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

27 Oct 04

MEMORANDUM FOR NRC REGION IV
ATTN: MR. JACK WHITTEN

FROM: AFMOA/SGPR
110 Luke Avenue, Room 405
Bolling AFB, DC 20032-7050

SUBJECT: Decommissioning Plan for Test Area C-74L, Eglin AFB, Florida

We are forwarding you the attached letter from Mr. Ralph Armstrong, Chief of the Restoration Section, Environmental Branch at Eglin AFB, FL. The letter is in response to the questions raised by Mr. Bob Evans, NRC Region IV, received in a February 2004, NRC Inspection Report. The attachment provides a response to items in that report by providing further information on topics submitted in Eglin's draft Decommissioning Plan.

Please review the attached and provide feedback as to whether it adequately addresses the NRC's request for further information. Should you have additional questions, or require additional input, please contact me at 202-767-4735 or e-mail at clint.abell@pentagon.af.mil. Our telefax is 202-404-4043.

CLINT E. ABELL, Capt, USAF, BSC
Health Physicist
Radiation Protection Division and
USAF Radioisotope Committee Secretariat
Air Force Medical Operations Agency
Office of the Surgeon General

Attachment:
Letter from Mr. Ralph Armstrong, dated 6 Aug 04

cc:
46 TW/TSRL (Mr. Davis) w/o Atch
96th AMDS/SGP (Mr. Curry) w/o Atch
96th ABW/EMR (Mr. Armstrong) w/o Atch
AFIERA/SDR (Lt Col Nichelson) w/o Atch
NRC REGION IV (Bob Evans)
NRC REGION IV (Mr. Gaines)

Docket No. 030-28641
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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 96TH AIR BASE WING (AFMC)
EGLIN AIR FORCE BASE FLORIDA

6 August 2004

Thru: Department of the Air Force
USAF Radioisotope Committee
HQ AFMSA/SGPR (ATTN: Lt Col Mather)
110 Luke Ave
Bolling AFB, DC 20322-7050

To: U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
ATTN: Mr. Jack Whitten
Arlington, TX 76011-4005

SUBJECT: Decommissioning Plan for Test Area C-74L, Eglin Air Force Base, Florida

Re: U.S. Nuclear Regulatory Commission (NRC) Letter, SUBJ: Request for Additional Information Regarding Eglin Air Force Base Decommissioning Plan, dated Feb 19, 2004

USAF Radioisotope Committee (RIC) Letter, SUBJ: NRC Inspection Report (w/attachments regarding Decommissioning Inspection of Test Area C-74L EAFB, 9-11 Feb 2004)

Mr. Whitten
(Nuclear Materials Licensing Branch)

This letter provides additional information requested by the NRC for Eglin Air Force Base incident to execution of the Decommissioning Plan for Test Area C-74L Gunnery Ballistic Facility at Eglin Air Force Base (Eglin). Upon review and acceptance of these responses it is anticipated that Eglin's Draft Decommissioning Plan for C-74L will be approved. This letter with its attached responses will serve to supplement the Decommissioning Plan for continued field remediation and management of regulated low level radioactive wastes at the site. (Test Area C-74L is currently listed in Eglin's Installation Restoration Program as IRP Site No. RW-41.)

The responses are considered sufficiently detailed to describe the concept for the soil excavation and management of generated low level wastes. The Derived Concentration Guideline Limits are revised to follow NRC requirements and are consistent across the site for media survey units. The responses also clarify the execution of survey work performed through March 2004. As noted in the responses, the Decommissioning Plan consists of Part A and Part B (referred to in the Plan as Items A and B). Part A consists of the land areas at C-74L where radiologically impacted areas remain in restoration status. Part A radiological operations are conducted by an Eglin Subcontractor (Earth Tech, Inc.). Part B consists of buildings and target areas at C-74L where limited radiological decontamination and site release surveys were completed. Part B radiological operations were performed by the U.S. Army Corps of Engineers (USACE) Omaha District. Eglin's Base Bioenvironmental Engineering Office has directed and integrated radiological operations at the facility.

