NEW MEXICO
ENVIRONMENT DEPARTMENT

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

December 28, 2011

David Scruggs, Chief
Environmental Restoration Program
49 CES/CEVR
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

SUBJECT: CONDITIONAL APPROVAL: BASEWIDE BACKGROUND STUDY REPORT
HOLLOMAN AIR FORCE BASE, EPA ID# NM6572124422
HWB-HAFB-09-004

Dear Mr. Scruggs:

The New Mexico Environment Department (NMED) has reviewed the United States Air Force's (Permittee's) *Basewide Background Study Report*, originally submitted January 2009. The report was subsequently revised in October 2009 (submitted December 7, 2009) in response to the NMED's May 4, 2009, Notice of Disapproval (NOD), and revised again March 10, 2011; April 1, 2011; and July 2011 in response to a NOD issued October 28, 2010. On August 12, 2011, the NMED issued a partial approval of the background study report setting forth the approved background levels for naturally occurring constituents at Holloman Air Force Base (HAFB) in soil and unfiltered (total) and filtered (dissolved) groundwater. NMED did not approve in the aforementioned August 2011 letter the background levels for radiochemical constituents because of various technical issues that were pending at the time.

The Permittee and the NMED were not able to resolve all technical issues concerning radiochemical constituents; these issues concern matrix interference matters which are unavoidable due to the natural conditions of soil and groundwater at HAFB. However, NMED finds that there is no evidence to suggest that the majority of the radiochemical data and their associated background statistics are flawed. Thus, the NMED is approving by this letter the background levels proposed by the Permittee for all radiochemical constituents, except that the levels for uranium radioisotopes have been adjusted as explained below. The approved

background levels are listed in Tables 1 and 2 of this letter. Background concentrations previously approved for chemical constituents in the August 2011 are also included in these tables and Table 3 of this letter.

The background levels are based in part on the Permittee's conclusion that soil and groundwater constituents are adequately represented as single populations at HAFB. However, there is some evidence that multiple populations for some constituents may exist at HAFB. Further, the variability of the sample data is large for many constituents in both soil and groundwater. Thus, NMED reserves the right to require a local background investigation should there be evidence of a significantly different background population for a given constituent at a particular Solid Waste Management Unit (SWMU) or Area of Concern (AOC).

Approved Background Levels for Soil

The background levels approved for soil apply to all depths, regardless of whether soil is saturated or unsaturated with groundwater, and are found in Table 1 of this letter. Some of the approved background levels are rounded up to the next highest tenth of a concentration unit from that proposed by the Permittee.

Table 1 – Approved Background Levels for Constituents in Soil

Soil Constituent	Approved Background Level	Unit	Remarks
Aluminum	13,722	mg/kg	
Antimony	1.6	mg/kg	
Arsenic	3.7	mg/kg	
Barium	169.3	mg/kg	
Beryllium	1.6	mg/kg	
Cadmium	0.3	mg/kg	
Calcium	317,332	mg/kg	
Chromium	25	mg/kg	
Cobalt	7.7	mg/kg	
Copper	13	mg/kg	
Iron	23,049	mg/kg	
Lead	10.9	mg/kg	
Magnesium	16,991	mg/kg	
Manganese	393	mg/kg	
Mercury	10.8	µg/kg	
Nickel	17.4	mg/kg	
Potassium	5,077	mg/kg	
Selenium	1.4	mg/kg	
Silver	1.1	mg/kg	
Sodium	5,196	mg/kg	
Thallium	1.3	mg/kg	
Tin	2.1	mg/kg	

Vanadium	42.6	mg/kg	
Zinc	54.6	mg/kg	
Carbon-14	0.84	pCi/g	
Radium-226	1.35	pCi/g	
Radium-228	0.95	pCi/g	
Lead-210	1.04	pCi/g	
Thorium-228	1.35	pCi/g	
Thorium-230	1.55	pCi/g	
Thorium-232	1.33	pCi/g	
Uranium-234	1.43	pCi/g	
Uranium-235/236	0.08	pCi/g	
Uranium-238	0.75	pCi/g	
Total Uranium	2.5	µg/g	

Approved Background Levels for Constituents in Groundwater

The approved background levels for groundwater constituents are found in Tables 2 and 3 of this letter, for unfiltered (total) and filtered (dissolved) constituents in groundwater, respectively. Approved background levels for radiochemical data are listed only in Table 2 for unfiltered constituents in groundwater. Table 3 is a duplicate of that found in the August 2011 letter, and is included here again for the convenience of presenting a complete set of tables. The Permittee is reminded that sampling and analysis of groundwater conducted under the Permittee's Hazardous Waste Operating Permit generally requires the collection of unfiltered water samples.

