

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

22 May 2007

### MEMORANDUM FOR NRC REGION IV ATTENTION: MS. RACHEL BROWDER

FROM: AFMOA/SG3PR

110 Luke Avenue, Room 405 Bolling AFB, DC 20032-7050

SUBJECT: Request for Determination of NRC Regulatory Jurisdiction for Material at Confirmed Site 10, at the Former McClellan AFB.

The Radioisotope Committee (RIC) Secretariat received from the Air Force Real Property Agency (AFRPA) a request for determination of the Nuclear Regulatory Commission's jurisdiction regarding Confirmed Site (CS) 10. To support this determination, this letter provides a description of the site and its contaminants.

The former McClellan Air Force Base (AFB) is on the National Priorities List (NPL), and as such is subject to the Comprehensive Environmental Restoration, Compensation and Liability Act (CERCLA) process under a Federal Facilities Agreement with the U.S. Environmental Protection Agency (EPA) and State of California. Under CERCLA, AFRPA has proposed final remedial systems for soil and groundwater that address the total site risk as prescribed by the National Contingency Plan. CS 10 is one of many former disposal pits at McClellan. Based upon historic information it is estimated that this site received industrial wastes, debris, and soil during the early 1960s. Based on the time period in which wastes were placed into CS 10, this disposal pit had the greatest potential to receive radioactive materials. It was during this time period, just prior to the Nuclear Test Ban Treaty of 1963, that there was a peak in the number of atmospheric weapons tests. The number of radiological samples handled by McClellan's radiochemistry laboratories would also have peaked during this same timeframe. In addition, during the late 1950s to early 1960s, McClellan may not have had an established offsite radioactive materials disposal facility available for use.

CS 10 is located in an industrial area of the base, and covers approximately two acres with approximate volume of 52,000 Cubic Yards (CY). To protect human health and better understand the contents of the disposal pit, the Air Force completely excavated the site as a CERCLA removal action. Approximately 28,000 CY of soil and 533 drums and their contents were properly disposed offsite. Another 24,000 CY of radium contaminated soil remain stockpiled onsite within a weatherization tent.

Extensive soil characterization was performed during the removal action. Contaminants of concern included heavy metals (lead, cadmium, and chromium) exceeding hazardous waste thresholds and radionuclides above background. Over 800 composite soil samples were

analyzed offsite for alpha and gamma spectroscopy to support disposal of the excavated material. Radioactive material constituents were derived from two primary sources: radium dial painting activities and classified laboratory operations associated with monitoring foreign nuclear weapons testing. Radium was the predominant radionuclide identified and is the only radionuclide present at concentrations above background in the 24,000 CY of stockpiled soil. Analysis of this remaining soil shows average radium activity of 12 pCi/g with a total activity of 0.4 curies. Evidence that this radium originated from paint operations includes the base history and the finding of small vials containing radium paint within one of the 533 drums unearthed at the site. The vials were found within a lead box. The total site inventory of radium prior to remediation was estimated to be less than 0.8 Ci.

Other radionuclides identified at CS 10 include americium 241, cesium 137, thorium 230, thorium 232, uranium 233, uranium 235, uranium 238, plutonium 238, plutonium 239/240, plutonium 241, europium 152, europium 155, neptunium 237, and silver 108m. The total activity of these nuclides combined in the remediated waste was less than 0.051 Ci (Total Activity 0.794 Ci - Total Ra-226 0.743 Ci = 0.051 Ci). Each of these radionuclides activities are summarized in Attachment 1 to this letter. These radionuclides are linked through site history with wastes from the nuclear weapons monitoring laboratory. The materials include reagents, resin columns, and used glassware generated during the analysis of samples collected from foreign countries' nuclear tests. The laboratory wastes were placed into drums prior to being disposed. Of the 533 drums unearthed at CS 10, 328 of these drums contained such laboratory wastes. Plutonium was only detected in one out of 892 soil samples, and as commodities in only one of the 533 drums. Within this drum the plutonium was contained in three laboratory jars and four laboratory vials, labeled with the elemental symbol "Pu". The predominate isotopes detected were plutonium 239/240 with a total activity of 9.7 mCi (Attachment 2). The Air Force believes that the plutonium and fission products found in this drum are also associated with the former radiochemistry laboratories at McClellan. The contents of the jars and vials were transferred to the Massachusetts Institute of Technology, where they were analyzed, and the presence of plutonium was confirmed. All materials containing radioactivity wastes with the exception of radium have been disposed offsite.

