mission activity is generally lower.

Please contact Howard Mathews at (850) 882-7791, extension 212, or by email at howard.mathews@eglin.af.mil any time should you have any questions or comments.

Thomas Churan

THOMAS CHURAN
Restoration Program Manager

1st Endorsement

96 AMDS/SGPBR
W. Choctawhatchee Ave Building 37
Eglin AFB, FL 32542-5714

Joseph E. Green

JOSEPH E. GREEN, Lt, USAF, BSC
Base Radiation Safety Officer
96th Aerospace Medicine Squadron

№ 469166

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 96TH AIR BASE WING (AFMC)
EGLIN AIR FORCE BASE FLORIDA

15 Feb 02

MEMORANDUM FOR HQ AFMOA/SGZR

FROM: 96th AMDS/SGPBR

SUBJECT: Request for USAF Radioactive Material License

1. Enclosed is the license package for decommissioning of Test Area C-74L.

2. If you have any questions or need further information regarding this permit renewal package, please contact Mr. Curry or myself at DSN 875-8607 x217 or 256.

JOSEPH E. GREEN, LT, USAF, BSC
Base Radiation Safety Officer
96th Aerospace Medicine Squadron

CC: HQ AFMC/SGBR

Attachment: Application For Material License Package

RECEIVED
19 FEB 2002

469166

NRC FORM 313 (5-1997)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

U. S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 7/31/1999

Estimated burden per response to comply with this information collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Forward comments regarding burden estimate to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0120), Office of Management and Budget, Washington, DC 20503. NRC may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a curently valid OMB control number.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS F/

ALL AIR FORCE APPLICANTS
MAIL IAW AFI 40-201 TO:
AFMOA/SGOR
110 LUKE AVE ROOM 405
BOLLING AFB DC 20332-7050

IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COI MASSACHUSETTS, NEW HAMPSHIRE, NEW JF RHODE ISLAND, OR VERMONT, SEND APPLI

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

ATLANTA FEDERAL CENTER
U. S. NUCLEAR REGULATORY COMMISSION, REGION II
61 FORSYTH STREET, S.W., SUITE 23T85
ATLANTA, GEORGIA 30303-3415

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, AND APPLICATIONS TO:

REGION IV

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip code)*

Douglas Davis
46 TW/TSRSL
207 W. D Avenue, Suite 125
Eglin AFB, FL 32542-6848

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Test Area Site C-74L
Gunnery Ballistic Facility
Eglin AFB, FL

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Lt. Joseph Green

TELEPHONE NUMBER
(850) 883-8607

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL.
a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY | AMOUNT ENCLOSED $

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39 AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OFJUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE: Douglas Davis, Facility Engineer | SIGNATURE: [signature] | DATE: 2-12-02

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED $	CHECK NUMBER	COMMENTS
APPROVED BY				DATE	

PRINTED ON RECYCLED PAPER

SITE DESCRIPTION AND HISTORY – ITEM 5

SITE DESCRIPTION AND HISTORY

Test Area C-74L is located in Walton County, Florida, within the north-central part of the Eglin Reservation, approximately 14 miles northwest of the city of Niceville (Figures 1 and 2). The site occupies an area east-northeast of Eglin Auxiliary Field No. 1. The fire control building for C-74L Test Area (Building No. 9372) is on the right side of the road. Directly across from the fire control building is the well house (Building 9373).

IRP Site No. RW-41 is located within the Test Area C-74 Complex on the Eglin Reservation. The Test Area C-74L Gunnery Ballistics Facility is an active facility comprised of a fire control building containing two gun bays used to test the damage potential and terminal ballistics of various ammunitions. The test area has been in operation since at least 1963 as a gunnery ballistics facility. From late 1974 to 1978, Test Area C-74L was used for pre-production testing of the GAU-8/A gun system, which uses DU ammunition. In late 1978, all testing involving DU was transferred to Test Area C-64, and the mission at C-74L was changed to include only the firing of high incendiary explosives. An estimated 16,315 pounds (7,400 kilograms [Kg]) of DU was expended at Test Area C-74L. Approximately 9,257 pounds (4,199 Kg) was disposed of, off site, in remediation activities between March 1978 and June 1987.

Physiography

Test Area C-74L is located within the Western Highlands Physiographic District of the Gulf Coastal Plain Physiographic Province (Northwest Florida Water Management District [NWFWMD], December 1996). The area surrounding the site is characterized by flat to rolling uplands with elevations ranging from 200 to 250 feet above mean sea level (MSL). The uplands are dissected by perennial creeks within relatively steep ravines. The relief between the bottom of the ravines and the surrounding uplands is generally between 50 and 90 feet.

Rocky Creek is located about 700 feet south of the site. A tributary to Rocky Creek is located about 1800 feet west of the site. A small dammed pond is located within the western tributary.

Presently, the site has a sparse vegetative cover of brush and grasses over sandy soils. An asphalt-covered earthen berm bounds the site on the southern edge to inhibit runoff into Rocky Creek. The asphalt covering the berm is cracked in many places. A shallow drainage ditch trending northeast has been constructed to draw storm water away from the eastern part of the RCA (Figure 3).

The site itself exhibits little relief, although the terrain around the site is wooded and slopes steeply to the southeast, south, and southwest toward Rocky Creek and its tributaries. Dominant trees are slash pine and turkey oaks with isolated stands of live oak. Palmettos, beach sage, and grasses constitute the underbrush.

Hydrogeology

Specific hydrogeologic conditions were estimated from site conditions and regional hydrogeologic maps.

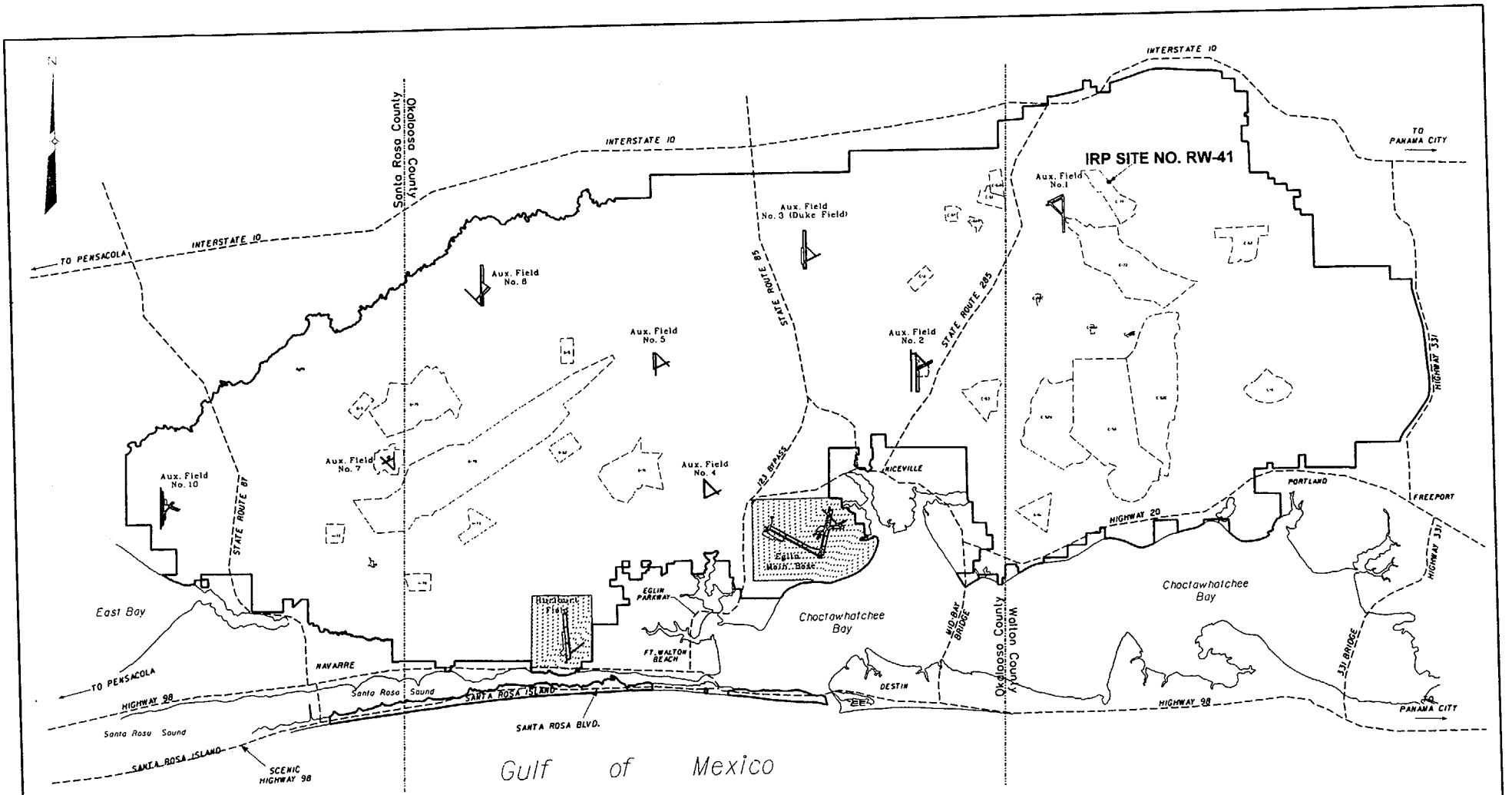
Geologic literature indicates that the surficial aquifer beneath this site extends to an approximate depth of 125 feet. The Pensacola Clay, which acts as an aquiclude and separates the surficial aquifer from the underlying Floridan aquifer system, is about 160 feet thick and extends to a depth of approximately 285 feet bls. The surficial aquifer occurs under water-table conditions. On the basis of site topography, the groundwater is approximately 50 to 60 feet bls. Groundwater flow directions within the surficial aquifer at the site are anticipated to have a southward component towards the Rocky Creek tributaries.

One supply well is located on site just across the asphalt road from the C-74L Control Building (Figure 3). The well is installed within the Sand and Gravel aquifer at a depth of 58 bls and has a capacity of 1800 gallons per minute (gpm). Results of laboratory analysis of a groundwater sample taken in May 1983 from this shallow well indicate a gross alpha concentration less than 1 picoCurie per liter (pCi/L). This is well below the Maximum Contaminant Level (MCL) for gross alpha activity in groundwater (15 pCi/L). Based on this analysis result, it appears that DU has not impacted the groundwater. Again, based on the anticipated direction of groundwater flow, this well is located hydraulically upgradient of the site. However, the well's effect on the hydraulic gradient (i.e., its zone of influence) when it's pumping is unknown. No other water supply wells are known to exist within a 1-mile radius of the site.

Surface Waters

Rocky Creek and its associated tributaries are classified as Class III bodies of water, designated for use for recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

Because of the relatively low site relief and the site's sandy soils, most storm water run-off at the site would percolate into the subsurface or be subjected to evapotranspiration. During heavy precipitation, some storm water run-off may enter nearby drainage ditches and be transported to the upper tributaries of Rocky Creek.



LEGEND

EGLIN AFB RESERVATION BOUNDARY

HIGHWAYS

EGLIN AFB TEST AREA

COUNTY LINE

0 2 4 8

1 INCH = 4 MILES

EARTH TECH

FIGURE 1
IRP SITE NO. RW-41
TEST AREA C-74L
GUNNERY BALLISTIC FACILITY
SITE LOCATION MAP
EGLIN AIR FORCE BASE, FLORIDA

DECEMBER 1999 PROJECT NO. 29234

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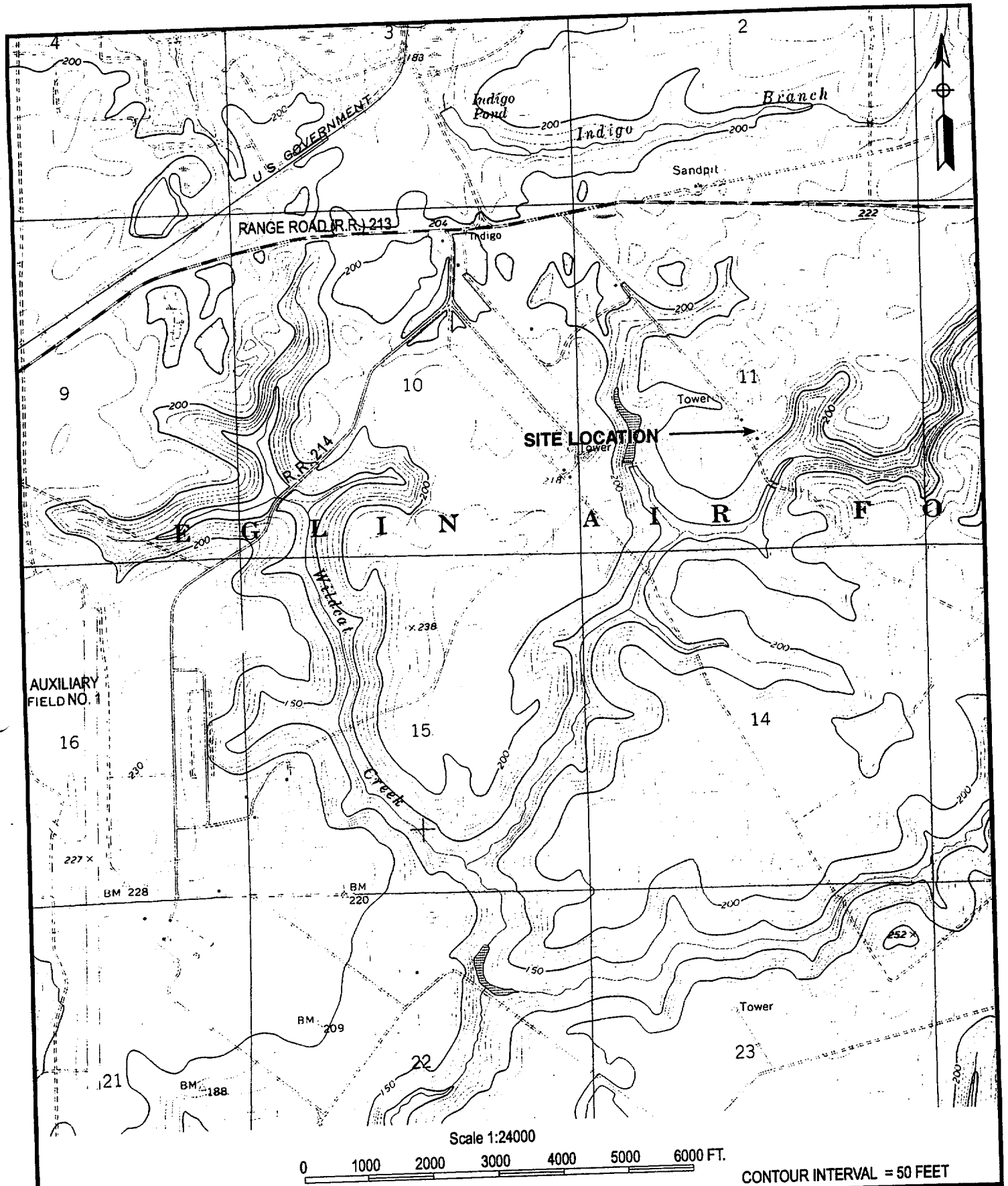


Ref.: U.S.G.S., 7.5 min Quadrangle Mossy Head, FL. 1973, PR 1987.

