

April 3, 1998

Ronald M. Levy  
Directorate of Environment  
USACMLS & MPCENS & FM  
Building 141A, 13th Avenue  
Fort McClellan, Alabama 36205-5000

**RE: Draft Background Metals Survey Report  
Fort McClellan, Alabama**

Dear Mr. Levy:

The Alabama Department of Environmental Management has received and reviewed the Draft Background Metals Survey Report for Fort McClellan dated January 1998. We have enclosed our comments for your review and written response.

For any questions or concerns please call me at 334-271-7789 or facsimile at 334-279-3050.

Sincerely,

Christopher L. Johnson  
Governmental Facilities Section  
Hazardous Waste Branch  
Land Division

CLJ/tc

Enclosure

cc: Bart Reedy, EPA Region IV, w/ enclosure  
Ellis Pope, USACE, w/ enclosure

**ADEM'S COMMENTS ON THE DRAFT BACKGROUND METALS  
SURVEY REPORT, DATED JANUARY 1998  
FORT McCLELLAN, ALABAMA**

---

*General Comments*

1. The Department understands that the data validation process is still ongoing and any changes resulting from the QA/QC process will be addressed during preparation of the final report.
2. The mathematical calculations used to derive the summary statistics within Tables 4-23 through Tables 4-32 should be re-evaluated for errors. The Department has found discrepancies with the total number of samples used in the calculations, number of detects, minimum and maximum concentration within data sets, arithmetic mean, etc. Some of these discrepancies have been worked via conference calls with our staff and SAIC over the past several days, however there still are some errors that remain outstanding.

**RESPONSE:** The statistical calculations will be checked to ensure that the correct number of samples correspond between the data tables and the statistical tables. Mean values presented in the Draft report were calculated by compositing all usable historical and supplemental data. Non-detected values were used at one-half of the detection level in the average. Several samples were eliminated from the statistical calculations but were not removed from the data tables. These inconsistencies are corrected in the revised report.

3. The Department feels there are a number of outliers (upper bound only) in the data sets that are skewing the data above acceptable background concentrations to be used for our screening purposes. The BCT needs to agree on a method for evaluating these outliers and eliminating them, when appropriate, from the data sets. The Department recommends evaluating individual analytes within samples as opposed to entire samples when conducting outlier analysis. For example, eliminate Arsenic @ 219 ug/L from the Background Groundwater data set for Pelham Range, as opposed to eliminating the entire sample (GW-P8607).

**RESPONSE:** The issue of outliers was resolved by the BCT in June 1998 through identification of outlier values using probability plot diagrams. Outliers were not identified for groundwater, surface soil, and subsurface soil. Outlier analyte values for sediment included antimony (BG-D06, BG-D12, BG-D17, SD-BK-001, SD-BK-002), arsenic (BG-D17), beryllium (BG-D04), cobalt (BGP-D02), copper (BG-D06, BG-D16, BGP-D17, BGP-D18), lead (BG-D06, BG-D17, T5-D02), manganese (BGP-D02), and thallium (SD-BK-001, SD-BK-002) as identified by USEPA and SAIC. Samples containing outlier values for surface water (as identified by USEPA) included antimony (BG-W06, BGP-W03, BGP-W19), chromium (BG-W04, BGP-W03, BGP-W19), cobalt (BG-W04, BGP-W03, BGP-W19), copper (BG-W04, BGP-W13, BGP-W19), mercury (BGP-W03), selenium (BGP-W19), silver (BGP-W19, BGP-W22), thallium (BG-W04, BGP-W03, BGP-W19), vanadium (BGP-W03, BGP-W19), and zinc (BG-W04). Outlier values were identified by USEPA in a memorandum dated May 28, 1998. Outlier

values for antimony, cobalt, mercury, selenium, and silver represent the only detections for these constituents in surface water.

4. Once the above comments have been addressed, the Department recommends combining Main Post and Pelham Range background concentrations within each medium to produce one background data set for Fort McClellan. In other words, background screening levels will be identical for Main Post and Pelham Range. Fort McClellan Background Concentrations for surface water, sediment, surface soil, and subsurface soil, and groundwater will be used for all sites. This approach contributes the following:
- Provides a statistically powerful data set by increasing the number of samples within each medium by a factor of two, or approximately 50 data points per constituent, per media. This in turn increases our confidence about the true nature of background at Fort McClellan.
  - Streamlines our screening process tremendously, by allowing only one set of Site-Specific Screening Levels (SSSLs) for Fort McClellan, as opposed to two sets; one for Main Post and one for Pelham Range.