The proposed total uranium (U) background level exceeded the New Mexico Water Quality Control Commission (WQCC) Standard and the U. S. Environmental Protection Agency Maximum Contaminant Limit (MCL), both which are 30 µg/L. For this reason, the approved background level for total U was set to the WQCC standard/MCL as explained in the August 2011 letter. Similarly, the proposed background activity levels for the uranium isotopes U-234, U-235/236, U-238 need to be adjusted in consideration of the WQCC standard/MCL. These adjusted activities are listed in Table 2, and were calculated by the NMED by dividing the activity levels for U-234, U-235/236, U-238 that are associated with the highest sample value for total U (296.6 µg/L) by a factor of 9.89 (note that 296.6 µg/L ÷ 30 µg/L = 9.89).

Where groundwater monitoring or remediation is required at a SWMU or AOC and where the true background level for a given constituent is thought to be higher than a WQCC standard or MCL, the Permittee will need to demonstrate this fact based on the collection of empirical data from groundwater monitoring wells (background wells).

Table 2 – Approved Background Levels for Unfiltered (Total) Constituents in Groundwater

Groundwater Constituent	Approved Background Level	Unit	Remarks
Aluminum	1043	µg/L	
Antimony	6	µg/L	Set at MCL
Arsenic	10	µg/L	Set at MCL
Barium	38	µg/L	
Beryllium	4	µg/L	Set at MCL
Cadmium	5	µg/L	Set at MCL
Calcium	1136664	µg/L	
Chromium	12	µg/L	
Cobalt	36	µg/L	
Copper	9.8	µg/L	
Iron	300	µg/L	Set at MCL
Lead	9	µg/L	
Magnesium	3692782	µg/L	
Manganese	50	µg/L	Set at MCL
Mercury	0.5	µg/L	
Nickel	22	µg/L	
Potassium	212144	µg/L	
Selenium	50	µg/L	Set at MCL
Silver	10	µg/L	
Sodium	20989585	µg/L	
Thallium	2	µg/L	Set at MCL
Tin	58	µg/L	Set at maximum MDL
Vanadium	90	µg/L	
Zinc	17	µg/L	
Carbon-14	8.6	pCi/L	
Radium-226	2.62	pCi/L	
Radium-228	3.99	pCi/L	
Lead-210	3.10	pCi/L	
Thorium-228	0.99	pCi/L	
Thorium-230	0.37	pCi/L	
Thorium-232	0.061	pCi/L	
Uranium-234	18.5	pCi/L	Adjusted as described in the text of this letter
Uranium-235/236	0.39	pCi/L	Adjusted as described in the text of this letter
Uranium-238	10.01	pCi/L	Adjusted as described in the text of this letter
Total Uranium	30	µg/L	Set at MCL
Alkalinity	387	µg/L	
Chloride	35040	µg/L	BG exceeds MCL and WQCC standard in all samples
Sulfate	17419	µg/L	BG exceeds MCL and WQCC standard in all samples
Sulfide	1	µg/L	

Table 3 – Approved Background Levels for Filtered (Dissolved) Constituents in Groundwater

Groundwater Constituent	Approved Background Level	Unit	Remarks
Aluminum	54	µg/L	
Antimony	6	µg/L	Set at MCL
Arsenic	10	µg/L	Set at MCL
Barium	30.2	µg/L	
Beryllium	1	µg/L	
Cadmium	2.5	µg/L	
Calcium	1151302	µg/L	
Chromium	2.5	µg/L	
Cobalt	2.6	µg/L	
Copper	22	µg/L	Set to maximum of sample population
Iron	65.6	µg/L	
Lead	9	µg/L	
Magnesium	3630927	µg/L	
Manganese	50	µg/L	Set to MCL
Mercury	0.2	µg/L	
Nickel	15.9	µg/L	
Potassium	120480	µg/L	
Selenium	25.3	µg/L	
Silver	10	µg/L	
Sodium	19972499	µg/L	
Thallium	2	µg/L	Set at MCL
Tin	58	µg/L	Set at maximum MDL
Vanadium	73.8	µg/L	
Zinc	23	µg/L	Set to maximum of sample population

The Permittee is to conduct an investigation of background and contaminant levels of nitrate (plus nitrite), nitrite, and ammonia in groundwater across the Facility as directed in NMED's letter of October 28, 2010. NMED has received and approved the schedule for conducting this work.

If you have any questions regarding this matter, please contact Mr. William Moats of my staff at (505) 222-9551.

Sincerely,

John E. Kieling
Acting Chief
Hazardous Waste Bureau

cc: W. Moats, NMED HWB
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