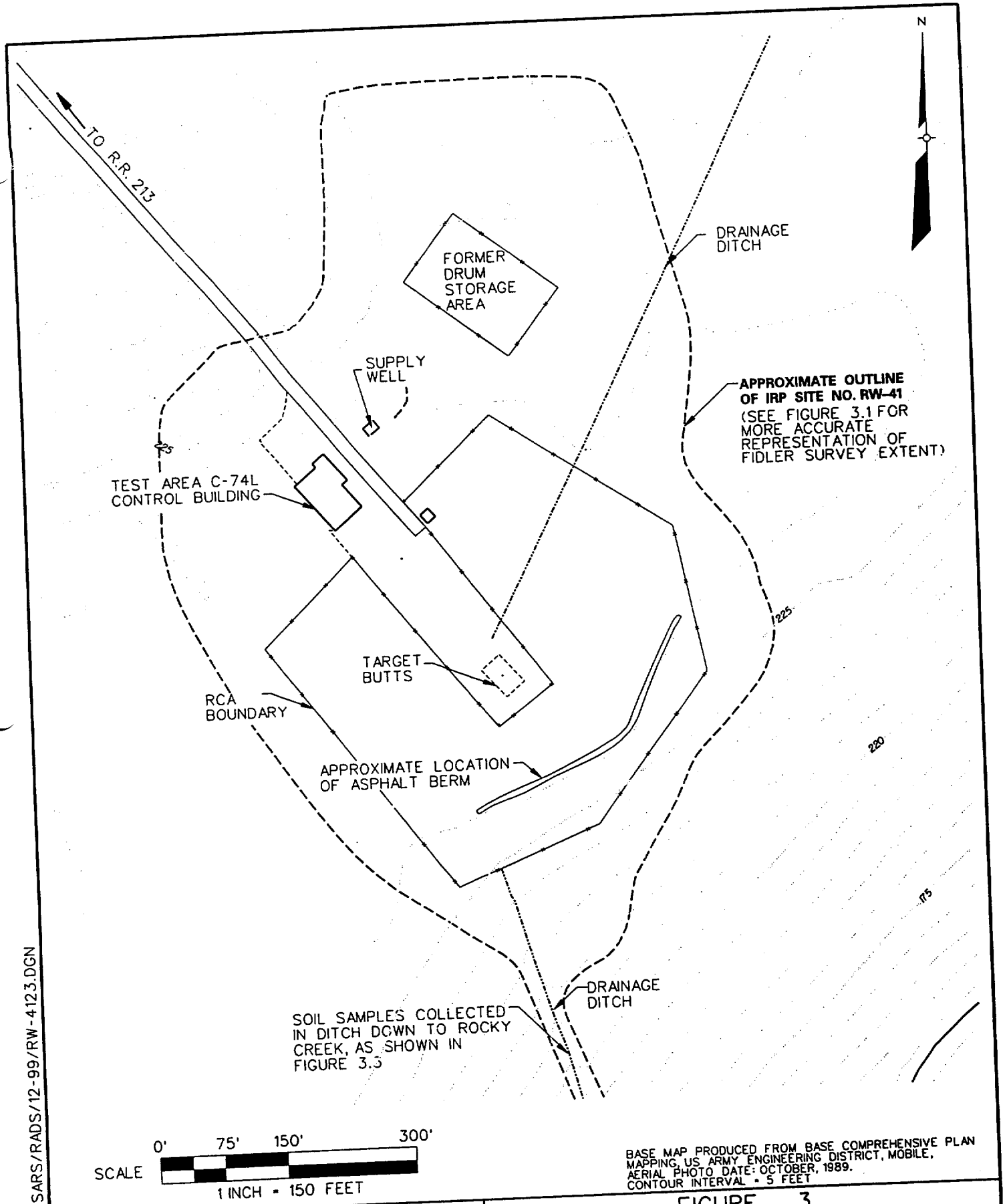
EARTH TECH

A tyco INTERNATIONAL LTD. COMPANY

FIGURE 2
IRP SITE NO. RW-41
TEST AREA C-74L GUNNERY BALLISTIC FACILITY
SITE AND VICINITY MAP

EGLIN AIR FORCE BASE, FLORIDA
PROJECT NO. 55553.000

Optical D 3/55553/F_2.2RW41.fh8



BASE MAP PRODUCED FROM BASE COMPREHENSIVE PLAN MAPPING, US ARMY ENGINEERING DISTRICT, MOBILE. AERIAL PHOTO DATE: OCTOBER, 1989. CONTOUR INTERVAL = 5 FEET

EARTH TECH

FIGURE 3
IRP SITE NO. RW-41
TEST AREA C-74L
SITE LAYOUT MAP
EGLIN AIR FORCE BASE, FLORIDA

DECEMBER 1999

PROJECT NO. 29234

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DECOMMISSIONING OBJECTIVE, ACTIVITIES, TASKS AND SCHEDULES – ITEM 6A

1. OBJECTIVE OF DECOMMISSIONING ACTION

The objective of the decommissioning of IRP Site No. RW-41 is to remediate the depleted uranium present in the soil to the extent that any residual radioactivity does not result in a total effective dose equivalent to the average member of a critical population that exceeds 15 mrem (0.15 mSv) per year from all exposure pathways. The radioactive material controlled area is the only area within IRP Site No. RW-41, which will require extensive remediation. All other areas within the site have been previously cleaned, but may require removal of DU fragments (hot spots) to achieve the total effective dose equivalent of 15 mrem per year from all exposure pathways. The 15 mrem per year dose equates to an excess cancer risk of $1x10^{-6}$ which meets or exceeds the NRC and EPA's risk based criteria.

2. ACTIVITIES, TASKS AND SCHEDULES

A. MOBILIZATION AND TRAINING (3 to 4 days)

Mobilization includes procurement and installation of necessary facilities, equipment, and materials to perform the Remedial Action. Mobilization activities also include the assignment of personnel to the job site; personnel radiation safety and site-specific construction safety training; and regulatory permitting and notifications, as required.

Earth Tech will provide site-specific radiological and general training for all employees at the commencement of the project. Training records will remain on site during site remediation. At completion of the remediation site training records will be transferred to the Earth Tech Fort Walton Beach office and placed in the site document repository.

B. SITE PREPARATION (3 days)

Site preparation will consist of a land survey of the Radioactive Material Controlled Area (RCA), resurvey of the land previously surveyed in 1999, and installation of environmental control systems, if required.

1) Land Survey of RCA

The perimeter of the excavation area and the soil sampling locations associated with IRP Site No. RW-41 remediation will be surveyed by a surveying firm licensed in the state of Florida. Both vertical and horizontal control surveying will be performed at each soil sampling location.

The surveyor will certify that the positions meet or exceed Third order, class I (1:10,000) Horizontal accuracy and Third-order Vertical accuracy.

2) Resurvey of Land Surveyed in 1999

The land area previously land surveyed in 1999 will be resurveyed to replace the stakes missing from the survey performed in 1999. A surveying firm licensed in the state of Florida will conduct the survey. Both vertical and horizontal control surveying will be performed at each soil sampling location.

The surveyor will certify that the positions meet or exceed Third order, class I (1:10,000) Horizontal accuracy and Third-order Vertical accuracy.

3) Environmental Control Systems and Monitoring Program

Prior to DU removal activities and throughout the remedial action, environmental controls will be implemented to control erosion and sedimentation, manage stormwater runoff, and minimize dust emissions, as determined by the remediation contractor.

a) Erosion and Sedimentation Controls

Prior to performing any intrusive work at the site, erosion and sedimentation controls shall be installed as required. Silt fencing will be utilized to minimize the transport of sediment in storm water runoff. The silt fence shall be installed down-slope of all areas where intrusive work is to occur, and down-slope of all soil stockpile areas. In addition, a silt fence shall be installed and maintained in active work areas and down-slope of re-vegetated areas until an adequate stand of vegetation is established.

b) Dust Suppression

Throughout remediation, all exposed areas will be watered if necessary to minimize dust emissions. Water used for dust suppression will be obtained from the on-site shallow well and stored in a mobile water tank. Dust suppression will occur, as needed, at the discretion of the RSO. Based on similar clean-up activities at other LLRM sites at Eglin, it is not anticipated that dust generation will be a problem. A temporary storage tank will be used to store dust suppression water in the EZ in case dust suppression is necessary.

c) Perimeter RAD Airborne Contaminant Monitoring

Perimeter RAD air monitoring is not necessary but may be performed at the discression of the Site Radiation Safety Officer (RSO).

If radiological airborne contaminant monitoring becomes necessary it will be conducted under the direct supervision of the Site RSO. Perimeter radiological airborne monitoring and will be performed by HPTs (HPTs will be Earth Tech or other). Air samplers will be installed at locations around the perimeter of the remediation area.

d) Environmentally Sensitive Areas

No threatened or endangered plants or animals have been observed at the remediation site.

e) Decontamination Pad

The location and construction of the vehicle/equipment decontamination pad within the EZ will be determined by the Site RSO during site preparation activities. Existing structures will be utilized whenever possible. Decontamination techniques and decontamination procedures will be approved by the Eglin Base RSO and the Earth Tech Site RSO.

f) Excavation Soil Stockpile Areas

Excavation stockpile areas will be designated for contaminated soils removed from the dirt mound located within the RCA. All excavated soils from this dirt mound will be considered contaminated with DU and will be transferred to the contaminated stockpile for removal of DU fragments and contaminated soil exhibiting readings above 50 percent of the $DCGL_{emc}$ area via a front-end loader. Soil determined to be radiologically clean will remain in the RCA and be used as back fill in the remediated areas.

g) Transportation Container Load-out Area

The container load-out area will be located at the contaminated soil stockpiles. The load-out area is where the transportation containers will be loaded with contaminated soils and debris by a front-end loader. Prior to the soil being placed characterized for placement in the disposal containers, EOD personnel will survey the soil for UXOs. Any UXO found in the soil will be removed by EOD personnel and stored in a safe location.

C. SITE REMEDIATION OPERATIONS

This section discusses the various procedures, equipment, and personnel to be used in the dismantling of any fencing, the present controlled entry shack, and excavation of the radiologically contaminated soils. The general scope of work does not include the removal and off-site disposal of radioactive contaminated soil and building debris. Segregation of the soils and building debris during excavation and dismantlement activities will be based on radiological surveys and on-site soil sampling results.

1) Radiological Surveys and Laboratory Analysis

Radiological surveys will be performed during excavation to ensure compliance with appropriate regulatory guidelines with respect to personnel and equipment release from the site, to determine excavation boundaries, and to document compliance with the cleanup goals. In addition, on-site and off-site laboratory analysis will be performed as discussed below:

The off-site laboratory used for characterization of the waste for disposal purposes will be validated by the USACE – Omaha District.

2) Personnel Surveying

Prior to leaving the EZ, all personnel will be surveyed for contamination using hand held radiological meters; this procedure is called "frisking." Frisking will be conducted within the EZ and CRZ prior to entering the SZ.

As personnel leave the EZ, PPE, such as Tyveks®, latex gloves, air-purifying respirator with HEPA filter cartridges, and other used PPE will be discarded within the EZ.

3) Decontamination

As a means of controlling radiological contamination, removable contamination will be addressed first. The waste generated by decontamination activities will be contained in bags and stored with other low level radioactive waste awaiting transportation to a LLRM waste disposal site.

4) RCA Soil Remediation

a) Soil Excavation

The scope of work for the remediation of soils includes the excavation and loading into disposal containers of approximately 500 cubic yards of soil contaminated with DU penetrators or DU fragments. These soils are located within the RCA, which surrounds three sides of the gun corridor. The excavation depth in areas where DU contamination is found is six inches. The depth to groundwater on the site is approximately 50 to 60 feet bls. Therefore, groundwater should not be encountered during excavation activities.

b) Excavation Storm Water Control

The excavated area will be covered with plastic sheeting at the end of each day to prevent precipitation from entering the excavation. The plastic (liner) will be secured with sandbags at the outer limits of the liner.

c) Material Management

The stockpile areas are dedicated to the materials they are storing. On the basis of the surveying and sampling effort, the excavated material and PPE will be segregated into four separate, dedicated stockpiles, as follows:

- Contaminated soils for off-site disposal,
- Contaminated debris for off-site disposal
- Contaminated PPE for off-site disposal
- Clean debris stockpile

All contaminated stockpiles will be staged on 10-mil plastic and will be covered with sheeting and sandbags. Sampling and surveying of the stockpiles will be conducted periodically at the discretion of the RSO. The contaminated PPE stockpile will be a suitable 55 gallon drum.

d) Quality Control and Oversight

As excavation/removal actions proceed, it will be necessary to document conditions prior to excavation, during excavation, after excavation, and after backfilling is completed. These activities will be documented by appropriate field personnel assigned to each task, and tracked by the on-site QAO.