**RESPONSE:** Background data for groundwater, surface water, sediment, surface soil, and subsurface soil will be composited by medium for the Main Post and Pelham Range as directed by the Fort McClellan BCT.

### *Specific Comments*

#### #/Page/Section

#### Comment

1/2-5/2.4.1 Soil associations are briefly described in this section. A figure depicting the various soil formations, as well as the sampling locations within the formations, should be provided for Main Post and Pelham Range.

**RESPONSE:** Figures depicting the regional distribution of soil types on the Main Post and Pelham Range (per SCS 1961) are provided in the revised report.

2/2-5/2.5 Line number 29-32. The statement regarding the groundwater flow patterns needs some clarification. The U.S. Geological Survey's Water Resources Investigation Report 87-4031 entitled *Geohydrology and Susceptibility of Coldwater Spring and Jacksonville Fault Areas to Surface Water Contamination in Calhoun County, Alabama* includes the Main Post and much of Pelham Range. This report **does indicate** regional groundwater movement based on wells and springs between the cities of Anniston, Gadsden and Piedmont. The above document is not referenced in this report. Please revise.

**RESPONSE:** Information regarding regional groundwater flow patterns was added to the revised background report using the cited literature. The USGS report maps groundwater elevation using widely spaced municipal wells and springs with a contour interval of 50 feet. The map does not interpret potential hydrogeologic influence of the Pell City fault and splays occurring west of Fort McClellan in the vicinity of the City of Weaver and was regarded (by SAIC) as a preliminary interpretation of the hydrogeology of the region. Further, municipal wells are commonly installed

to maximize water yields and are consequently screened over large, productive aquifer intervals that may not accurately represent the potentiometric surface or flow directions within the aquifer. This is particularly evident for heterogeneous geologic settings where longer screen lengths can interconnect stratigraphic horizons with contrasting hydrogeologic properties and flow directions and underestimate vertical flow components.

3/3-1/3.1.1 Groundwater samples were taken from 16 locations on Main Post and 13 locations on/around Pelham Range. The locations of these samples are not easily determined from Plates 1 & 2 that were provided. Plates 1 & 2 depict more wells than the number of samples that were used in this survey or the labeling is incorrect. Please revise the plates to include only the locations that were used for the purposes of this report. Such locations should include the Weaver supply wells, and ANAD monitoring wells. Also, a brief summary discussing the depths, water levels, screened intervals, formations, and other pertinent information regarding the ANAD and City of Weaver wells should be provided in the report.

**RESPONSE:** Plates 1 and 2 show the locations of all of the monitoring wells and samples (historical and supplemental) that are included in the overall background data set. The ANAD monitoring well locations are shown on Figure 4-2 of the Draft report. The locations for the wells at Weaver have been added as an inset to Sheet 1 in the revised report.

4/3-3/3.1.3 Line 10. This sentence states “Background groundwater samples were obtained from 30 locations on the Main Post, Pelham Range, the city of Weaver, and ANAD.” Section 3, page 3-1, line 4 & 5 states that 16 locations on Main Post and 13 locations on Pelham Range were taken, giving a total of 29 groundwater sampling locations. Please clarify.

**RESPONSE:** Groundwater samples for the purpose of supplemental sampling were obtained from 29 locations. Planned groundwater sampling at the McCullers well (ANAD) was not conducted during the supplemental sampling because the well was found in a state of disrepair. The McCullers well was sampled during the ANAD RI and usable data from these samples are incorporated into the FTMC database.

5/Appendix C Figure 1 and 2. The figures presented are supposed to be geologic maps with soil and water sample locations for the Main Post and Pelham Range of Fort McClellan. However, there is no legend other than the symbols for the geologic formations and for a thrust fault. Even with these symbols, it is very difficult to determine the outcrop areas for the different formations. Also, there are no legend symbols to distinguish between the soil and water samples that are supposed to be depicted. Please revise maps.

**RESPONSE:** Color coding will be added to the sample location maps to further identify the geologic formations on Pelham Range and Main Post. The maps as presented in the Draft report contain a legend that identifies the symbols for the soil, groundwater, surface water, and sediment samples. The legend does contain an error in labeling that misidentifies the symbols used for monitoring wells and soil borings. This error will be corrected in the revised version of the report.

