



SUSANA MARTINEZ  
Governor

JOHN A. SANCHEZ  
Lieutenant Governor

**NEW MEXICO  
ENVIRONMENT DEPARTMENT**

*Hazardous Waste Bureau*

2905 Rodeo Park Drive East, Building 1  
Santa Fe, New Mexico 87505-6303  
Phone (505) 476-6000 Fax (505) 476-6030  
[www.nmenv.state.nm.us](http://www.nmenv.state.nm.us)



RYAN FLYNN  
Cabinet Secretary-Designate

BUTCH TONGATE  
Deputy Secretary

TOM BLAINE, P.E.  
Director  
Environmental Health Division

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

December 18, 2013

Mark Patterson  
BRAC Coordinator  
Ravenna Army Ammunition Plan  
Building 1037  
8451 State Route 5  
Ravenna, OH 44266

Steve Smith  
USACE FWDA Program Manager  
CESWF-PER-DD  
819 Taylor Street, Room 3B06  
PO Box 17300  
Fort Worth, TX 76102-0300

**RE: EVALUATION OF BACKGROUND LEVELS FOR ARSENIC IN SOIL  
FORT WINGATE DEPOT ACTIVITY, NEW MEXICO  
EPA ID# NM6213820974  
FWDA-MISC**

Dear Messrs. Patterson and Smith:

In light of concerns raised by the Army regarding the variability in natural arsenic concentrations in native New Mexico soils, the New Mexico Environment Department (NMED) has conducted the following assessment of the arsenic background levels at the Fort Wingate Depot Activity (FWDA).

An initial Background Study was performed for the U.S. Army Corps of Engineers (USACE) by Shaw Environmental Inc. (Shaw). This study was completed in 2010, as documented in a report entitled *Soil Background Study and Data Evaluation Report of Fort Wingate Depot Activity* (Shaw, 2010). The 2010 Background Study included collecting and analyzing both surface soil samples and subsurface soil samples collected from soil borings to determine background concentrations of the 23-element Target Analyte List (TAL) metals in soil at the FWDA based on ecological zones. The arsenic levels determined in the initial Background Study were used for subsequent comparison to site investigation data. However, problems arose as arsenic values from hundreds of samples from solid waste management units (SWMUs) and areas of concern (AOCs) where arsenic was not expected to be present due to historic activities exceeded the

background value (95% upper tolerance level, UTL) established in the 2010 Soil Background Study (calculated following the site attribution methodologies in the NMED Soil Screening Guidance). As there did not appear to be sources for arsenic in the investigation areas, the Army concluded that the arsenic concentrations determined in the 2010 report were not representative of arsenic at the FWDA and the background value were underestimated natural arsenic variability and concentrations.

In order to better define arsenic (and antimony) concentrations in soil, a Phase 2 Soil Background study at FWDA was undertaken. The results of the Phase 2 Background study were reported in the *Phase 2 Soil Background Report*, dated February 5, 2013 (USACE 2013). It refined the background levels of arsenic. However, FWDA continues to have issues with arsenic levels being slightly above background levels for given ecological zones or soil units. In addition, problems have been noted with arsenic levels in clean fill from off-site locations not meeting established background concentrations.

The detected arsenic concentrations in soil may be explained through: 1) natural variation in soils and geology, 2) transport of soils from higher elevations to lower areas through natural weathering and erosion processes, 3) off-site soils being brought in and used as fill, and 4) mixing of soils (surface and subsurface) through construction activities. However, it is also likely that arsenic could be a site contaminant where there are possible historical uses of arsenic such as: 1) heavy use of herbicides and pesticides, 2) buried or stockpiled wood (preservative), 3) lead batteries (Bleiwas, 2000), 4) discarded or destroyed munitions, and 5) as a byproduct from the burning of diesel fuel (or other dunnage).

It is agreed that in cases where site concentrations of arsenic are greater than previously established background values, and there are no possible sources of arsenic, a more flexible approach is required for assessing arsenic in FWDA soils.

Table 1 presents the arsenic results of soil background investigations for the Fort Wingate Army Depot (USACE, 2013).

<b>Table 1. Soil Background Study, Fort Wingate Depot Activity, New Mexico</b>					
<b>Dataset</b>	<b>Number of Samples</b>	<b>Minimum (mg/kg)</b>	<b>Maximum (mg/kg)</b>	<b>Mean (mg/kg)</b>	<b>95% UTL (mg/kg)</b>
Full dataset 2009	112	0.2	11.2	1.1	3.7
Full dataset 2012	100	0.6	14	2.3	4.3
Combined 2009 and 2012	212	0.2	14	1.7	3.9

1. mg/kg = milligrams per kilogram.
2. Values taken from Table 4-1 of USACE (2013).
3. USACE (2013) states that the value of 14 mg/kg in the 2012 dataset may be an outlier.

The following data are taken from the United States Geological Survey (USGS) geochemical database found at <http://mrdata.usgs.gov/pluto/soil/>. Data are grouped by county in the state of New Mexico. The samples were collected from surface and/or subsurface soil.