It is the Air Force's opinion based on site history and waste characteristics that the origin of radionuclides except radium identified at CS 10 are associated with nuclear weapons testing related analyses. These analyses involved radioactive samples collected from nuclear test events and small quantities of traceable standards to assess radiochemistry efficiency and perform instrument calibration. We believe that the majority of this material falls under Section 91(b) of the Atomic Energy Act of 1954 (42 USC Section 2121). It is also our understanding that a proposed change in definition of by-product material under the Energy Policy Act of 2005 would expand NRC jurisdiction over radium. However, it remains unclear whether the NRC would regulate radium in soil, such as found at CS 10, under the proposed rule.

Under CERCLA, AFRPA has evaluated remedies for CS 10. The "Focused Strategic Sites Proposed Plan at Former McClellan AFB" (previously submitted to the NRC in October 2006) included a proposal for constructing a consolidation unit at the CS 10 site. The consolidation unit would be engineered to Resource Conservation and Recovery Act (RCRA) Class 1 standards and to meet all Federal and State requirements (e.g., composite liner, leachate

collection and monitoring, and composite cap). The site is intended to be used for permanent storage of the remaining soil excavated from CS 10 with the potential to place low level radioactive soils from future McClellan environmental projects. As such, long-term operation and maintenance and institutional controls including land use restrictions, site security, and monitoring would be implemented to ensure the long-term integrity of the consolidation unit and protection of human health.

CS 10 has been fully characterized as the entire site has been excavated, drum contents removed, and thousands of soil samples analyzed for radioactive materials and other hazardous constituents. Work performed at CS 10 has cost the Air Force over \$46M to date. The proposed CERCLA remedy for CS 10 (consolidation unit) would cost \$4M. Transporting and disposing of the remaining soil to an out-of-state licensed facility would cost \$20M.

The Air Force requests your determination on whether the NRC would have regulatory jurisdiction over the radioactive materials originally present at CS 10. Your findings will help establish the remediation process and criteria for this, and other McClellan sites.

Thank you for your timely support of this environmental management effort. We invite you and your decision-making team to visit McClellan for a tour of CS-10 and the other sites included in the Focused Strategic Sites Proposed Plan. This site visit may help your understanding of the historical activities, site characterization results, and the Air Force's proposed remedial actions. We look forward to your response no later than 29 June 2007. If you have any questions or need further input to process this request, I may be contacted at 202-767-4308 or e-mail at Mark.Wrobel@pentagon.af.mil. Our telefax is 202-404-8089.

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MARK C. WROBEL, Lt Col, USAF, BSC Chief, Radiation Protection Division USAF Radioisotope Committee Air Force Medical Support Agency Office of the Surgeon General

2 Attachments:

1. Confirmed Site 10 Total Radioactivity

2. AFIERA e-mail, 30 November 2000

cc:

NRC Region IV (Mr. Jack Whitten) HQ. NRC (Mr. Richard Struckmeyer) CA DHS (Ms. Penny Linewander) AFRPA Western Region (Mr. Mayer/Mr. Green) SAF/GCN-RPO (Mr. Curlee) AFIOH/SDRH (Capt Pugh/Mr. Cicotte/Mr. Reneghan/Mr. Harcek) AFLSA/JACE (Mr. Murad) AFLOA/JACE (Maj Pakola)