*End of Comments*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4



61 Forsyth Street  
Atlanta, Georgia 30303-3104

May 28, 1998

4WD-OTS

MEMORANDUM

**SUBJECT:** Risk review comments, ecological aspects,  
Fort McClellan  
Anniston, AL

**FROM:** Ted W. Simon, PhD. DABT, Toxicologist  
Office of Technical Services

**TO:** Bart Reedy, RPM  
FFB/BRAC

**CC:** Elmer W. Akin, Chief  
Office of Technical Services

The purpose of this memo is to provide background screening levels for surface water and sediment to be used at Fort McClellan main post and Pelham Range. Ms. Linda George performed the exploratory data analysis on the surface water analytical data, and I performed a similar analysis on the sediment analytical data. Details of this analysis is presented later in this memo.

Tables I and II below provide background sediment and surface water screening levels to be used with the twice background criterion test discussed in Region 4 Supplemental Guidance.<sup>1</sup>

---

<sup>1</sup>USEPA, 1995, Supplemental Guidance to RAGS: Region 4 Bulletins - Human Health Risk Assessment, #1, Data Collection and Evaluation.

**Table II - Average Background Levels and Background Screening Criteria in Surface Water**

Chemical	Average Background Conc. ( $\mu\text{g/L}$ )	Background Screening Criterion ( $\mu\text{g/L}$ )	Sampling Locations not considered
Aluminum	3237	6475	
Antimony	0.6	1.2	BG-W06, BGP-W03, BGP-W19
Arsenic	0.99	2.0	
Barium	39.6	80	
Beryllium	0.21		
Cadmium	0.18	0.36	
Chromium	10.4	21	BG-W04, BGP-W03, BGP-W19
Cobalt	11.6	23.2	BG-W04, BGP-W02, BGP-W19
Copper	8.5	17	BG-W04, BGP-W13, BGP-W19
Iron	12620	25240	
Lead	4.86	9.8	
Manganese	357	715	
Mercury	0.1	0.2	BGP-W03
Nickel	10.6	21.2	
Selenium	2.6	5.2	BGP-W19
Silver	0.07	0.14	BGP-W19, BGP-W22
Thallium	0.07	0.14	BG-W04, BGP@03, BGP-W19
Vanadium	13.1	26.2	BGP-W03, BGP-W19
Zinc	189	380	BG-W04

#### Probability Plots for Determination of Outliers

It was generally considered that human activities at the site could have contributed lead cadmium, chromium and nickel to natural background at the site. Any or all of these metals may be released to the environments from the discharge of military firearms. It was further assumed that the naturally occurring distributions of the metal concentrations were lognormal. In general,

4/30/98

## Ted Simon's comments on Fort McClellan risk assessment issues

These comments are in response to a request from the RPM to review a risk screening strategy in time for a meeting on Mon. 5/4/98.

### **Potential Pitfalls of Site-specific Risk Based Screening**

The memos from IT propose a site-specific risk screening protocol based on specific receptors and pathways at the myriad sites at the base. Such an approach is warranted because of the large number of sites. There is, however, a major concern with such an approach. If a decision for NFA is made based on a given exposure scenario and land use changes to an exposure scenario in which the receptors are exposed at higher levels, these receptors may experience unacceptable risk. Such a situation might slip through the proposed screening protocol.

My recommendation is to perform screening as indicated in the memo, but also screen against Region III RBCs to represent an unrestricted use scenario. The risk managers can compare the two lists of chemicals and determine whether any chemical should be included in the risk assessment.

Another minor drawback of excluding a future residential or unrestricted use scenario from the risk assessment involves a change of land use in the future. Once the land use changes, another risk assessment will need to be performed to account for the new land use.

A third drawback involves relative cost of cleanup for those sites requiring active remediation. With information only on a single scenario, risk managers will not be able to compare costs of cleanups to various use scenarios.

Of course, any screening should be performed against the maximum detected concentration of a given chemical at a site.

### **Cumulative Risk from all Media**

On page 4 of the March 25 memo, there is a discussion of TCE in groundwater resulting from another upgradient site. To stay in accord with the NCP, mention of the groundwater contamination should be made along with estimates of cumulative risk including the groundwater contamination. The document should also state the source of the contamination and whether cleanup is likely.

### **Use of statistics**

I am strongly in agreement with the theme of the memos that statistics is a tool to aid the exercise of judgment and not the last word regarding a decision. That said, I have some reservations about the proposed soil normalization procedure and would like more details.

**Soil screening levels based on protection of groundwater**

A hydrogeologist should review these screening levels to ensure they are calculated appropriately.