D. FINAL STATUS SURVEY (FSS) SAMPLING AND ANALYSIS (5 days)

FSS sampling and analyses will be performed following excavation/removal activities of contaminated soils and prior to backfilling, in accordance with the guidelines specified in NUREG 1575, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM; August 2000) and approved protocol changes.

E. TRANSPORTATION AND DISPOSAL OPERATIONS (7 days)

Transportation and disposal activities are the responsibility of the Air Force Radioactive Material and Mixed Waste office located at Brooks AFB, Texas. Transportation and disposal procedures are not included as part of the remediation effort.

F. BACKFILLING AND SITE RESTORATION (2 days)

Backfilling of the excavations will commence after the FSS sampling program has confirmed that soils containing DU penetrators and DU fragments above the $DCGL_w$ have been removed from the remediated area and has been approved by Eglin, USACE, the State of Florida, and US EPA.

G. SUPPORTING OPERATIONS (Performed in Conjunction with Remediation Activities)

1. Safety and Health, and Radiation Protection

The Site SSHP and RPP will be implemented to ensure both worker and public protection throughout the remediation effort. These plans establish requirements in regard to medical surveillance, bioassays, PPE, air monitoring, stop-work authority, restricted work areas, hazardous and radiation work permits, training requirements, emergency response and notifications, and waste minimization and pollution prevention. The provisions of this plan are mandatory for all on-site personnel, including subcontractor personnel.

2. Quality Control

The site Quality Assurance Project Plan will be implemented and monitored to ensure that all sampling, surveying, and construction quality objectives are met.

Upon conclusion of work, a review will be completed to verify that all documentation is in order prior to close out and transfer of files to the Earth Tech Fort Walton Beach Office.

3. Decontamination and Release Operations

All equipment leaving a radiologically controlled area will be decontaminated and surveyed to demonstrate compliance with NRC Regulatory Guide 1.86., Surface Contamination Guidelines.

H. PERSONNEL, EQUIPMENT, AND FACILITIES DEMOBILIZATION

At the conclusion of remedial activities, the project will demobilize from the remediation site. All equipment will have been decontaminated and equipment tested and cleared through the Site RSO. Decontamination and testing details are provided in the SSHP (Appendix A) and QAPjP (Appendix E).

DECOMMISSIONING OBJECTIVE, ACTIVITIES, TASKS AND SCHEDULES – ITEM 6B (Building)

1. GENERAL

Structure History

Test Area C-74L Gunnery Ballistics Facility (Building No. 9372) is an active facility comprised of office work areas, two gun bays, and a target area used to test the damage potential and terminal ballistics of various ammunitions (Becker and others, 1994). The test area has been in operation since at least 1963 as a gunnery ballistics facility. From late 1974 to 1978, Test Area C-74L was used for pre-production testing of the GAU-8/A gun system, which uses depleted uranium (DU) in the ammunition. In late 1978, all testing involving DU was transferred to Test Area C-64, and the mission at C-74L was changed to include only the firing of high incendiary explosives.

The ballistics building was not used to store DU munitions. DU munitions were brought to the site at the start of the test and any remaining rounds were taken back to the normal storage area at the end of the test.

A well house building (Building No. 9373) is also present at C-74L. This building was constructed after DU munitions testing had ceased.

Building Areas

Given the historical use of DU munitions in the two gun bays at the ballistics building, and the design of the depleted uranium munitions, it is unlikely that contamination exists within the building at greater than background levels. The GAU-8/A 30 mm DU rounds produced by Aerojet and Honeywell all use an aluminum wind screen which, when combined with other components, effectively encapsulates the DU until the round strikes a target. Under normal handling and storage of these munitions, contamination is unlikely. Accidents or malfunctions of the munitions could be a potential source of contamination in the gun bay areas; however, this was not documented in the site history. Because firing was conducted over several years and the surface soils near the target were likely contaminated, it is possible that range workers carried DU contamination back into the gun bays and other work areas on their shoes or other clothing. If present, DU contamination inside the ballistics building would likely be found on floors, lower walls below 2 meters, and possibly air handling systems of the building. These areas of the ballistics building are considered impacted as defined in MARSSIM.

In addition to the historical information that indicates a low potential for residual radioactivity, a scoping survey, conducted during October 2001, supports the classification of the ballistics building interior as a Class 3 area. It is unlikely that remedial efforts of the building will be required. The processes described in MARSSIM chapter 2 and detailed in chapters 3 – 9 will be conducted.

The NRC screening values presented in Volume 3 of NUREG/CR-5512 will be used as DCGLs for the survey of the ballistics building interior. Since DU is comprised of U-238, U-235, and U-234, a DCGL that accounts for each isotope is developed. Given the stated 90th percentile individual DCGLs (NRC 2001) and the activity percentage of these isotopes in DU (AEPI 1995), a DCGL of 99 dpm/100 cm^2 total uranium above background is established. The Oak Ridge Institute for Science and Education (ORISE) computer code COMPASS® was utilized to develop the DCGL and was verified by hand calculations. See the calculation CE-Eglin-001 in section 10B.

The external surfaces of the ballistics building and the well house building, which is a non-occupied structure, are considered impacted due to windblown contamination and will be classified as Class 3 areas. The DCGL for target areas (discussed below) will be used to determine the radiological status of the building exteriors.

A scoping survey of a small drain and outfall area located outside of the ballistics building will be conducted. Soil/sediment samples will be obtained and gamma scanning conducted. The drain collects surface runoff from in front of the gun bays. The soil DCGL for the site (discussed in other sections) will be used for comparison.

Target Area

The concrete blocks that supported the targets used in DU munitions testing at the range were disposed of as contaminated items during site remediation efforts in the 1980s. The original catch box, a concrete and metal structure behind the targets, remains at the site. DU contamination is likely to be present and the structure is considered an impacted area. It is possible that small fragments of DU penetrators may be lodged in the concrete of the catch box or finer particles may be disbursed on the surfaces. Though measurable contamination was identified during the October 2001 scoping survey, the levels are not anticipated to exceed an appropriate DCGL. Since the target areas, just as building exteriors, are not habitable, they are considered equipment for development of the DCGL. A DCGL of 5,000 dpm/100 cm^2 (USACE EM-385-1-80, Table 6-4, the equivalent of NRC Regulatory Guide 1.86, Surface Contamination Guidelines) will be used to ensure proper instrument selection and count times. The characterization survey of the target area will be designed to meet, at a minimum, the needs of a Class 3 final status survey for the structure surfaces.

2. OBJECTIVE OF STRUCTURE SURVEY ACTION

The objective of the surveys (buildings and target area) are to:

- Augment the Historical Site Assessment
- Support area classification
- Determine the presence/absence or extent of contamination
- Provide data to demonstrate the final status of an area

3. ACTIVITIES, TASKS AND SCHEDULES

A. MOBILIZATION AND TRAINING (1 day)

Mobilization includes procurement of necessary facilities, equipment, and materials to perform the surveys. Mobilization activities also include the assignment of personnel to the job site; personnel radiation safety and site-specific construction safety training; and regulatory permitting and notifications, as required.

Site-specific radiological and general hazard training will be provided, by the USACE Site Safety and Health Officer (SSHO), for all team members prior to the commencement of the survey. This will be further described in the SSHP (Site Safety and Health Plan) a component of the work plan.

B. SITE PREPARATION (1 day)

Site preparation will consist of an initial exposure rate survey of the buildings and target area.

1) Initial Radiological Survey

Prior to any field activities within the survey area, an initial walkover radiation survey will be conducted to determine additional safety considerations, if any. Measurements of gross alpha and beta levels for non-impacted construction materials, such as high on interior walls, will be obtained to determine count times and as an indication of whether background reference areas will be required.

2) Land Surveying by a Licensed Surveyor

The survey work will not require land surveying. Survey/sample locations will be identified on a scale drawing and by room dimension coordinates to be specified in the work plan.

3) Environmental Control Systems and Monitoring Program

a) Erosion and Sedimentation Controls
The survey work will not require erosion or sedimentation controls.

b) Dust Suppression
The survey work will not generate dust.

c) Airborne Contaminant Monitoring
The survey work will not generate airborne contaminants.

d) Environmentally Sensitive Areas
No threatened or endangered plants or animals have been observed at this site.

e) Decontamination
Decontamination techniques will be determined by the SSHO, specified in the Site Safety and Health Plan (SSHP), and the Eglin RSO will approve decontamination procedures.

C. SITE REMEDIATION OPERATIONS

Remedial actions, such as decontamination, are not expected to be required in the buildings or target areas.

1) Radiological Surveys and Laboratory Analysis

Radiological surveys of building and target surfaces will be conducted using alpha, beta, and gamma scintillation detectors. Detailed procedures will be given in the work plan. Results will be presented in dpm/100 cm^2 total uranium and μR/hr. Wipe samples for removable contamination will be collected to determine whether the use of the DCGL presented in NUREG/CR-5512 is appropriate. Wipe sample results should indicate that the average removable activity is less than ten percent (10%) of the DCGL. Soil/sediment samples collected from the drain area will be sent to an off-site laboratory for analysis of total uranium. Results will be presented in pCi/g. The laboratory used for survey purposes will be validated by the USACE – Omaha District.

2) Personnel Surveying

Prior to leaving the survey area, all personnel will be surveyed for contamination using hand held radiological meters. Surveys will be conducted in areas specified in the SSHP as will detailed frisking procedures.

3) Decontamination

Any contaminated waste generated by activities will be contained in bags and stored for transportation to the LLRM waste disposal site.

D. FINAL STATUS SURVEY (FSS) SAMPLING AND ANALYSIS (2 days)

A final status survey will be conducted for the impacted ballistics building interior surfaces, exterior surfaces of the ballistics building and the well house building. The final status surveys will be conducted using the guidance presented in the Multi-Agency Radiation Survey and Site Investigation Manual, NUREG-1575, Rev. 1, *Multi-Agency Radiation Survey and Site Investigation Manual* (NRC 2000a). The final status survey plan, a component of the work plan, will be provided to the USAF once completed.

E. CHARACTERIZATION SURVEYS

A characterization survey of the target area will be conducted using alpha, beta, and gamma scintillation detectors. Results will be presented in dpm/100 cm^2 total uranium and μR/hr. The objective of the characterization survey is to determine the extent of contamination on the catch box structure and augment scoping survey results that indicate only low levels of contamination. Should higher levels of contamination be identified during the characterization survey, the data will be used to select appropriate decontamination methods and plan remedial action. If contamination is found at a small fraction of the DCGL then decontamination may not be

required and a final status survey could be performed. It is expected that the characterization survey will meet at least the needs of a Class 3 final status survey.

F. SUPPORTING OPERATIONS (Performed in Conjunction with Survey Activities)

1) Safety and Health, and Radiation Protection

The survey SSHP will be implemented to ensure both worker and public protection throughout the survey. These plans establish requirements in regard to medical surveillance, bioassays, PPE, air monitoring, stop-work authority, restricted work areas, hazardous and radiation work permits, training requirements, emergency response and notifications, and waste minimization and pollution prevention. The provisions of this plan are mandatory for all survey personnel.

2) Quality Control

The survey Quality Assurance Project Plan, a component of the work plan, will be implemented and monitored to ensure that all sampling, surveying, and construction quality objectives are met. Upon conclusion of work, a review will be completed to verify that all documentation is in order prior to close out and transfer of files to the USAF.

3) Decontamination and Release Operations

All equipment leaving a radiologically controlled area will be decontaminated and surveyed to demonstrate compliance with USACE EM-385-1-80, Table 6-4, the equivalent of NRC Regulatory Guide 1.86, Surface Contamination Guidelines. These procedures will be detailed in the work plan.

G. PERSONNEL, EQUIPMENT, AND FACILITIES DEMOBILIZATION (1 days)

At the conclusion of survey activities, the project team will demobilize from the site. All equipment will have been decontaminated and equipment tested and cleared through the Site RSO. Decontamination and testing details will be provided in the SSHP.

H. TENTATIVE SCHEDULE

The following tentative schedule is based on the expected contamination level determination but does include contingency time.

Plan review and comments: February 2002
Final Plans: March 2002
Final Status and Characterization Surveys: March-April 2002
Report Preparation: April 2002
Report review and comments: May 2002
Final Report: June 2002

DECOMMISSIONING ORGANIZATION AND RESPONSIBILITIES – ITEM 7A

PROJECT ORGANIZATION AND KEY PERSONNEL

Site Personnel (Personnel currently assigned to site. Individuals and individual duties may change. All personnel changes will be approved by the Eglin LLRM Partnering Team prior to the beginning of remediation activities).