<b>County</b>	<b>Number of Results in Database</b>	<b>Minimum (ppm)</b>	<b>Maximum (ppm)</b>
Catron	2	1.5	4.1
Chaves	2	11	11
Cibola	60	2.2	36
Curry	1	5.5	5.5
De Baca	1	8.9	8.9
Dona Ana	17	4.3	11
Eddy	128	2.6	13
Grant	44	4.6	17
Guadalupe	1	2	2
Harding	4	4.9	7.5
Hidalgo	145	10	14
Lea	3	3.1	4.4
Lincoln	1	2	2
Luna	10	<0.1	<10 (2.78)
McKinley	4	5.6	11
Otero	2	3.9	4.3
Quay	1	3	3
Rio Arriba	8	3.1	11
Roosevelt	1	2.5	2.5
San Juan	149	1	40
San Miguel	1	6.2	6.2
Sandoval	2	6	9.9
Torrance	1	4.33	4.33
Union	4	4.5	7.6
Valencia	2	8.4	13

1. ppm = parts per million
2. Value in parenthesis is the maximum detected concentration.
3. Results with very high detection limits were not included in this summary table (data with detection limits 100 ppm or greater).

While there were only four quantifiable detections of arsenic in McKinley County by the USGS, the results are comparable to the data from the 2010 and 2013 FWDA background reports. The range of arsenic concentrations from the USGS report for McKinley County is 5.6 to 11 ppm (mg/kg) while the range of data for the FWDA is 0.2 to 11.2 mg/kg (the datum of 14 mg/kg is likely an outlier). The minimum detected concentration (5.6 mg/kg) for the USGS data is slightly greater than the UTL derived using FWDA data (depending on the datasets, between 3.7 to 4.3 mg/kg).

In lieu of a traditional site attribution analysis that follows the methodology in the NMED Soil Screening Guidance (NMED, 2012), the following approach will be applied to assessing arsenic in soils at the FWDA. A new background reference value of 5.6 mg/kg has been determined based on evaluation of FWDA and McKinley County data.

**Step 1.** Compare the site (SWMU/AOC) maximum arsenic concentration to the new background reference for arsenic (5.6 mg/kg). If the maximum detected concentration of arsenic from site soil is below 5.6 mg/kg, then no additional action is required and the arsenic may be considered background. If the site maximum is greater than 5.6 mg/kg, proceed to Step 2.

**Step 2.** Compare the range of site (SWMU/AOC) data to the range of background data (0.2 to 11.2 mg/kg). If the site range falls within the background range of arsenic, then no additional action is required and the arsenic may be considered background. If the site range is inconsistent with the background range, then additional investigation and/or correct action may be required.

This new background reference value allows for natural variability of arsenic in soil as well as accounts for fill material from another part of the county being brought in and used at the depot. Note that this approach will only be appropriate if arsenic is not suspected to be site-related for a specific SWMU/AOC and no source(s) for arsenic have been identified through review of site history. If arsenic is suspected to be site related and/or there are possible sources of arsenic, then the traditional site attribution analysis that follows the methodology outlined in the NMED (2012) Soil Screening Guidance and site specific background data presented in USACE (2013) must be applied.

## References

Bleiwas, Donald I., 2000. *Arsenic and Old Waste*. Interagency Working Group of the President's Council of Environmental Quality. February. <http://minerals.usgs.gov/minerals/mflow/d00-0195/>

New Mexico Environment Department (NMED), 2012. *Risk Assessment Guidance for Site Investigations and Remediation*. <http://www.nmenv.state.nm.us/HWB/guidance.html>

Messrs. Patterson and Smith  
December 18, 2013  
Page 5

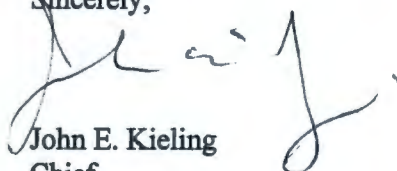
Shaw, 2010. *Soil Background Study and Data Evaluation Report, Fort Wingate Depot Activity, Gallup, New Mexico, Version 2 Final*-October 2010.

USACE, 2013. *Final Phase II Soil Background Report*. Fort Wingate Depot Activity, McKinley County, New Mexico. February, 2013.

U.S. Geological Survey, 2001. Geochemistry of soils in the US from the PLUTO database: U.S. Geological Survey, Reston, VA. <http://mrdata.usgs.gov/pluto/soil/>.

This approach is specific to arsenic concentrations detected at FWDA and does not apply to any other facility or constituents. If you have questions regarding this assessment please contact Neelam Dhawan of my staff at 505-476-6042.

Sincerely,



John E. Kieling  
Chief  
Hazardous Waste Bureau

cc: Neelam Dhawan, NMED HWB  
Dave Cobrain, NMED HWB  
Vicky Baca, NMED HWB  
Christy Esler, USACE  
Laurie King, U.S EPA Region 6  
Chuck Hendrickson, U.S. EPA Region 6  
Darrell Tsabetsaye, Zuni Pueblo  
Kirk Bemis, Zuni Pueblo  
Tony Perry, Navajo Nation  
Franklin Jishie, Navajo Nation  
Jason John, Navajo Nation  
Sharlene Begay-Platero, Navajo Nation  
Eugenia Quintana, Navajo Nation  
Clayton Seoutewa, Southwest Region BIA  
Rose Duwyenie, Navajo BIA  
Judith Wilson, BIA  
Eldine Stevens, BIA  
Matthew Kirkland, BIA

File: FWDA 2013 & Reading File, Arsenic Soil Background Assessment