## TOTAL RADIOACTIVITY (Ci) **CONFIRMED SITE 10**

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	Ra-226	Cs-137	Pu- 238	Pu- 239/240	Pu- 241	Am-241	Eu-152	Eu-155	Np-237	Th-230	Th-232	U-233	U-235	U-238	Ag-108m
SOIL	7.30E-01	2.00E-05	QN	3.47E-05	QN	1.32E-05	2.52E-05	3.11E-04	8.16E-04	QN	2.82E-02	QN	4.19E-05	1.72E-03	QN
DRUMS CONTENTS &															-
COMMODITIES	1.32E-02	7.21E-07	3.27E-04	9.67E-03	7.25E-03	2.43E-03	3.01E-06	Q	Q	1.01E-06	Q	1.35E-07	4.69E-08	QN	5.11E-08
TOTAL (Ci):	7.43E-01	2.07E-05	3.27E-04	9.70E-03	7.25E-03	2.44E-03	2.82E-05	3.11E-04	8.16E-04	1.01E-06	2.82E-02	1.35E-07	4.19E-05	1.72E-03	5.11E-08
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7.94E-01 COMBINED TOTAL ACTIVITY (Ci)

### **REFERENCES:**

URS CS10/PRL32 Daily Field Reports, 15 August to 6 September 2000
Air Force Institute of Environmental Safety and Occupational Health Risk Analysis (AFIERA) E-Mail of 30 November 2000

Waste Manifest AF-R-99-03-EMC-01 for a shipment by New World Technologies on 19 January 2001
URS CS10 Interim Data Summary Report - Final - November 2004
MKM Engineers Waste Manifests, AFIOH/SDRR laboratory data for shipments of 27 September to 1 October 2004

# ATTACHMENT 2

### E-MAIL, 30 NOVEMBER 2000

### AIR FORCE INSTITUTE OF ENVIRONMENTAL SAFETY AND OCCUPATIONAL HEALTH RISK ANALYSIS (AFIERA)

DALE THOMAS BROOKS AFB TX

ATTACHMENT 2

Dave,

Here is the way I derived the activities for each of the items containing Pu.

The analytical results from Duke Engineering yielded the following results/relationships.

### Table 1

	Average	
	Value"	Ratio to
Isotope	(uCi/mL)	Am-241
Pu-238	0.035	0.135
Pu-239,Pu-240	1.047	4.004
Pu-241	0,783	2.994
Am-241	0.262	1.000

\*\* Based on the average value of two separate 10 mL aliquots from Jar 54

The jar labeled 54 yielded an estimated value of 19.9 uCi of total Am-241 activity (contained in 100 mL of solution). This comes from the gamma spectroscopy measurement(s) that we did while at McClellan AFB in mid-September. Taking the Am-241 value from the Duke results, it agrees fairly closely with the gamma spectroscopy measurement. (i.e., 0.262 uCi/mL x 100 mL =26.2 uCi). The Duke results were obtained from an extremely small volume (~ 1.27 x 10<sup>-6</sup> mL). In contrast, the gamma spectroscopy data was based on the measurement of the entire sample. I elected to use the measured value of the Am-241 from the entire sample (as obtained via gamma spectroscopy) in conjunction with isotopic ratios of Pu to Am-241 (obtained from Duke Engineering) to estimate the total isotopic quantities of Pu in each item.

The measured values of Am-241 for each item are:

### Table 2

Sample Identification	Isotope	Result	Activity Units
Brown Jar	Am-241	2000.00	Microcuries
Jar 964-0401	Am-241	354.60	Microcuries
Jar Labeled 54	Am-241	19.90	Microcuries
Jar Labeled 55	Am-241	7.70	Microcuries
Jar Labeled 56	Am-241	19.70	Microcuries
Jar Labeled 52	Am-241	19.50	Microcuries

The general formula used for computing the isotopic quantities for each item is as follows:

[Am-241 Activity (Table 2)] x [Pu-2??/Am-241 Ratio (Table 1)] = Pu-2?? Activity

The limiting assumption in this estimate is that the isotopic ratios of Pu to Am-241 for all items are consistent with those observed in the Jar Labeled 54.