In April 2004 Eglin informed the NRC and RIC that three additional areas of subsurface DU impacted soils had been identified at C-74L. These areas were discovered during conduct of radiological surveys and while completing excavation of known surface and near-surface areas at the site. Eglin suspended removal operations at that time (March 2004) and resumed site investigation using FIDLER and down logging techniques to determine the vertical and lateral extent of subsurface impacted soils. Three areas were identified which exist at approximately 12 – 24 inches depth, the largest area through the gun corridor, a subsurface area immediately west on the corridor and a small subsurface area just to the south. Work plans call for removal of an additional 9,000 cubic feet of DU impacted soils. This work is expected to resume in the October-November 2004 timeframe.

The gun corridor is declared a Class 1 Area due to the subsurface impacted soils discovered (previously the corridor was listed as a Class 3 Area). The asphalt pad will be removed and the FIDLER survey extended to the Gun Bay. Upon completion of soil excavation at the site, a final status survey will be performed in accordance with the Decommissioning Plan and existing site work plans. A Final Status Survey Report will be prepared which will address the separate MARSSIM survey units listed under Parts A and B in the Decommissioning Plan. The Site Release Survey Report (Part B) will be included as an Appendix to the Final Report for the entire site. Eglin will apprise the RIC and NRC of its progress in order to schedule the appropriate time for site visit and collection of confirmation samples at the site.

Eglin is pursuing funding resources to complete disposal of regulated low level wastes. It is anticipated that excavated soils will remain stored at the facility just north of the range complex and shipped in staged increments as funds become available. Upon completion of disposal operations Eglin will complete its decommissioning requirements requesting termination of the C-74L portion of the installation's Radioactive Materials Permit.

Please contact Mr. Steve Curry at Eglin Base Bioenvironmental Engineering (850) 883-8294 regarding any questions concerning the attached responses or if any further information or clarification required.

FOR....

DOUGLAS DAVIS
46TW/TSRL
Eglin Air Force Base, FL

RALPH ARMSTRONG
96 ABW/EMR
Eglin Air Force Base, FL

Stephen K Curry

STEPHEN CURRY
96th Aerospace Medicine Squadron
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Comments/Questions Related to Eglin Air Force Base Decommissioning Plan

1. **The draft Decommissioning Plan (DP) consists of two major potions. The two portions provide inconsistent details of the proposed final status survey. In particular, one portion is lacking a $DCGL_{emc}$, and the other portion is lacking final status survey plan information for outdoor soil/land areas. Please resubmit the proposed final status survey in a manner that is consistent across the site.**

The inconsistencies in the two portions of the Decommissioning Plan are addressed as follows. The $DCGL_{emc}$ for both portions of the Decommissioning Plan (Items/Parts listed as A or B) will be performed consistent with one another. The $DCGL_{emc}$ is changed to 22 kcpm, which is equivalent to a soil DU concentration of 300 pCi/g. The final status survey of all outdoor soil/land areas will be conducted in accordance with the final status survey plan for the major land areas (exclusion area, gun corridor, drum storage area, etc.) The $DCGL_w$ for the outdoor soil/land areas has also been changed to 469 pCi/g. A copy of the Radiological Survey Plan (Sept 2002) for Buildings and Target Areas is attached. This Plan was prepared by the U.S. Army Corps of Engineers (USACE) Omaha District in consultation with Eglin's Low Level Materials Partnering Team and addresses sections described in Items B of the Decommissioning Plan. The Final Status Survey Report prepared at the conclusion of all field work will include as an appendix the USACE Site Release Report for the Buildings and Target Areas.