**Combining data to obtain a site-wide background estimate**

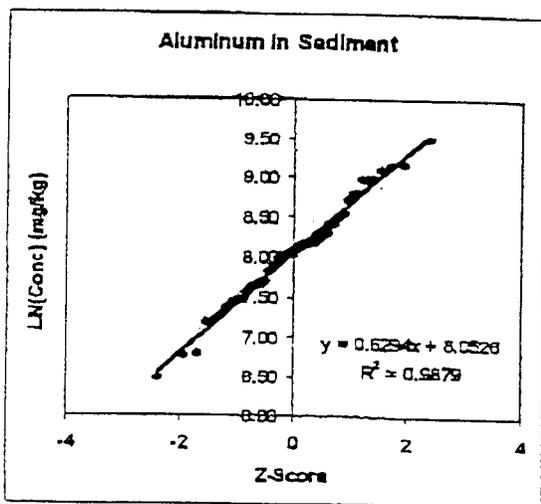
After conversations with Bill O'Steen, it seems appropriate to combine results from the main base and Pelham range in a single groundwater data set. There are four wells discussed in Bill O'Steen's recent memo that should be excluded from the data set for all inorganic analytes. In addition, he indicated that the soil types were likely to be sufficiently similar across both the main base and Pelham range to combine these data sets into a site-wide background.

Table I - Average Background Levels and Background Screening Criteria in Sediment

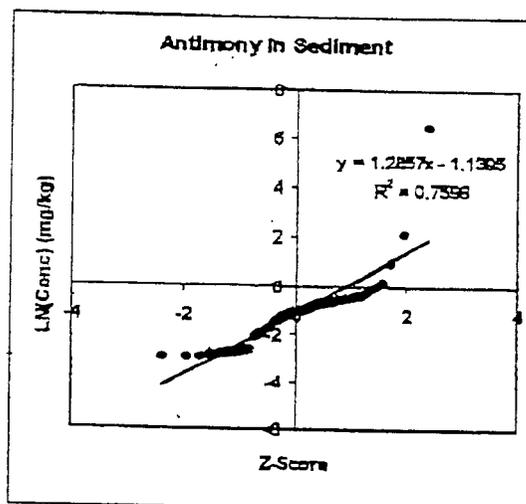
Chemical	Ave. Background Conc. (mg/kg)	2X Background Screening Criterion (mg/kg)	Sampling Locations Not Considered
Aluminum	3813	7626	
Antimony	0.35	0.7	BG-D06, BG-D12, BG-D17
Arsenic	5.6	11.2	BG-D17
Barium	48.1	96.2	
Beryllium	0.51	1.0	BG-D04
Cadmium	0.14	0.28	
Chromium	13.3	26.6	
Cobalt	5.7	11.4	BGP-D02
Copper	8.0	16.0	BG-D06, BG-D16, BGP-D17, BGP-D18
Iron	15626	31250	
Lead	21.1	42.2	BG-D06, BG-D17
Manganese	363	725	BGP-D02
Mercury	0.06	0.12	
Nickel	6.7	13.4	
Selenium	0.3	0.6	
Silver	0.12	0.24	
Thallium	0.06	0.12	
Vanadium	19.5	40	
Zinc	25.1	50	

metals in surface soil will be carried by surface flow during rainfall events to both sediment and surface water. One would expect that patchy occurrences of metals would undergo successive dilutions as they are carried to surface water and sediment. Hence, by the theory of successive random dilutions<sup>2</sup>, one would expect lognormal distributions of metals in these two media.

Lognormal distributions were in fact observed (See figures below). Probability plots were made by calculating a percentile for each datum, expressing this percentile as a z-score or standard normal and plotting the natural logarithm of each datum versus its z-score. This procedure should produce a linear plot for single distributions. If any high outliers departed from this straight line expectation, they were removed from the calculation of the mean (see Tables I and II). Simple visualization was used to decide whether a datum represented an outlier, and no formal outlier tests or goodness of fit tests were performed. Examples of sediment data without and with high outliers are shown below.



In sediment, the aluminum samples showed no high outliers and all were retained for computation of the average.



Three outliers were removed from the antimony data set for sediment.

Please let me know if you need further help.

Attachment: diskette with Excel files

T.W. Simon/tws:4WD-OTS:28642/05/28/98/A:\DISK3\MAY98\FTMC\_SWD.BGM.WPD

<sup>2</sup>Ott, WR (1995) *Environmental Statistics and Data Analysis*, Lewis Publishers, Boca Raton.