	Am-241		Pu-239, Pu-	Pu-241
	(uCi/Sampl	Pu-238	240	(uCi/Sampl
	e)	(uCi/Sample)	(uCi/Sample)	e)
Brown Jar	2.0E+03	2.7E÷02	8.0E+03	6.0E+03
Jar 964-0401	3.5E+02	4.8E+01	1.4E+03	1.1E+03
Jar Labeled				
54	2.0E+01	2.7E+00	8.0E+01	6.0E+01
Jar Labeled				
55	7.7E+00	1.0E+00	3.1E+01	2.3E+01
Jar Labeled				
56	2.0E+01	2.7E+00	7.9E+01	5.9E+01
Jar Labeled				
5?	2.0E+01	2.6E÷00	7.8E+01	5.8E+01
Total				
Activity (uCi)	2.4E+03	3.3E+02	9.7E+03	7.3E+03
Total Mass				
(grams)	7.0481E-04	1.9058E-05	1.5632E-01	7.0346E-05
(8)				

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### DUKE ENGINEERING AND SERVICES ENVIRONMENTAL LABORATORY

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10 CFR Part 50/61 Analysis Report Page 1 of 1

Laboratory Sample Number:	Z13460	Customer:	McClellan APB
Sample Submission Code:	ILIQ97 3800	Sample Reference Date:	September 18, 2000
Hedia Type:	Liquid	Date Sample Received:	September 25, 2000
Total Amt of Sample Sent:		Report Date:	October 12, 2000

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### Sample Description: McClellan AFB - Yellow Fluid Vial #1

Analysis	Aliquot Weight Processed	Analysis	Activity Concentration Nat ± 10 Overall on Reference Date	Minimum Detectable Concentration (A) on Reference Date CALCULATED REQUIRED	
Requested	(mL)	Date	[µCi/mL]	( µCi/mL )	Note(s)
Pu-238	1.39901-06	10/11/00	r 2.75 ± 0.73 1 5-02	1.2 E-02	8
Pu-239.240	1.39908-06	10/11/00	1.076 ± 0.046 ] ±+00	1.5 E-02	B
Pu-241	1,2970E-03	10/07/00	7.98 ± 0.59 ] B-01	1.2 E-02	В
Am-241	1.41508-06	10/10/00	[ 2.37 ± 0.19 ] B-01	2.7 E-02	В
Cn-242	1.41305-06	10/10/00	[ 1.35 ± 0.43 ] E-02	3.6 X-03	B
Cm-243,244	1.41505-06	10/10/00	[ 2.5 ± 1.7 ] B-03	3.3 B-03	·

Note(s):

A - Calculated MDCs are a-posteriori values.

B - Results are statistically positive at the 99.9% confidence level (activity is greater than three times the standard deviation).

Reviewed by

, 10/12/co J. M. Raimondi

10/12/00

λ. D. Banavali

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### DUKE ENGINEERING AND SERVICES ENVIRONMENTAL LABORATORY

10 CFR Part 50/61 Analysis Report Page 1 of 1

Laboratory Sample Number:	Z13461	Customer:	McClellan AFB
Sample Submission Code:	ZLIQ96 3800	Sample Reference Date:	September 18, 2000
Hedia Type:	Liquid	Date Sample Received:	September 25, 2000
Total Amt of Sample Sent:		Report Date:	October 12, 2000

Sample Description: McClellan AFS - Yellow Fluid Viel #2

Analysis Requested	Aliquot Weight Processed (mL)	Anslysis Date	Activity Concentration Net ± 10 Overall on Reference Date [ µC1/mL ]	Hinimum Detectable Concentration (A) on Reference Date CALCULATED REQUIRED [ µCi/mL ] Note(2)
********	1 27408-06	10/11/00		
Pu-236	1.2/408-06	10/11/00	$4.3 \pm 1.0$ ] 2-02	1.3 5-02 B
Pu-239,240	1.27408-06	10/11/00	$\{1.018 \pm 0.051\}$ E+00	1.6 X-02 B
Pu-241	1.17105-03	10/07/00	[ 7.68 ± 0.56 ] 2-01	1.1 5-02
Am-241	1.27405-06	10/10/00	( 2.86 ± 0.22 ) E-01	3.0 8-02
Cm-242	1.27405-06	10/10/00	$3.0 \pm 2.1$ 1 E-03	4.0 5-03
cm-243,244	1.27408-06	10/10/00	[ 1.4 ± 1.4 ] E-03	3.7 2-03

Note(s):

 $\lambda$  - Calculated MDCs are a-posteriori values. B - Results are statistically positive at the 99.5% confidence level (activity is greater than three times the standard deviation),

Reviewed by

10/12/00 J. M. Raimondi

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