Base Radiation Safety Officer (USAF) - Steve Curry

Project Manager (ET) – John Albright

Site Health Physicist (ET) – Ken Kreiger, CHP

Explosive Ordnance Disposal (ET) – To Be Determined – 2 individuals

Site Quality Assurance Program Officer (ET) - Jeffrey Reichert

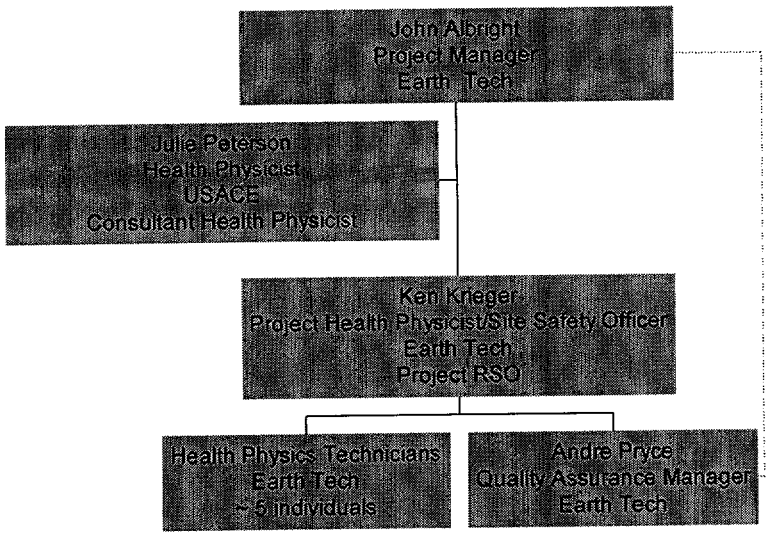
Site Health and Safety Officer (ET) – Andre Pryce

Health Physics Technicians (ET) – 3 HP Technicians plus 2 subcontractor HP Technicians

Heavy Equipment Operators (ET) – 1 Heavy Equipment Operator

Radioactive Material Broker – Determined by Air Force – Not part of remediation activities

C-74L Ground Decommissioning
Soil Remediation
Flow Diagram



Support Personnel

RW-41 Test Area C-74L Permit Certifying Official – Doug Davis (USAF Site Support)

Eglin Environmental Management - Howard Mathews (Contract Oversight Only)

Earth Tech Corporate Health and Safety Officer – Dale Prokopchak

Site Health Physics Technical Consultants – Julie Peterson (USACE), John Albright (ET), Carl Forbes (ET)

PROJECT MANAGER (EARTH TECH)

The Project Manager (PM) is responsible for the overall safety, coordination and direction of the remediation effort. He will serve as the principal point of contact with the USACE, Eglin Bioenvironmental Engineering (BE), Eglin Environmental Management Restoration (EMR) and the various project subcontractors. The PM is responsible for overall health, safety, regulatory compliance, quality, schedule and cost control, project staffing and employee relations, subcontractor approval, management and direction.

BASE RADIATION SAFETY OFFICER

The Base Radiation Safety Officer will be responsible for Air Force oversite of all remediation activities at the Site. The Base RSO is the final authority for all decisions regarding medical surveillance, personal protective equipment, and remediation operations including storage, transportation and disposal.

SITE RADIATION SAFETY OFFICER (EARTH TECH)

The Site Radiation Safety Officer (RSO) will be responsible for day-to-day compliance monitoring of the approved Site Safety and Health Plan (SSHP, Appendix A) with emphasis on the site Radiation Protection Plan (RPP, Appendix B). Specific tasks include site-specific personnel training, monitoring of the medical surveillance program, Personal Protective Equipment (PPE) decisions, respiratory protection and decontamination operations, and operations support to the on-site construction work force. The RSO is the site safety representative, who will report to the PM. The SSHP and RPP will be approved by the Eglin LLRM Partnering Team prior to the start of decontamination activities.

APPROVED RADIOACTIVE MATERIAL BROKER (SUBCONTRACTOR)

The certified radioactive material broker will be contracted for by the Air Force Radioactive and Mixed Waste office located at Brooks AFB, Texas. The broker will be responsible for the packaging, transportation, and disposal of low-level radioactive wastes. Transportation and disposal are not considered part of the remediation contractors services and are not addressed in the decommissioning permit application.

SITE QUALITY ASSURANCE OFFICER (EARTH TECH)

The site Quality Assurance Officer (QAO) will be responsible for day-to-day monitoring, surveillance and inspection to verify compliance with this Work Plan and its appendices, including records filing and archiving. The QAO will report directly to the Site RSO.

EARTH TECH SUPPORT STAFF

Earth Tech support staff will be temporarily assigned to the project on an as-needed basis and will consist of health physics technicians and other technical specialist principally from the Fort Walton Beach, Florida and San Antonio, Texas offices.

EXPLOSIVE ORDNANCE DISPOSAL CONTRACTOR (To Be Determined)

The Explosive Ordnance Disposal (EOD) contractor will be directly responsible to the PM and Site RSO. EOD personnel will be responsible for the identification and removal of unexploded ordinance (UXO) from the remediation site. EOD personnel will ensure all UXOs have been removed from the excavated soil prior to the soil being containerized. EOD personnel will be required on site while on-site personnel are within the RCA/EZ. EOD personnel will meet the minimum requirements for working on federal facilities. A minimum of two EOD personnel is required.

SUBCONTRACTORS

Subcontractor services are presently anticipated for any site surveying during the mobilization and FSS phase of the project. Subcontractors services during remedial operations can possibly include land surveying, off-site laboratory analyses, waste transportation, on-site laboratory operations, radiation control and EOD technicians.

REMEDIATION PERSONNEL QUALIFICATIONS

Stephen K. Curry (Base Radiation Safety Officer)

ASSIGNMENTS:

Alternate Radiation Safety Officer 96 AMDS/SGPB Eglin AFB, FL 32542	April 2000 - Present
Range Radiation Safety Officer BAE Systems Eglin AFB, FL 32542-1800	June 1998 – April 2000
Site Radiation Safety Officer Environmental Hazard Abatement Team Marconi Systems	June 1996 – June 1998

Eglin AFB, FL 32542-1800

Radiation Safety Officer — February 1994 – June 1996
Target Hazard Survey Group
Tracor
Eglin AFB, FL 32542-1800

Site Radiation Safety Officer — April 1990 – February 1994
Advanced Warhead Experimental Facility (AWEF)
USAF Permit FL 30031-01/00AFP
Vitro Technical Services
Eglin AFB, FL 32542-1800

Certified Radon Specialist — April 1989 – April 1990
Florida Certificate RO 960
Radiological Health Services
Niceville FL 32578

Career Noncommissioned Officer — September 1968 – June 1989
Bioenvironmental Engineering
U.S. Air Force

Formal Training:

Response to Radioactive Materials Transportation Accidents Course, Escambia County Department Of Public Safety — August 2001

Advanced Radioactive Waste Packaging, Transportation, and Disposal Workshop
Duratek Inc. Columbia, SC 29210 — June 2001

Basics of Partnering
The Management Edge Inc.
Clearwater Beach, FL 33767 — November 2000

Environmental Monitoring, ORAU
Oak Ridge, TN 37831-0117 — August 2000

MARSSIM, ORAU
Oak Ridge, TN 37831-0117 — May 2000

Radiation Safety Officer Course (5 days)
Nevada Technical Associates, Inc — June 1999

Henderson, Nevada 89009.

Radiation Safety for Depleted Uranium (5 days) Aero Jet Ordnance, TN	August 1990
In-Place HEPA Filter Testing (5 days) Harvard School of Public Health Boston MA, 02115	June 1992
Transportation of Radiological Materials (1 day) Florida HRS Office of Radiation Control Milton FL, 32570	January 1996
Radon Specialist Florida HRS, Orlando FL (2 days)	June 1998
HAZWOPER (5 days initial 1 day recertification) Eglin AFB FL, 32542	February 2000

Training at the School of Aero Space Medicine (USAFSAM)

90730 Preventive Medicine Specialists	1969
90770 Industrial Radiation Hazards	1978
90770 Industrial Hygiene Measurements	1981
90770 Nuclear, Biological, Chemical Warfare Defense	1979

Non Radiation Certifications

Lead Abatement Worker	March 2000
Lead Abatement Supervisor	March 2000
Asbestos Management Planner	April 2001
Asbestos Building Inspector	April 2001
Asbestos Project Management and Supervisor	April 2001
Defense Demilitarization Program Course	February 2001

Ken V. Krieger, CHP, NRRPT

Education

MS in Health Physics, Texas A&M, College Station, TX, December, 1999
BS in Marine Biology, Texas A&M, Galveston, TX, December 1986
BS in Marine Science, Texas A&M, Galveston, TX, December 1986

Experience

Radiation Safety Specialist, The University of Texas Medical Branch at Galveston, Texas. Main Responsibilities were to audit about 300 laboratories that use radioactive material in medical research, maintain training records for lab personnel, perform training for employees, oversee the calibration of portable survey meters that are used in the hospital, serve as emergency response to radioactive spills and accidents. Special projects are: perform updated calculations for the calibration range, setting up and calibrating detectors for thyroid bioassays, setting up LSC in counting lab, starting to set up specialty safety programs. (May 2000-Present)

Health Physicist (Consultant), The Delphi Group, Austin, Texas. Supervised the removal of an underground pipeline containing radioactive material for a radiopharmaceudical company in St. Louis, Mo. Responsible for all aspects of safety for about 8 personnel for the six week project. Prepared short class on gamma spectroscopy of Sodium lodide detectors. (April-May 2000)

Senior Health Physics Technician, TN Technologies, Austin, Texas. Extensive experience in managing and coordinating various aspects of radiological safety

- Provided instantaneous engineering and health physics consultation services to both in-house and customer problems in a variety of applications.
- Emergency response to radiation equipment failures
- Managed radioactive material packaging and transport
- Coordinated nuclear waste disposal shipments
- Surveyed and de-commissioned blast furnaces (containing nuclear materials) and a nuclear storage facility.
- Maintained sealed source disposal inventories
- Presented radiation safety training classes for customers
- Developed and instructed a half-day course in radiation safety to non-engineering personnel.
- Wrote a comprehensive industrial nuclear gauge unloading manual
- Performed installation-leak tests, inspections, surveys, and maintenance of nuclear gauges.
- Maintained working condition and calibration of radiation counting equipment

Extensive experience in profiling, segregation, processing, management, and disposal of radiological, chemical, bio-medical, and mixed waste materials. Provided environmental, industrial hygiene, and safety consultation services.

- Conducted air, water and soil monitoring to assure facility compliance with EPA regulations.
- Certified as a hazardous material incident commander
- Conducted occupational exposure monitoring for a variety of potential contaminants

- Implemented confined space , electrical safety, lock-out/tag-out fall protection, construction, biological, and process safety management plans. (Mar. 1988-Feb 2000)

Teaching Assistant, Texas A&M, College Station. Instructed students in a Radiation Instrumentation lab course. Guest lectured for professor in the Radiation Instrumentation, Radiological Health Engineering, Radiological Safety (1997-1999)

Special Training

Risk Assessment and Management - 32 hr (Harvard School of Public Health)
Waste Management – 32 hr (Harvard School of Public Health)
40 hour HAZWOPER training (re-certification current)
Effective Training seminar
Gamma Spectrum Analysis (2 courses)
Radiation Safety (RSO course)
Industrial Hygiene and Safety courses
Incident Commander Certification training
Over 75 site specific occupational safety classes

Professional Memberships

Health Physics Society (national)

- President, Texas A&M Student Chapter(98-99)
- Member of the South Texas Chapter
- Public Education Committee Member

American Nuclear Society (national)

- Texas A&M chapter member (97-99)

American Association for the Advancement of Science
Gulf Coast Chapter of American Industrial Hygiene Association
Alpha Nu Sigma, nuclear engineering honor society

Presentations

- Radioactive Waste reduction at a Large Academic Research Facility", Waste Management Conference, Tucson AZ., February 2001.
- "Analysis of a Small Sample Geometry", Midyear HPS Meeting, Virginia Beach, VA, January 2000.
- "Review of Emergency Dose Limits"; South Texas Chapter meeting of HPS, Austin, TX, May 1999.
- "Feasibility Study for the Production Tc-99 at the TAMU Nuclear Science Center"; Winter Meeting of HPS, Albuquerque, NM, November 1998.
- "Agricultural Impacts of Accidents Postulated for Missions Proposed for the U.S.D.O.E. Pantex Plant"; EPA Post Emergency Response Issues Conference, Washington, D.C., September 1998.
- "Comparative Risk Assessment"; Annual meeting of HPS, Minn. MN, June 1998.

- "Agricultural Impacts for Postulated Accidents for Proposed Missions at Pantex"; South Texas Chapter meeting of HPS, College Station, TX, May 1998.

John P. Albright – Site Project Manager
Health Physicist

Education

ME, Environmental Engineering (Health Physics), University of Florida, 1987
BS, Nuclear Engineering, Mississippi State University, 1977

Experience Summary

Mr. **Albright** has more than 24 years of experience with OSH, NRC, and DOD environmental programs including radiological decommissioning and decontamination projects. Extensive management and hands on experience in health physics, industrial hygiene, environmental engineering and readiness programs. 22 years experience in Air Force Bioenvironmental Engineering programs. This includes experience with accident response, interaction with state and federal officials, hazardous and radioactive material disposal, development of procedures for health and safety programs, environmental monitoring and chemical, biological and nuclear warfare agent detection and decontamination.