2. **The MARSSIM survey unit classifications have a direct impact on the number of final status survey measurements collected in each survey unit. The DP has inconsistent, out of date, or unjustified survey unit classifications. Please update the site-wide survey unit classifications and provide a justification for each area classified as MARSSIM Class 2 or Class 3.**

The following is a revised listing of the survey units located on Test Area C-74L:

   a. Gun Corridor – Class 1 (1645 square meters)
   b. Drum Storage Area – Class 2 (1376 square meters)
   c. Radiation Controlled Area/Exclusion Zone (EZ) – Class 1 (15,051 square meters)
   d. Remainder of Site Land - Class 2 (45,147 square Meters)

MARSSIMs suggests an area size to be applied for land classification purposes. The MARSSIM classification also considers exposure pathway modeling, assumptions, and site-specific conditions. The MARSSIM suggested Class 1 site classification is a land area up to 2,000 square meters. For Class 2 site the land area ranges from 2,000 to 10,000 square meters. The drum storage area (Class 2) and the Gun Corridor (Class 1) meet the area requirements. The radiation controlled area (Class 1) and remainder of the site land (Class 2) area are in

excess of the MARSSIM suggested areas. The following discussion justifies why the increased area size and reduced number of soil samples do not negatively impact the design of the FSS or the ability to assure survey units meet site release criteria.

With the site characterization survey performed in 1999 and the subsequent remediation activities conducted from 1999 to present, the RW-41 site has been well characterized with several 100% FIDLER walkover surveys. All survey units were 100% FIDLER surveyed and static measurements collected at all grid nodes (independent of its MARSSIM classification). The design of the FSS for RW-41 considers the previous investigative and remedial work performed at the site. Prior to conducting the FSS, all hot spots found in surface and sub-surface soils will have been removed, additional FIDLER scanning surveys conducted, and static measurements taken. A comprehensive effort will be made to ensure all survey units do not contain areas of elevated activity exceeding 22 kcpm (equating to 300 pCi/g). Following this field methodology provides confidence that residual radioactive levels are well below the 469 pCi/g ($DCGL_w$ for total uranium) previously agreed to by the NRC.

Equating the $DCGL_{emc}$ (44 kcpm) to the initial $DCGL_w$ (600 pCi/g) allowed field measurements at the site to be evaluated directly to the $DCGL_w$, removing the need for statistical tests. Comparing field measurements directly to the $DCGL_w$ also provides greater confidence that site release criteria have been met. Therefore, the remediation of any areas of elevated activity above one half the original $DCGL_{emc}$ 22 kcpm (or 300 pCi/g for total uranium) ensures that survey unit contamination levels could be declared well below the NRC established release criteria of 469 pCi/g.

Based on the 1999 site characterization study and the FIDLER survey information collected during 2002/2003, the site does not contain any areas of homogenous DU contamination. DU was mainly found as fragments or small particles spread sparsely over the site in a very random pattern. As noted in MARSSIM (paragraph 5.5.2.4) the determination of soil sampling points for small areas of elevated activity relying on statistical selection of sampling points and methods would not likely provide adequate characterization and assure with confidence that release criteria can be met. Surface scanning and systematic measurements in conjunction with soil sampling are required.

Previous studies have also indicated that many areas of elevated activity can be remediated at the site with the removal of a single fragment or numerous particles in less than a one square foot area. This makes soil sampling as a means of evaluating whether a survey unit meets release criterion inadequate regardless of the number of soil samples collected.

Decommission Plan, Part A

With exceptions as noted, Part A of the Decommissioning Plan addresses the land areas at Test Area C-74L. The exceptions noted include the land immediately surrounding Building 9372, the asphalt apron adjacent to Building 9372 and extending south to the the gun corridor, and the range runoff outfall area.

It was recognized early in the investigative process that the site did not contain areas of homogeneous DU contamination. Rather, the site contamination was heterogeneous represented by discrete DU fragments ranging from complete intact DU penetrators down to various size DU fragments or particles. It was also concluded that over 90 percent of the surface soils at RW-41 contained no DU fragments or particles. Except in a few areas, DU hot spots consisted of small DU fragments residing in less than a cubic inch of soil. In most cases DU hot spots were not clumped together but existed individually within several feet to several yards of each other. In some areas, hot spots existed as much as 50 to 100 feet from each other. Sparse, random hotspot locations greatly influenced the design of the site characterization survey and field remediation techniques selected to ensure success. In a strict application of MARSSIM protocols, i.e. soil sampling alone, would not ensure detection of all areas of elevated activity at the site. Because of the random distribution of hot spots over the site, the probability of finding even 10 percent of existing hot spots would be questionable. To ensure the site was properly remediated with all survey unit's residual activity below the release criteria, scanning techniques and direct measurements were the primary means of validating remaining survey unit residual activity. The FIDLER was also selected as the survey instrument of choice to increase the sensitivity of the field measurements.

The first step was determining the $DCGL_{emc}$. The procedure used to establish the $DCGL_{emc}$ was modified from MARSSIM. The $DCGL_{emc}$ (44 kcpm) for the site was equated directly to the $DCGL_w$ (600 pCi/g) for the site, and one half the $DCGL_{emc}$ (22 kcpm) was set as the action level. Any direct measurement which exceeded 22 kcpm, required the radiological technician/surveyor to flag the location, record the count rate on the flag and in the field notebook, then return to the location and manually remove the radioactive material. After the radioactive material was removed another direct measurement was taken at the location. If the measurement again exceeded one half the $DCGL_{emc}$, additional soil was removed until a direct measurement below 22 kcpm was measured. If the measurement was below 22 kcpm but higher than background it was left up to the radiological surveyor if he/she considered it practical to continue with removal of the remaining DU. In many cases, if the DU remaining was easily accessible it was removed as well.

Direct measurements and scan percentages within all Class 1 and Class 2 survey units followed the same remedial/release criteria. In other words, all Class 2

survey units received 100% FIDLER scans in two directions with static measurements taken at each survey node. The only difference was the Class 2 areas where survey nodes were 30 feet apart, instead of 10 feet. Direct measurements were taken at all grid nodes and at each location where FIDLER measurements exceeded 22 kcpm ($DCGL_{emc}$). A small percentage of the grids within the radiation controlled area/exclusion zone (EZ) contained too many hot spots to perform direct measurements. In this case the upper 3 to 6 inches of soil was removed from the grid and a 100 percent scan survey of the grid performed again. If there were still too many hot spots the grid would again have a 3-6 inch layer of soil removed and another 100 percent survey performed until only several or no hot spots were detectable in the grid. Direct measurements were again taken noting with flags any hot spot locations remaining. Static measurements taken involved recording the count rate on the flag at each direct measurement location.

To reduce the possibility of missing an area of elevated activity greater than the $DCGL_w$, the grid size within the Class I survey units was reduced to ten feet. Class 2 areas used a 30 foot grid. As was stated before, each grid, in both the Class 1 and Class 2 areas were 100 percent surveyed in two directions. Any areas exceeding 22 kcpm were marked with a pin flag and the DU later removed. All cleared grids were marked with a different colored pin flag, which was placed in the middle of the grid. Direct measurements verified that DU contamination had been successfully removed from the grid before it was marked as cleared.

Any areas of elevated activity which continued to increase with depth were investigated in both the horizontal and vertical direction until all DU contamination above 22 kcpm was removed and the removal verified by direct measurement with a FIDLER.

The above procedure was used during the 1999 characterization survey of Test Area C-74L, and subsequent removal operations conducted in 2002 and 2003. Once the FSS is completed, all survey units will have received a FIDLER 100 percent survey a minimum of six times. Many grids within the radiation controlled area will have had two additional FIDLER 100 percent surveys and numerous static surveys.

Based on MARSSIM protocols, the six FIDLER 100 percent surveys, grid node static readings, and static readings made at each location where areas of elevated activity were found offer substantial evidence that each survey unit meets the site release criteria. This evaluation also considers application of the soil sampling criteria found in the discussion of soil samples in Question 3 of this document.