Project Experience

Army Corps of Engineers, Low Level Radioactive Material Project, Eglin Air Force Base, Florida. Senior Health Physics consultant for depleted uranium Superfound cleanup sites on Eglin AFB land ranges. Provides health physic support for DU remediation project at Site RW-41, Test Area C-74L. Includes development of detailed remediation work plan. Cost savings of over $300,000 in remediation and disposal cost realized using modified remediation techniques and procedures. Managed site characterization surveys of Test Areas A-15, B-5, SAC Munitions Area, and Site 74E Disposal Area. [6/2001 – Present]

Army Corps of Engineers, PM-1 Reactor Site, Sundance, Wyoming. Provided health physics consulting services to Ellsworth AFB regarding the characterization survey of the closed PM-1 Reactor Site located in Sundance, Wyoming. Performed the initial risk assessment using RESRAD and Micro-Shield Risk Based modeling programs. Developed detailed site specific reactor health physics information package for distribution to the local community and the State of Wyoming. Interperted analytical results from characterization survey and developed draft follow-up radiological sampling program. [2/2001 – 4/2001]

Environmental Protection Agency, Li Tungsten Site, Glen Cove, New York. Provided Site Radiation Protection Audit support of an EPA Superfund Site located at Glen Cove, New York. Audited Earth Tech's radiation support sub-contractor for overall

radiation protection program including sample collection and analysis, employee radiological training, site radiological monitoring, and site operating procedures for compliance with State and Federal regulations. [5/2001]

Army Corps of Engineers, Low Level Radioactive Material Project, Eglin Air Force Base, Florida. Project manager for depleted uranium Superfund cleanup sites on Eglin AFB land ranges. Managed all on-site radiological activites, interfaced with base, USACE, State of Florida and EPA personnel. Provides management and technical assistance during preliminary site assessments, site investigations, interim corrective actions, remediation and disposal of radioactive materials. [2000 – 6/2001]

HQ Reserve Command, Office of the Surgeon General, Robins AFB, Georgia. Consults and inspects environmental, industrial hygiene, and health physics programs. Performs Occupational Health Comprehensive Assessment Management Program (OHCAMP) at full-time Bioenvironmental Engineering Offices on 16 Reserve Bases.
[4/1997 – Present]

USAF Reserve, 919th Medical Squadron, Ecuador and Honduras. Participated in Humanitarian Civic Action deployments. Provided specialized training to decontamination and chemical, biological, and nuclear detection teams for eight years as the squadron Disaster Preparedness Officer. Participated in base chemical and broken arrow exercises as bioenvironmental engineering representative to the on-scene command post. [10/1989 - 04/1997]

USAF, Hurlburt Field Bioenvironmental Engineering. Provided health physics and environmental engineering support to the base radiation safety officer. Performed radiofrequency and laser radiation surveys, environmental compliance assessment audits, radiation protection surveys of nondestructive inspection shops and annual radiation protection surveys of five USAF Radioactive Material Permits. [06/1996 - 05/1997]

Tyndal Air Force Base, Laboratory Operations Support Contract, Applied Research Associates, Inc. Served as safety, occupational health, and radiation protection manager. Managed health and safety program and maintained OSHA and NRC compliance documentation. Coordinated and implemented the health and safety program for personnel working in Air Force Research Laboratory, Environmental Technology Laboratory. [1997–2000]

Air Force Material Command, Industrial Hygiene Support, Eglin AFB, FL. Served as senior health physicist and on-site program coordinator for a $1.4 million, 14-month, contract to provide a comprehensive OSH evaluation that included collection, testing analysis of ambient and source air and other environmental pollutants to ensure compliance with industrial hygiene, radiation, and environmental regulations. [1994 - 1995]

Analysis Corporation. Served as a health physics and industrial hygiene consultant responsible for document compliance with EPA, OSHA, NRC regulations, and applicable Department of Energy orders. Performed audits of Department of Energy Gaseous

Diffusion facilities located in Paducka, Kentucky and operated by Martin Marietta Energy Systems. Reviewed CERCLA documentation for health physics regulatory compliance. [1993 - 1994]

RHS Environmental Services. Senior health physicist responsible for directing, scheduling, and implementing all radiation programs. Managed the EPA Proficient Radon Measurement laboratory. Developed radon sampling protocols, laboratory quality assurance program, radon analysis protocols, and radon in water program using EPA's liquid scintillation method. Certified by the State of Florida as a Radon Measurement Specialist. Provided support to 22 radon measurement businesses throughout Florida. Provided technical support for radioactive waste disposal including procedure development, identification of hazardous and radioactive waste, labeling and marking of containers, and disposal of low level waste. Served as member of the Radon Measurement Certification Program Course/Test Validation Committee. [1989 - 1993]

Oak Ridge Gaseous Diffusion Plant (K-25), Industrial Hygiene Support, Delphi Group. Developed industrial hygiene standard practice procedures and training programs consistent with Department of Energy standards and guidelines, federal (OSHA and EPA), and Tennessee health and safety regulations.

USAF Regional Hospital, Eglin AFB. Base bioenvironmental engineer and base radiation safety officer. Provided industrial hygiene and environmental program support for over 300 industrial hygiene shops on Eglin AFB and Hurlburt Field. Support included personnel air sampling, air monitoring, review of shop procedures for proper safety and health considerations, identification of hazardous materials for proper use and disposal. Evaluated industrial processes for proper personnel training, use and disposal of hazardous and radioactive waste. Managed the installation Restoration Program (IRP) on Eglin AFB. Reviewed NPDES Permit applications for Hurlburt Field, Florida and gathered air emission data and developed the air emission inventory for Eglin AFB. Provided on scene guidance for a 10,000 gallon JP-4 spill at the base tank storage area. Set up initial sampling protocol to determine extent of contamination, determined safety and health guidelines for site use, and made appropriate notifications to state and federal environmental agencies. Performed air sampling for hydrazine and monitored accident site for radioactive contamination after destruction of a Bomarc missile in a missile silo. Supervised cleanup activities of the area and storage of debris. Evaluated contractor operated health and safety programs at Arnold Air Force Station, Tennessee. Ensured that contract health and safety personnel were in compliance with Air Force AFOSH Standards and other federal regulations. [1983 - 1989]

USAF Regional Medical Center Wiesbaden. Served as OIC Environmental Quality and Base Bioenvironmental Engineer. Performed detailed sewage treatment plant surveys of Air Force Bases in England and Germany. Surveys included deployment of an on site laboratory for 3 weeks. Results of surveys were utilized to evaluate the overall operation of the sewage plant and its individual processes. Provided environmental consulting services to USAF bases in Europe regarding environmental quality of drinking water. Provided industrial hygiene and environmental protection surveillance of Air Force activities at the

USAF Regional Medical Center, Wiesbaden Air Base, and Lindsey Air Station. Performed radiation protection surveys of nondestructive inspection facilities, communications facilities and radar sites. Provided surveillance of the Nuclear Medicine Section. Provided chemical, biological and nuclear detection and decontamination training to Medical Center Personnel. Participated in chemical and Broken Arrow training exercises. [1980 - 1983]

USAF Hospital, Tyndall AFB, Florida. Served as Base Bioenvironmental Engineer. Provided industrial hygiene, radiation protection, and environmental protection surveys for all industrial shops located on Tyndall AFB, Florida. Provided surveillance for a NRC By-Product Materials License and a USAF Radioactive Material License as acting Base Radiation Protection Officer. [1979 - 1980]

Ingalls Shipbuilding. Submarine refueling engineer responsible for the installation and removal of temporary fluid systems installed onboard nuclear submarines during refueling operations. Developed technical instructions for installation, removal, modifying, repairing, and decontamination of components and equipment used during refueling operations in accordance with health and safety regulations. [1977 - 1978]

Special Training

OSHA 8-hour HAZWOPER Annual Refresher Course, 2001
OSHA 8-hour HAZWOPER Annual Refresher Course, 2000
OSHA 40 Hazardous Waste Technician Course, 1998
HEPA In-House Filter Training Course, 1992
Radon Measurement Certification Course, 1989
Certified Trainer Course, Martin Marietta Energy Systems (K-25), 1989
Department of Defense Radioactive Waste guidance Course, 1987
USAF Hazardous Waste Remediation Course, 1987
Industrial Hygiene Review Course, 1986
Troxler Nuclear Density Gauge Radiation Safety Course, 1985
Advanced Bioenvironmental Engineering Course, 1984
Occupational and Environmental Radiation Course, 1984
Health Aspects of Depleted Uranium Course, Fort Belvoir, 1984
USAF Laser Hazard Course, 1984
Environmental/Sanitary Engineering Course, 1982
USAF Bioenvironmental Engineering Course, Brooks AFB, 1979

Presentations

Instructor for Health Aspects of Depleted Uranium Course, Fort Belvoir, Virginia and Eglin AFB, Florida, 1990.

Publications

"Radiation Protection Procedures for the Advanced Warhead Experimentation Facility," AWEF, 1992.

Andre C. Pryce, REM – Site Quality Assurrance Officer

Education

BS, Industrial Engineering Technology, Southern Illinois University, 1996
AAS., Bioenvironmental Engineering, Community College of the Air Force, 1990

Experience

Eglin AFB Florida, IRP Site no A-15 and POI 405, Characterization Survey/Site Investigation. Radiological control manager and Project radiation safety officer for a 300k dollar Magnesium-Thorium Super Fund cleanup site on U.S. Air Force Range A-15. Responsible for all onsite radiological activities including use of a 100K Pentex scabbler, supervision of 2 health physics technicians and interface with military personnel. (Dec 01)

Eglin AFB Florida IRP Site no 74E and POI 404, Characterization Survey/Site Investigation and Interim Corrective Measures. Radiological control manager and Project radiation safety officer for a 250k dollar Depleted Uranium Super Fund cleanup site on U.S. Air Force Range C-74E. Responsible for all onsite radiological activities, supervision of the 2 health physics technicians and interface with military personnel. Other responsibilities included producing the MARSSIM based Final status survey report, and data interpretation. This test area was released as requiring no further actions by the regulators (Nov 01)

Eglin AFB Florida IRP Site no B-5, Characterization Survey/Site Investigation and Interim Corrective Measures
Radiological control manager and Project radiation safety officer for a 150K depleted uranium Super Fund cleanup site on U.S Air
Force Range B-5. Responsible for all site activities as well as supervision of 2 health physics technicians and interface with EPA and
military personnel. Supervised the characterization, remediation and final status survey resulting in site being released for no further
action by the regulators. (Nov 01)

Earth Tech Inc., San Antonio, Texas. Project Scientist.
Developed training plan and provided Low Level Radiation Safety Training to Earth Tech Radiation workers. Created radiation
training folders and established radiation Dosimetry program for radiation workers.

US Air Force, Facility Scoping and Characterization, Kelly AFB, Texas.
Assistant Site manager for the scoping and characterization of a 20K square foot paint facility contaminated with radium. Also

performed scooping and characterization of the outside area and other areas of interest dealing with source and pathway of the
contaminant to receptors.

Earth Tech Inc., San Antonio, Texas. Project Scientist. Performed detailed engineering noise assessment of Tyco Plastic plant, recommended personal protective equipment, engineering and administrative controls for compliance with hearing conservation Program.

USAF School of Aerospace Medicine, San Antonio, Texas. Manager. Managed 150k annual budget, equipment valued at over 1 million dollars as well as a dedicated, highly motivated staff of eight. Successfully planned and directed four 40-hour Ionizing Radiation Measurement courses. Taught radiation safety and survey procedures for Industrial and Medical X-ray facilities. Managed benchmark design workshop for advanced radiation courses. Taught over 1000 hours as senior instructor in industrial hygiene topics such as noise, radiation, chemical evaluation, hazard communication, air sampling, ventilation and ergonomics. Developed and implemented course curriculum through time saving data analysis techniques. Managed and maintained several Access and Excel databases for budget and resources cogent, highly readable documents. Managed and developed over 20 ionizing radiation lesson plans, PowerPoint presentations and test questions flawlessly.

Special Training

Occupational and Environmental Radiation Protection (Harvard School of Public Health)
Comprehensive Industrial Hygiene Review (Harvard School of Public Health)
40 hour HAZWOPER training (re-certification current)
Teaching Practicum
Ionizing Radiation Measurements (Course Supervisor)
Hazmat employee training (Radioactive Waste Packaging Transportation and Disposal)
Industrial Hygiene and Measurements course
Lead Inspector and Risk Assessor
MARSSIM Approach for Design and Conduct of Radiological Surveys
Trainer course in Occupational Safety and Health for the General Industry
USAF Air University Academic Instructor School course
Ventilation troubleshooting/Indoor Air Quality course
Medical Effects of Ionizing Radiation course

Professional Memberships

National Registry of Environmental Professionals

American Industrial Hygiene Association

EARTH TECH REMEDIATION QUALIFICATIONS

Earth Tech Current Radiation Projects

TERC III
Eglin AFB DU Range Clean-Up 22 Radiological sites
Characterization/Remediation/Final Status Surveys

TERC I
Sundance WY, PA/SI Buried Nuclear Reactor Site
Providing Support and oversight of the subcontractor

NAVSEA
Kelly Air Force, Characterize/Remediation/Decommissioning 80,000 sq/ft Radium Dial Facility

NAVSEA
Kelly Air Force, Characterize 10,500 ft of potentially contaminated Storm/Sewer Drains for Radium Contamination

NAVSEA
Kelly Air Force, Bldg 375,Remediation/Decommissioning of 300,000 sq/ft Aircraft hanger of DU Contamination

EPA
Long Island, NY
Provide oversight at Long Island, NY- (DO#037) for Region 2 (Contract #68-S2-99-08). The site's name is Li-Tungsten (Operable Unit 2, this site will be called Garvey's Point. It is located in Glen Cove, NJ as is the other Li Tungsten site.

IERA DO 55 and DO 1
Lackland Air Force Base- Medina Training Annex,
Investigate/Characterize 7 former Atomic Energy Commission Burial Sites

Additional Information

Representative Project Experience

Earth Tech is experienced with planning, managing, and executing large D&D projects associated with facilities at hazardous and radioactive waste sites. We have selected typical projects that show our direct experience in D&D activities. These projects have provided our qualified and experienced staff with the technical (D&D, liquidation, asbestos, lead, radium, depleted uranium, and explosive hazards management) and project management skills necessary for us to successfully complete all types of D&D projects. The project descriptions provide a cross section of our experience with decontamination/demolition/disposal and remediation services.

We utilize our staff of trained and experienced health physics professionals, as well as those of specialized health physics services firms to accomplish tasks for our federal and private-sector clients. While our experience as a DOE environmental contractor is limited, we assert that our professional capabilities in the environmental and radiological areas, along with our established management systems and experience with large environmental remediation and D&D services, make us a capable and low-risk provider of remediation services for the Hanford site. Highlights of our representative remediation experience include:

- Managed the USACE Omaha TERC 1 and TERC 3 contracts, two of the largest and most diverse ID/IQ environmental remediation contracts in the nation
- Performed environmental remediation projects in every USEPA Region concurrently under numerous ID/IQ contracts
- Managed the Boston Harbor Cleanup, one of the largest ($4.1 billion) active environmental programs in the nation
- Managed 12 ID/IQ AFCEE contracts with 398 delivery orders valued at $332 million

Austin Avenue Low-Level Radiation Site, USEPA, Region III, Lansdowne, PA

This project involved the demolition, remediation, and disposal of structures including a warehouse, a 4-acre park and 18 private residences contaminated by LLRW. The LLRW had been generated from a manufacturing plant that operated in the early 1900s, and tailings from the processing of uranium ore had been used throughout the community for general fill and aggregate in construction materials.

Earth Tech mobilized within 72 hours of receiving this task order to perform site remediation tasks, including removing the warehouse building and associated private residences that had been identified as contaminated. Demolition of the warehouse involved identification and removal of 3,000 square feet of ACM, systematic dismantling of the structure to reduce the risk of collapse, and extensive monitoring of the potential radiation exposure of the workers and off-site dispersion of radioactivity. Earth Tech also characterized, remediated, and/or removed contaminated residences. Earth Tech identified contaminated soils in the areas surrounding the facility, which were then removed and disposed of properly. Earth Tech temporarily relocated families from affected homes and maintained site security, including a guard patrol to ensure the safety of private home owners' possessions during the removal action. Earth Tech maintained round-the-clock air monitoring at the USEPA Command Post Area and the Lansdowne Municipal building, and at each property during remediation.

A total of 10,474 waste packages weighing over 10,000 tons were shipped. Earth Tech provided a shredder on site for wooden debris to reduce volume. The waste, including building materials, rubble, concrete, and debris, was shredded and packaged in 55-gallon drums, 1-cubic-yard boxes, 1-cubic-yard "Super Sacks," and 30-cubic-yard intermodal (SeaLand) containers, which were shipped from Lansdowne, Pennsylvania, to Envirocare in Utah via truck. The waste products from the radium processing (uranium-238, thorium-230, and radium-226) presented unique health and safety issues. Key points of the radiation protection program included a comprehensive air monitoring program, dosimetry, medical monitoring, and health physics technicians at the job locations to ensure radiation exposure was kept as low as reasonably achievable.

Earth Tech's flexibility and close partnering with USEPA expedited the daily changes needed to keep productivity up while protecting the community and satisfying intense public

scrutiny. Earth Tech worked closely with USEPA to help implement an improved process to pay for waste disposal. The USACE negotiated a nationwide agreement for naturally occurring radioactive material (NORM) waste disposal at a reduced cost. Earth Tech's disposal coordination with USEPA and the Corps resulted in an estimated project savings of $5 million.

Radium Facility D&D, Kelly Air Force Base, Texas. Earth Tech is performing characterization, decontamination, and decommissioning services for a 80,000 square foot former radium painting facility. Tasks include planning and management, removal of raised flooring, piping, and conduit, characterization of radium contamination in the concrete flooring, walls, drains, roof, and adjacent site soils, removal of radium-contaminated media, recycling of usable materials, identification and removal of lead based paint and asbestos, waste packaging and disposal, and a final (MARSSIM) status survey. The building will be turned over to the Greater Kelly Development Authority for reuse pending acceptance of the final status survey.

Depleted Uranium Characterization and Removal, Eglin Air Force Base Ranges, Florida. Earth Tech has supported the Air Force in characterizing contamination on aircraft target ranges where depleted uranium (DU) ammunition was fired. Earth Tech has performed historical site assessments and characterization surveys for 22 sites, performed removal of DU, thorium, radium, and mag-thor, and has had 8 sites (75 acres total) approved for no further action.

BOMARC Missile Accident RI/FS and Environmental Impact Assessment, McGuire Air Force Base, New Jersey. Earth Tech performed the first concurrent Remedial Investigation/ Feasibility Study and Environmental Impact Statement at an Air Force facility to address plutonium contamination following a fire at the BOMARC Missile Site. Health and safety controls were instituted during the Remedial Investigation including air monitoring, dust suppression and air filtering processes as well as supervision of sampling activities by certified health physicists. A baseline risk assessment was prepared to evaluate risks posed by the various contaminated media on site. The Feasibility Study addressed appropriate remedial alternatives for each contaminated media identified at the site. Many of the technologies reviewed in the Feasibility Study were considered innovative. We developed an Air Force approved Record of Decision prescribing offsite disposal as the most viable remedial option.

TRC Form 12-1
7/90

Texas Department of Health
BUREAU OF RADIATION CONTROL

RADIOACTIVE MATERIAL LICENSE

Pursuant to the Texas Radiation Control Act and Texas Health Department regulations on radiation, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Texas Department of Health (Agency) now or hereafter in effect and to any conditions specified below.

LICENSEE		This license is issued in response to a fax
1. Name	EARTH TECH ATTN KENNETH KRIEGER CHP	Dated: September 11, 2001
2. Address	110 BROADWAY STE 320 SAN ANTONIO TX 78205	Signed by: Kenneth Krieger, C.H.P.

3. License Number	Amendment Number
L05449	01

PREVIOUS AMENDMENTS ARE VOID

4. Expiration Date: July 31, 2008

RADIOACTIVE MATERIAL AUTHORIZED

5. Radioisotope	6. Form of Material	7. Maximum Activity*	8. Authorized Use
A. Any radioactive material with atomic numbers 1 to 92	A. Solid, sludge, liquid or sealed source	A. As needed for each job. No individual sealed source to exceed 2 Ci except for H-3 sealed sources which shall not exceed 20 Ci	A. Decontamination of pipe, land, equipment and materials contaminated with radioactive materials. Recovery of sealed sources from landfills and scrap metal and salvage facilities.
B. Naturally occurring radioactive material (NORM) as defined in **TAC 289.259	B. Solid, sludge or liquid	B. As needed for each job not to exceed 15,000 kgs.	B. Decontamination of NORM contaminated pipe, land, equipment and materials.
C. Special Nuclear Material	C. Solid, sludge or liquid	C. 200 gms U-233 200 gms U-235 200 gms Pu (sum of ratios < 1)	C. Decontamination of pipe, land, equipment and materials contaminated with special nuclear materials.

* Ci-Curies mCi-Millicuries µCi-Microcuries **Title 25 Texas Administrative Code

9. The authorized place of use is at temporary job sites located at a customers facility, in areas not under exclusive Federal jurisdiction, throughout Texas.

10. Each site shall maintain documents and records pertinent to the operations at that site. Copies of all documents and records required by this license shall be maintained for Agency review at 110 Broadway, Suite 320, San Antonio, Tx, 78205.

11. The individual designated to perform the functions of Radiation Safety Officer (RSO) for activities covered by this license is Kenneth Krieger, CHP, NRRPT.

12. The licensee shall comply with the provisions of (as amended) 25 TAC '289.201, '289.202, '289.203, '289.204, '289.205, '289.251, 289.252, '289.257, and '289.259.

RADIOACTIVE MATERIAL LICENSE

LICENSE NUMBER	AMENDMENT NUMBER
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13. Radioactive material shall be used by, or under the direct supervision of, individuals designated by the RSO only after each worker has successfully completed an Agency accepted training course. Documentation verifying the successful completion of the training for each worker shall be maintained by the licensee for inspection by the Agency.

14. Possession of material listed in conditions 5, 6, 7 and 8 sections A, B and C shall be incidental to decontamination of pipe, equipment and materials contaminated with radioactive materials at the customers job site. At the conclusion of decontamination activities radioactive material shall be: returned to the original generator; transferred to authorized recipients and/or transferred to authorized radioactive materials disposal facilities.

15. The licensee shall provide written notification to the Agency:

    A. At least five (5) days prior to commencing decontamination or remediation activities. The notification shall specify the following:
       (1) type of operation;
       (2) the mode of decontamination (if more than one mode is authorized on the license);
       (3) address and physical location of the decontamination or remediation activity;
       (4) dates when the activity will be conducted; and
       (5) the name of the person in charge of the operation at the site.

    B. within 7 days of completion of decontamination work for a customer at the customer's site. The notification shall specify the following:
       (1) customer name,
       (2) customer mailing address,
       (3) customer telephone number,
       (4) quantity of contaminated material generated as a result of the decontamination process, and
       (5) disposition of contaminated material.
          (a) If contaminated material is left in the possession of the customer, the licensee shall also submit the following information:
             (i) method (e.g., drums) of storage of contaminated material,
             (ii) site where material is stored (provide map if street address is not available)
             (iii) location at site where material is stored, and
             (iv) storage conditions (e.g., metal shed, pallets on open ground, etc.).

    C. This information shall be addressed to the following:

       Decontamination Notification
       ATTN: Division of Compliance and Inspection
       Bureau of Radiation Control
       Texas Department of Health
       1100 W. 49th Street
       Austin, Texas 78756-3189 or
       by facsimile to: (512) 834-6654.

RADIOACTIVE MATERIAL LICENSE

LICENSE NUMBER	AMENDMENT NUMBER
L05449	01

16. The RSO shall conduct unannounced audits each month to ensure that procedures are being conducted at the appropriate frequency and in the appropriate manner.

    A. These audits shall as a minimum consist of the following:

    (1) survey location for personnel,
    (2) material receipt procedures,
    (3) processing procedures,
    (4) personnel survey procedures,
    (5) personnel monitoring procedures,
    (6) equipment and material release surveys,
    (7) material balance records and calculations,
    (8) transfer and disposition records,
    (9) occupational and environmental air monitoring procedures,
    (10) facility survey procedures, and
    (11) posting and noticing requirements

    B. The RSO shall document these audits by recording the date of the audit, the findings of the audit, and any corrective action taken. These records shall be retained for inspection by the Agency.

17. Except as specifically provided otherwise by this license, the licensee shall possess and use the radioactive material authorized by this license in accordance with statements, representations, and procedures contained in the following:

    applications dated: May 24, 2001; and

    letter dated: June 26, 2001

    Title 25 TAC Chapter 289 shall prevail over statements contained in the above documents unless such statements are more restrictive than the regulations.

EFF:ef

FOR THE TEXAS DEPARTMENT OF HEALTH

Date September 12, 2001

Eugene F. Forrer II, Chief
Uranium/Norm Licensing Program

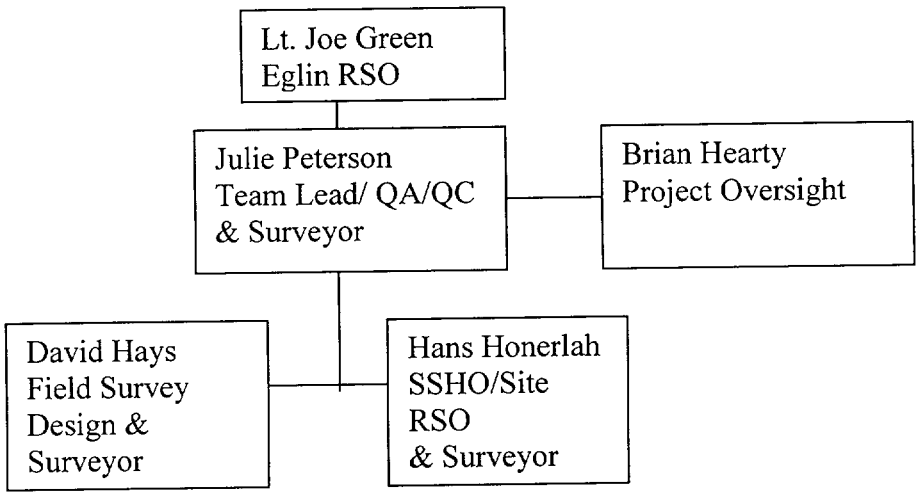
DECOMMISSIONING ORGANIZATION AND RESPONSIBILITIES – ITEM 7B

STRUCTURE SURVEY ORGANIZATION AND KEY PERSONNEL

Key personnel for the characterization and final status surveys are the following:

- Project Radiation Safety Officer (USAF) - Lt. Joe Green (Base RSO)/Steve Curry
- Overall Team Lead – Julie Peterson – Health Physicist, USACE
- Field Survey Design Team Lead – David Hays – Health Physicist, USACE
  SSHO/RSO/surveyor – Hans Honerlah – Health Physicist, USACE
- QA/QC/surveyor – Julie Peterson
- Project QA oversight – Brian Hearty – Certified Health Physicist, USACE

Org. Chart for Field Effort



The above personnel have varied experience in decommissioning and survey efforts. All have at least 5 years experience planning, conducting, and overseeing decommissioning and radiological survey efforts.

The building/target area survey team is comprised of USACE health physicists. The team is involved in many radiological decommissioning, remediation, and survey efforts. Project related duties include the following:

- Application of federal, state, and other regulations or guidance to projects.
- Review and development of DCGL's using computer codes such as D&D, RESRAD, RESRAD-Build, and COMPASS.
- Oversight, management, or performance of characterization surveys.
- Oversight, management, or performance of site remediation.
- Oversight, management, or performance of remedial action control and final status surveys (in accordance with MARSSIM)

- Development or review of the Site Safety and Health Plans and Quality Assurance Project Plan.
- Development or review of work, field sampling, and quality assurance plans.
- Coordination and teaming with Federal, state, and local regulators, and the public.

Decommissioning or survey projects involving uranium or DU that members of this team have supported, or are actively supporting, are listed in the table below.