Decommissioning Plan, Part B

The survey unit classification for Part B of the Decommissioning Plan are not addressed here since the Part B release survey areas have been completed. All

areas of Building 9372, the Building 9372 sump and drain, Building 9373, the range runoff and outfall areas, catch box, and asphalt pad areas were considered Class 3 areas. During the USACE conducted site release survey the gun mount slots on the south asphalt apron area were changed to a Class 1 area due to the presence of DU fragments discovered in the slots. These fragments were removed incident to the conduct of the survey. The results of the draft USACE survey report recommends that all of Building 9372, the Building 9372 sump and drain, Building 9373 and the range runoff and outfall areas be released without radiological restrictions. The draft USACE report recommends that the catch box and asphalt pad be investigated further, decontaminated or disposed of with consideration of contaminant levels identified. The USACE Site Release Survey Report is expected to be finalized by 23 June 2004 and will be provided for your review. The Final Status Survey Report for C-74L decommissioning will include the USACE Site Release Report as an appendix.

3. **The number of soil samples to be collected as part of the final status survey is inconsistent across the site. Please clarify the number of soil samples that will be collected site-wide and justify the proposed number if less than the number recommended in MARSSIM for each survey unit classification.**

Applying 469 pCi/g as the $DCGL_w$ and relying on a remedial action level of 300 pCi/g as the lower bound of the Class 1 area (EZ), the DU residual present, relative to the background, exists at a very small percentage of the $DCGL_w$. The average concentration of total uranium within the controlled area is 110 pCi/g. The average concentration of total uranium within the Class 2 areas is much less than 110 pCi/g. The average concentration of total uranium found within the controlled area will be used to determine the number of soil samples necessary for each survey unit. Considering the relative values of alpha and beta radiation, the decision errors will be 0.01 in all cases. This will produce the greatest number of soil samples for conservative evaluation. The value of sign p is 1 since (469-300)/110 = 1.53. The number of soil samples = $(2.326 + 2.326)^2/4(1.0\text{-}0.5)^2$ = 21.64 or 22 samples. Adding 20 percent more allows a total of 27 soil samples required for evaluation under MARSSIM.

MARSSIM paragraph 5.5.24 (Determining Data Points for Small Areas of Elevated Activity) provides a statistical test to use when it is necessary to determine the number of soil sampling locations required when residual radioactivity in an area exceeds the $DCGL_w$. This method/test is good for contamination conditions that are approximately uniform across the survey unit. The number of soil samples indicated above may not successfully detect small areas of elevated contamination. Instead, systematic measurements and sampling in conjunction with surface scanning surveys are used to obtain adequate assurance that small areas of elevated radioactivity will still satisfy the release criterion or the $DCGL_{emc}$.

The FSS soil samples will consist of three types: existing soil samples collected during the Characterization Study (CS) in 1999; new biased soil samples; and new random soil samples. The attached Figure 1 shows the locations of these samples. A total of 31 CS soil samples, 30 biased soil samples, and 30 random (unbiased) soil samples will be collected at locations within the gun corridor, former drum storage area, and Areas 1 through 5 of the radiation controlled area. This represents a total of 91 soil samples throughout the site.

In addition to the collection and analysis of these soil samples, the FSS will include a 100 percent survey of all Class 1 and Class 2 areas. The 100 percent FIDLER survey will be performed in two directions perpendicular to each other resulting in each grid being completely surveyed twice. Also at each survey node a static measurement will be taken. In addition, a static measurement was taken at each location where FIDLER readings indicated DU was present at levels greater than 22 kcpm (300 pCi/g, which is less than the $DCGL_w$ 469 pCi/g).

At the conclusion of the FSS each survey unit will have been completely surveyed with the FIDLER a total of 6 times. A 100 percent survey in two directions was conducted in 1999, another 100 percent- FIDLER survey in two directions was completed in 2002/2003 and again in the 100 percent walkover in 2004. DU contamination was removed in accordance with approved procedures used in the first two surveys. The notable exception was where removal at surface could not access deeper DU contamination and heavy equipment and other manual DU removal methods were used.