Team Member	**Site or Project**
Julie Peterson	Eglin, AFB
	USACE FUSRAP (21 + sites)
	Shattuck Chemical Company, CO SUPERFUND
	Palos Forrest Preserve, IL DOE
Hans Honerlah	Watertown Arsenal, MA FUDS
	Colonie, NY FUSRAP
	Deepwater, NJ FUSRAP
	McAlester Army Ammunition Plant, OK
	Frankfort Arsenal, PA FUDS
	Shpack, MA FUSRAP
	Combustion Engineering, CT FUSRAP
David Hays	Middlesex, Maywood, and Wayne, NJ FUSRAP Sites
	Sierra Army Depot, CA
	Ravenna Army Ammunition Plant, OH
	McAlester Army Ammunition Plant, OK
	Watertown Reactor Decommissioning, MA
Brian Hearty	USACE FUSRAP (21 + sites)
	Sierra Army Depot, CA
All	Many others sites with differing radionuclides of concern.

BRIEF RESUME

1. NAME & TITLE — Hans B. Honerlah
Health Physicist, Baltimore District

2. EXPERIENCE

USACE, Baltimore District – Feb 1997 to present

Serves as health physicist for the North Atlantic Division (NAD) HTRW Design Districts. Plans, organizes, conducts, directs, or reviews surveys of radiation areas within the NAD. Assesses the level of risk associated with the radiation hazards of operations performed within NAD. Interprets and applies Federal and State Regulations, Army Regulations, and USACE Regulations for radiation safety and remediation activities. Serves as an active member of the USACE Radiation Safety Support Team, assisting any USACE District by addressing any radiological questions and concerns. Site Specific details available upon request.

USACE, Sacramento District – Oct 1995 to Feb 1997

Serves as health physicist for the Sacramento District HTRW Design District. Plans, organizes, conducts, directs, or reviews surveys of radiation areas within the South Pacific Division (SPD). Assesses the level of risk associated with the radiation hazards of operations performed within SPD.

3. EDUCATION - 1994 - B.S. Health Professions, Southwest Texas State University

4. REGISTRATION - Certified Hazardous Material Manager, Master's Level, Institute of Hazardous Materials Management.
- Plenary member of the Health Physics Society.

5. ADDITIONAL TRAINING

TITLE	Hours	Date
Hazardous Waste Manifest	36	4/2000
8 Hour HAZWOPER Refresher	8	3/2000
Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Workshop	16	2/2000
Environmental Laws and Regulations	36	5/1999
GIS/KEY Workshop	24	12/1998
RESRAD (Residual Radioactive Material Guidelines) and RESRAD-Build Training Workshop	24	5/1998
Implementing MARSSIM Approach for Design and Conduct of Radiological Surveys	24	4/1998
Leadership Development Course	40	3/1997
Intermediate Industrial Hygiene Techniques	80	3/1997
Basic Industrial Hygiene Techniques	80	2/1997
Environmental Radiation Surveys	40	8/1996
Nuclear Laboratory and Portable Field Equipment	40	8/1996
DOT/Radioactive Waste Guidance Course	40	6/1996
Operational Radiation Safety Course	40	5/1996
40-Hazardous Waste Operations Training	40	5/1996
Laser and Radiofrequency Hazards Course	40	4/1996
Medial X-Ray Survey Techniques	40	4/1996
Health Physics Specialist Course 332-N4	640	1/1996-3/1996
Legal Aspects of Safety	36	12/1995
Training and Education Workshop	36	11/1995
OSHA Training Certification and Inspection Course	16	11/1995

BRIEF RESUME

1. NAME & TITLE — David C. Hays, Health Physicist, Tulsa District

2. EXPERIENCE

US Army, 15 years in Health Physics and Environmental Restoration arenas, most recently;

USACE, Tulsa District – Oct 1995 to present

Serves as health physicist and Radiation Safety officer for the South Western Division (SWD) Districts. Plans, organizes, conducts, directs, or reviews surveys of radiation areas/sites within the SWD and USACE districts nationwide. Assesses the level of risk associated with the radiation hazards of operations performed within SWD and nationwide. Interprets and applies Federal and State Regulations, Army Regulations, and USACE Regulations for radiation safety and remediation activities. Serves as an active member of the USACE Radiation Safety Support Team, assisting any USACE District worldwide by addressing radiological questions and concerns. Site Specific details available upon request.

USACE, Baltimore District – May 1994 to Oct 1995

Serves as Environmental Health Technician, for the Baltimore District HTRW Design District. Plans, organizes, conducts, directs, or reviews surveys of radiation areas/sites within the North Atlantic Division (NAD). Serves as site safety officer for, plans, and conducts HTRW and environmental sampling operations on USEPA superfund and Army BRAC/IRP sites.

3. RELATED EDUCATION - 1997 – Graduate, U.S. Army Health Physicist Internship

4. REGISTRATION - Nationally Registered Radiation Protection Technologist
   - Plenary member of the Health Physics Society.

5. ADDITIONAL TRAINING

TITLE	Hours	Date
RESRAD (Residual Radioactive Material Guidelines) and RESRAD-Build Training Workshop	24	4/2001
Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Workshop	32	12/2000
8 Hour HAZWOPER Refresher	8	10/2000
First Aid and CPR (American Heart Association)	8	5/2000
Annual Radiation & Site Safety/Health Training	24	2/2000
DOT/Radioactive Waste Guidance Course	40	6/1999
SU-474-5 ISOCS Measurements using the Inspector	32	3/1999
Implementing MARSSIM Approach for Design and Conduct of Radiological Surveys	24	4/1998
Leadership Development Course	40	3/1997
Intermediate Industrial Hygiene Techniques	80	3/1997
Basic Industrial Hygiene Techniques	80	2/1997
Environmental Radiation Surveys	40	8/1996
Nuclear Laboratory and Portable Field Equipment	40	8/1996
Operational Radiation Safety Course	40	5/1996
40-Hazardous Waste Operations Training	40	5/1996
Laser and Radiofrequency Hazards Course	40	4/1996
Medial X-Ray Survey Techniques	40	4/1996
Health Physics Specialist Course 332-N4	640	1-3/1996
Legal Aspects of Safety	36	12/1995
Training and Education Workshop	36	11/1995
OSHA Training Certification and Inspection Course	16	11/1995

BRIAN P. HEARTY, CHP
U.S. ARMY CORPS OF ENGINEERS
(402) 697-2478 FAX (402) 697-2595

EXPERIENCE

Health Physicist, GS-1306/13 — March 1998 – Present

U.S. ARMY CORPS OF ENGINEERS
HAZARDOUS, TOXIC AND RADIOACTIVE WASTE CENTER OF EXPERTISE
12565 WEST CENTER ROAD, OMAHA, NEBRASKA 68144-3869

Provide technical assistance to Corps Headquarters, Divisions, and Districts worldwide in the areas of radiation safety, radiation site remediation, radioactive waste disposal, and reactor decommissioning. Perform technical quality assurance reviews of environmental restoration project documents. Programs supported include the Formerly Utilized Sites Remedial Action Program (FUSRAP), Base Realignment and Closure (BRAC), Formerly Used Defense Sites (FUDS), EPA Superfund, and the Army Deactivated Reactor Program. Represent the Corps at national meetings, conferences, and workshops. Member of the U.S. Nuclear Regulatory Commission 10 CFR 40.13 Jurisdictional Working Group. Perform field oversight and investigation as part of the Corps Radiation Safety Support Team.

Radioactive Materials Program Manager — May 1996 - March 1998

NEBRASKA DEPARTMENT OF HEALTH AND HUMAN SERVICES REGULATION & LICENSURE
301 CENTENNIAL MALL SOUTH, P.O. BOX 95007, LINCOLN, NEBRASKA 68509-5007

Planned, organized, developed, implemented, and directed a comprehensive statewide radiation safety program in the handling of radioactive materials. Supervised the review, issuance, and termination of licenses for the use of radioactive materials. Provided technical guidance on the control of hazards pertaining to radioactive material storage, handling, and transportation. Conducted and supervised inspections and surveys to identify potential health and safety concerns and determined compliance with applicable regulations and license conditions. Prepared legislation and regulations concerning all health and safety aspects associated with radioactive materials. Developed, implemented, and conducted training programs. Developed and implemented program procedures. Prepared and presented educational material to public groups, media, and other interested parties. Represented the Agency at national meetings, conferences, and workshops. Participated on the Agency's emergency response team as response manager and dose assessment specialist. Radiation Safety Officer on Agency's material license.

Radiological Health Physicist II — June 1995 – May 1996

NEBRASKA DEPARTMENT OF HEALTH
301 CENTENNIAL MALL SOUTH, P.O. BOX 95007, LINCOLN, NEBRASKA 68509-5007

Served as technical lead for the review of licenses for the use of radioactive materials. Conducted inspections and surveys of radioactive material users to identify potential health and safety concerns and determine compliance with applicable regulations and license conditions. Participated on the Agency's emergency response team as response manager and dose assessment specialist.

Radiological Health Physicist I — October 1993 - June 1995

NEBRASKA DEPARTMENT OF HEALTH
301 CENTENNIAL MALL SOUTH, P.O. BOX 95007, LINCOLN, NEBRASKA 68509-5007

Reviewed licenses for the use of radioactive materials. Conducted and participated in inspections and surveys of radioactive material users to identify potential health and safety concerns and determine compliance with applicable regulations and license conditions. Participated on the Agency's emergency response team as dose assessment specialist and field team leader.

Radiological Health Specialist II — August 1991 - October 1993

NEBRASKA DEPARTMENT OF HEALTH
301 CENTENNIAL MALL SOUTH, P.O. BOX 95007, LINCOLN, NEBRASKA 68509-5007

Conducted inspections and surveys of users of radiation generating equipment to identify potential health and safety concerns and determine compliance with applicable regulations. Assisted in the technical review of an application for a low-level radioactive waste disposal facility. Presented educational workshops on the regulations for interested groups. Performed facility shielding reviews. Participated on the Agency's emergency response team as field team leader and field team member.

EDUCATION

Graduate College Course work — **August 1988 to August 1991**
UNIVERSITY OF NEBRASKA - LINCOLN — LINCOLN, NEBRASKA
Chemistry. 54 semester hours. GPA 3.462

B.S. Degree May 1988
UNIVERSITY OF NEBRASKA - OMAHA — OMAHA, NEBRASKA
Chemistry. 128 semester hours. GPA 2.930

CERTIFICATION

Comprehensive Health Physics — **November 1999**
AMERICAN BOARD OF HEALTH PHYSICS

REGISTRATION

Radiation Protection Technologist — **November 1994**
NATIONAL REGISTRY OF RADIATION PROTECTION TECHNOLOGISTS

PROFESSIONAL MEMBERSHIPS

Health Physics Society
Plenary Member [1999-Present].

Mid-America Chapter Health Physics Society
Member [1992-Present].
Secretary/Treasurer [1995-Present].

SKILLS AND TRAINING

- Over 500 hours of NRC/DOE/EPA/USACE sponsored radiation related coursework.
- Extensive use of word processing, spreadsheet, and database programs.
- Familiarity with various radiological risk/dose calculation programs, RESRAD, REARAD-Build.
- Extensive use of radiation monitoring equipment.
- Portable nuclear gauge and x-ray fluorescence analyzer safety training.

Julie Ann Peterson
3520 South 153rd Street
Omaha, Nebraska 68144
(402) 691-8608

Education

Bachelor of Science in Biological Sciences
University of Nebraska, 1987

Master of Science in Biological Sciences
University of Nebraska, 1996

Certification/Licenses

Certified Health Physicist
Registered Radiation Protection Technologist

Experience

Summary: Eleven years of well-rounded health physics experience in radioactive waste packaging, transportation, and disposal; environmental restoration; emergency planning; dosimetry; instrumentation; and, radiological transport modeling. Skilled public speaker and technical writer.

Health Physicist (06/95 to present)
US Army Corps of Engineers, HTRW Center of Expertise

Provide health physics information and recommendations to Corps Districts and Divisions world-wide during execution of environmental restoration activities for the US Army, US Air Force, US EPA, US DOE, NASA, and others. As requested, may serve as District project health physicist and plan/execute radiation surveys and monitoring. Develop and/or review technical Corps guidance, special studies, and policies. Technical liaison internal and external to the Corps. Represent the Corps on national committees and at conferences, workshops, and training courses.

Fact Witness, FUSRAP, May 1999
Provided fact testimony regarding the radioactive waste disposal market at the US Court of Federal Claims for the Envirocare of Utah, Inc. protest litigation involving the Corps' nationwide disposal services procurement. Result: opinion in our case. The Corps avoided protest and awarded $300 million in disposal contracts.

Health Physics Consultant, Senate Hearing, April 2000
As requested by the Assistant Secretary of the Army (Civil Works) [ASA (CW)], co-authored written and oral testimony given by the ASA (CW) at a hearing of the Committee on Environment and Public Works regarding the management and disposal of low activity radioactive waste. Attended the hearing and supported the ASA (CW) during questions and answers.

Julie Ann Peterson
3520 South 153rd Street
Omaha, Nebraska 68144
(402) 691-8608

Radiological Health Physicist II (02/91 to 06/95)
Nebraska Department of Health, Division of Radiological Health

Supervised Nebraska's Agreement State Program. Reviewed radioactive material license applications, amendment requests, and license termination requests to ensure the safe receipt, use, and disposal of sealed and unsealed sources of radiation. Inspected complex radioactive material licensees including irradiators, universities, and sealed source manufacturers for compliance with regulations and license conditions. Responded to incidents involving radioactive material; identified and evaluated problems; and, recommended solutions. Participated in exercises with Nebraska's two nuclear power plants as field team member, field team coordinator, performing dose calculations, or assisting local civil defense agencies with decontamination of personnel and facilities. Developed, interpreted, and promulgated Nebraska Regulations for Control of Radiation, state operating policies, and procedures.

Radiological Health Specialist I (05/90 to 02/91)
Nebraska Department of Health, Division of Radiological Health

Coordinated the implementation of the State Indoor Radon Grant. Assessed and analyzed data from a state-wide residential radon survey. Conducted on-site, follow-up radon measurements. Developed regulatory controls for radon measurement and/or mitigation of buildings. Consulted with the public, providing advisory and technical assistance.

Training

RESRAD and RESRAD-BUILD
Implementing MARSSIM
Radioactive Waste Packaging, Transportation, and Disposal
Environmental Radiation Surveys
Environmental Laws and Regulations
Radiation Protection Engineering
Five-week Health Physics and Radiation Protection Course
Fundamentals Course for Radiological Response Teams
Licensing and Inspection Procedures
Risk Communication, Risk Management, and Decision Making
Leadership Development

References

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SITE RADIOLOGICAL CHARACTERIZATION REPORT – ITEM 8

Note: All site information provided in this item, including references to Figures and Tables, refer to the information found in the IRP Site No. 41 Characterization Study (March 1999) attached at the end of this item.

PREVIOUS INVESTIGATIONS AND ACTIVITIES

This item includes several soil sampling summaries that have been performed since the mid-1970s at Test Area C-74L to monitor and evaluate the soil quality at the site with regard to uranium. The latest documented sampling to take place was the Site Characterization Study Sampling conducted in 1999. Further clean-up of the former drum storage area and gun corridor were conducted during 2000.

Initial Soil Sampling (1976 – 1978)

An initial soil sampling program was performed from June 1976 to August 1978. Surface soil samples were collected along a polar grid with radiating sampling lines extending out to beyond the RCA (Figure 2.4). The sample collection method consisted of compositing approximately 500 grams (g) of soil collected from the inside of a 10 centimeter (cm) square by 5 cm deep stainless steel form pushed into the ground. Samples were collected along this grid approximately twice a year for the duration of the sampling program. Samples collected in the early part of the program were analyzed using Instrumental Epithermal Neutron Activation (IENA). Later samples were analyzed using Gamma Spectroscopy. Comparison of laboratory analyses of split samples using both methods shows good correlation between the two methods. The results of the sampling are presented in detail in Becker and others (1990). The maximum concentration detected at each sampling point during the sampling program is presented in Table 2.1. Uranium background values from this study ranged from less than 1 to 2.4 micrograms per gram (μg/g; 0.06 picoCuries per gram [pCi/g] to 0.7 pCi/g) (Becker and others, 1990).

Soil Sampling Event (1979 – 1980)

Between October 1979 and September 1980, the Los Alamos National Laboratory (LANL) performed research at Eglin that emphasized sampling at Test Area C-74L to determine areas needing cleanup because of DU contamination. Samples were collected along an expanded grid, using the existing polar grid as a basis. The samples were analyzed using IENA, and the uranium concentrations were evaluated using a Kriging statistical technique and plotted accordingly (White, 1981). The outline of the area of the site showing concentrations above 100 μg/g (30 pCi/g) is shown on Figure 2.4.

In 1986, nine additional soil samples were collected from inside the RCA, and two background samples were collected from near Indigo Pond located approximately 1.1 miles

north of the site (Figure 2.2). These samples were analyzed using Inductively Coupled Plasma/Mass Spectroscopy (ICP/MS) and Beta Radiation. Uranium concentrations in the background samples were less than 3 μg/g (0.9 pCi/g). Uranium concentrations detected using the ICP/MS method are shown on Figure 2.4 (Becker and others, 1990).

Soil Excavation within Approach Corridor (1980)

In 1980, after evaluating the analytical results from the soil samples collected at the Test Area C-74L, Eglin cleaned the approach corridor of the facility leading from the gun bay building to the target butt (Figure 2.3). The upper 6 inches of the surface soil was removed and stockpiled outside and just east of the corridor, within the RCA. The approximate location of this stockpile is shown on Figure 2.3. The target butts at Test Area C-74L were also cleaned during this time frame. The contaminated sand from the target butts was sealed in 55-gallon drums and placed within the drum storage area, located north of the RCA (Figure 2.3; Becker and others, 1990). Drums containing gun butt sands from Test Area C-64 were also staged at this drum storage area during the early 1980s (Eglin, March 1999). The drums remained in the drum storage area until the middle 1980s, when they were transported to a receiver facility in Barnwell, South Carolina. A total of 1,252 55-gallon drums were sent for disposal due to this cleanup (Becker and others, 1994). According to Mr. Rick Crews, an Eglin Wright Laboratory physical scientist involved with the soil sampling and soil excavation activities described in these sections, in contrast to Becker and others (1990), the soil from the target butts was stockpiled within the RCA, while the excavated upper six inches of soil from the corridor ground surface was contained in the drums (Crews, 1998). Efforts to clarify this discrepancy have been unsuccessful. It should not affect this CS/ICM and future environmental work at the site, because the primary concern is characterizing the present DU concentrations at the stockpile and drum storage area, rather than determining the DU source.

After the excavated area was monitored to determine that radioactivity was near the background values, clay from an off-site borrow location was back-filled onto the excavated area.

Groundwater Sampling (1983)

Results of laboratory analysis of a groundwater sample taken in May 1983, from the shallow supply well located just outside the RCA indicated a gross alpha concentration of less than 1 picoCurie per liter (pCi/L). The maximum contaminant level (MCL) for gross alpha activity in groundwater, of which uranium can be a major contributor, is 15 pCi/L. Based on this analysis, it appears that DU has not impacted groundwater near the RCA. It should be noted that the proposed MCL for total uranium is 20 μg/L; however, the detected gross alpha activity cannot be directly compared to this limit.

Soil Sampling Event (1988)

In 1988, soil samples were collected in three to six-inch intervals at depths ranging from zero to 36 inches below land surface (bls) to measure the magnitude of remaining DU contamination and assess the potential for uranium transport downgradient of the RCA. Soil samples were collected from inside the former drum storage area, within a drainage ditch inside the RCA extending northeastward from the target butt, the target butt, the soil stockpile location, and the steep slope south of the RCA. These samples were analyzed using either Delayed Neutron Activation or ICP/MS. Both the concentration of uranium in soils and the isotopic ratio of uranium 238 (^{238}U) to uranium 235 (^{235}U) were measured. Natural uranium consists predominantly of ^{238}U (99.3 %) and ^{235}U (0.7 %). If uranium in soils had an isotopic ratio of ^{235}U to ^{238}U between 0.0064 and 0.0080 %, the uranium was naturally occurring. If the ratio was between 0.0028 and 0.0064 %, then a mixture of naturally occurring uranium and DU existed. If the ratio was less than 0.0028 %, then the uranium detected in the sample was DU (Becker and others, 1994). The vast majority of these results indicated that the uranium detected was DU.

The samples collected from within the RCA (near the soil stockpile) indicated that DU concentrations decreased with depth, with the maximum concentrations of DU detected in the surface (zero to 3 inches bls) sample. The results of this sampling effort are shown on Table 2.2 and Figure 2.5.

Fate and Transport Investigation (1990 – 1991)

Additional soil sampling was performed in 1990 and 1991. Samples were collected from three locations within the northeast-trending drainage ditch (Northeast Ditch). Samples were collected from zero to six inches bls just inside the RCA, from zero to 43 inches bls at the second location 150 feet outside of the RCA, and from zero to 2 inches bls, at the third location about 400 feet outside of the RCA. Samples were also collected within the drainage ditch on the slope south of the RCA (South Ditch; Figure 2.5). Naturally occurring uranium was detected in the South Ditch at concentrations less than background. The Northeast Ditch showed DU concentrations ranging from 60 μg/g (18 pCi/g) at the surface to 1.2 μg/g (0.36 pCi/g) at a depth of 38 inches. Naturally occurring uranium was detected at a concentration of 0.76 μg/g (0.22 pCi/g) from 38 to 43 inches bls (Becker and others, 1994). Refer to the Table 2.2 for a summary of laboratory analytical results.

Sampling of sediments associated with Rocky Creek located south of the RCA indicated no DU in the sediment at concentrations above its detection limit. To assess the potential and occurrence of DU transport away from the RCA at Test Area C-74L, Eglin installed a cumulative sampler in 1990 along the Northeast Ditch that begins within the RCA. A total of 14 run-off samples were detected between October 1990 and November 1992. The results from these analyses and the evaluation of the data indicate that, when run-off occurs, DU is

present in both the dissolved and suspended sediment phases. Generally, the DU concentrations detected ranged from below detection limits to 14.7 micrograms per liter (μg/L) in the dissolved phase, and from 4.5 μg/g (1.3 pCi/g) to 291.0 μg/g (87 pCi/g) (202 μg/g [61 pCi/g] average) in the suspended sediment phase (Becker and others, 1994). Refer to Table 2.2 for a summary of laboratory analytical results.

SITE CHARACTERIZATION STUDY (1999)

A complete characterization study of IRP Site Ro. RW-41 Test Area C-74L Ballistics Gunnery Testing Facility was conducted in 1999. The characterization study report is included in its entirety as Appendix A of this item. The following is the summary of results of the study:

- The FIDLER survey indicated numerous isolated occurrences of DU fragments (hot-spots), identified by FIDLER readings above the investigation level used during the field work
  (10 kcpm).
- The results of this CS confirmed that the DU fragments are the source of the DU contamination. Furthermore, the DU remains as discrete fragments of the DU penetrators. That is, the DU contamination is not adsorbed to soil particles.
- The majority of these DU fragments range in size from tiny specks to full rounds and weigh less than 1 gram to approximately 50 grams.
- The DU fragments were deposited onto the ground surface and the very shallow subsurface (generally less than 0.5 feet bls) from ricocheting off of steel and concrete targets during ground to ground test firing.
- The ICM activities, which entailed removing up to three shovels-full of the DU fragment and surrounding soil and collecting pre- and post-DU/soil removal FIDLER readings, proved very effective in mitigating the hot-spots (Figures 4.1 and 4.2). A total of approximately 106 cubic feet (4 cubic yards) of soil and DU fragments were transported to Test Area C-64 under Eglin's existing RAM permit. This material was contained in seven 22-gallon drums, eighteen 30-gallon drums, and two 55-gallon drums (these largest drums also contained some personal protective equipment).
- The soil sampling results indicate that the total uranium decreases sharply with depth and that DU contamination is not being transported off site within the Northeast or South Ditches.
- The FIDLER survey down-hole logging survey, and soil sample results indicate that areas with elevated DU are currently primarily located in the gun corridor, the eastern part of

the RCA, and the northwest corner of the drum storage area, generally from 0 to 0.5 feet bls (locally down to 1.5 feet bls).

- Extensive DU fragments are currently visible on the surface of the ground in the eastern parts of the RCA and the northwestern part of the former drum storage area.
- The findings of this CS/ICM are generally consistent with the historical investigative work performed at the site (Becker and others, 1990; Becker and others, 1994; White, 1981).
- During this CS/ICM, the FIDLER survey grid was extended for a radius of 60 feet for every DU fragment that was detected near the edge of the grid. This criterion proved to be impracticable. Eglin is currently developing more scientifically valid criteria for extending the survey grid during future LLRM investigative activities.
- Total uranium was detected in the groundwater sample collected from the production well on site at a very low activity (-24.42 pCi/L). This indicates that the groundwater has not been impacted with the DU.

Based on the results of the characterization survey the following are the recommended actions to be taken at IRP Site No. 41:

The results of this CS/ICM at IRP Site No. RW-41 Test Area C-74L indicate that the DU contamination is present in the eastern part of the RCA, the gun corridor, and the northwestern part of the former drum storage area. The laboratory analytical data from subsurface samples and preliminary results from the DU Testing indicate that the DU fragments are generally confined to the upper six inches of soil.

Therefore, it is recommended that remedial action be performed in these parts of the site. This remedial action should entail excavation and off-site disposal of the DU fragments currently at the site. Some of the details of this recommendation are as follows:

- The depth of the excavation is estimated to be six inches bls in the RCA and the former drum storage area. Within the gun corridor, the total depth of the excavation is estimated to be approximately one foot bls, because of the presence of the 0.5-foot clay layer covering this part of the site. This estimate of lateral and vertical extent is based on the DCGL for the industrial scenario of 600 pCi/g for laboratory analytical results of soil samples and the corresponding $DCGL_{emc}$ of 44 kcpm for the FIDLER readings (Eglin, February 2000).
- FIDLER readings and confirmation soil samples should be collected during and after the excavation, using 44 kcpm and 600 pCi/g, respectively, as the excavation action levels. The presence of DU fragments should also be used to guide the excavation.

- On the basis of the excavation zone described above, the estimated volume of soil to be excavated and transported/disposed off-site as radioactive waste is approximately 1,200 cubic yards. This estimated volume of soil does not warrant a feasibility study of on site treatment technologies (Eglin, December 1999).
- Substantial UXO support will be needed for this remedial action. The IRP prime contractor performing this work will need to subcontract this support.

ADDITIONAL CHARACTERIZATION ACTIVITIES (2000 – 2001)

On several occasions since the 1999 characterization study, Earth Tech personnel have conducted additional FIDLER surveys in conjunction with hot spot removal activities of small areas of elevated activity (FIDLER readings greater than 44 kcpm). During these removal activities, the hot spots identified in the former drum storage area and the gun corridor were removed and the DU waste generated placed in drums and moved to the permitted DU waste storage area located at Test Area C-64. Also one area in the gun corridor suspected of having a DU hot spot turned out, upon further investigation, to be a small disposal area for several DU rods, each of which were several feet in length. The Base RSO was promptly notified and the DU rods were removed and stored in the DU waste storage area located at Test Area C-64. The only land area remaining to be remediated at IRP Site No. RW-41 is the RCA.