The 100 percent FIDLER scanning surveys, static measurements of both Class 1 and Class 2 areas, and with 91 soil samples collected for analysis from both biased and random locations far exceed the requirements of MARSSIM for ensuring areas of elevated radioactivity have been removed and satisfy the release criterion of 469 pCi/g.

4. **The wording of the DP suggests that a second final status survey will be conducted after backfilling of excavated areas. Please clarify whether additional survey measurements will be taken after backfilling of excavated areas.**

The Decommissioning Plan has been revised. The wording indicating that a second FSS will be conducted after backfilling of excavated areas has been removed. The FSS will be conducted prior to any backfill operations.

5. **Please add site area and/or survey unit sizes (in units of square meters) to the DP. As examples, the gun corridor, drum storage area, and target area sizes were not clearly stated in the DP.**

The survey unit sizes for the gun corridor, and drum storage area have been added to the Decommissioning Plan in units of square meters. The target area is not a

separate area from the gun corridor. The land around the targets has been included in the FSS. The $DCGL_{emc}$ and $DCGL_w$ remain at 22 kcpm and 469 pCi/g respectively. The decontamination DCGL for the targets and catch box (gun butt) are listed in the scoping survey conducted by USACE and attached to this document.

6. **Clarify whether the soil samples will be analyzed for total uranium or uranium-238.**

All final status survey soil samples will be analyzed for total uranium.

7. **Provide background values for building surfaces.** The building surface background values as recorded in the USACE Final Status Survey of Building 9373 and 9372 are as follows:

Material	Alpha (static) Mean cpm	Beta (static) Mean cpm	Scanner Mean alpha cpm	Scanner Mean Beta cpm	Gamma Mean uR/hr	FIDLER cpm	Areas
Concrete	3	161	3	181	12	9251	Floors, gun bay walls
Cinder Block 1	1	126	3	280	12	6412	Walls
Plaster (Stucco)	3	285	7	251	10	4000	Building exterior
Asphalt	13	493	NA	NA	9	11000	Range areas
Tile	2	129	3	179	12	3827	9372 floors
Cinder Block 2	3	365	7	558	12	17660	Some wall portions and 9373
Steel	40	300	NA	NA	12	4000	Range pieces

Table taken from Draft Site Release Survey Report No. CESWT-SO-R1-11-2002, Eglin AFB, Niceville, Florida, September 2002

8. **The proposed background value for uranium in groundwater was negative number (-24.4 pCi/l) with an unusually high minimum detectable activity (105 pCi/l). Please justify the proposed value or submit an alternate background value for groundwater.**

To clarify the background values of groundwater at the site, the Decommissioning Plan is revised to require collection of additional water samples to include a split sample submission to two approved laboratories. Samples will be analyzed for total uranium. A revised background value for groundwater will be generated.

9. **The DP indicates that containerized wastes will be transferred to another area at Eglin Air Force Base (C-64) after loading, but the licensee was actually storing containers onsite at Area C-74L. The DP requires updating with regards to onsite storage of containerized radioactive wastes.**

The Decommissioning Plan has been updated. The Plan now states that waste storage will be on site and not transferred to Test Area C-64 as previously indicated.

10. **The DP wording and actual field practices were inconsistent in use of dosimeters, bioassays, silt fencing, and plastic sheeting. Please update the DP to specify whether these areas are optional (at the discretion of the onsite project manager or radiation safety officer) or mandatory.**

The requirement to use dosimeters and bioassays has been removed from the Decommissioning Plan. The requirement to use silt fencing and plastic sheeting has been removed from the Plan as well.

11. **The organizational charts provided in the DP were out-of-date. Please update accordingly.**

The organizational chart in the Decommissioning Plan has been updated to reflect positional responsibilities and management relationships. Primary positions will include a Project Manager with budgetary and scheduling authority, a Site Project Manager, Site Radiation Safety Officer, and Site Safety Officer.

C-74L Ground Decommissioning
Soil Remediation
Flow Diagram