

MEMORANDUM

TO: Jack McBurney (*de maximis*)
C: Paul Ryan (Texaco)
FROM: Thomas V. Danahy, Daniel Nachman
DATE: January 12, 1995
SUBJECT: Selection of Soil Standards or Background Values for Metals, Tutu Wells Site, St. Thomas, U.S. Virgin Islands

As discussed in our telephone conversation today, Geraghty & Miller, Inc. would like to have concurrence from Tutu Environmental Investigation Committee (TEIC) and the U.S. Environmental Protection Agency (USEPA) on the selection of metal soil standards for the Final Remedial Investigation (RI) Report. As you know, in the draft RI we used 10 times the maximum background metal concentration to screen soil values. In USEPA's comments (dated December 28, 1994) on the Draft RI, General Comment 2 stated that New York State Technical and Administrative Guidance Memorandum (NYS TAGM) should be used as TBCs to determine soil impact. Please have the USEPA define the abbreviation "TBCs". The NYS TAGM levels provided by USEPA provide a soil value for only one inorganic (metal) parameter (arsenic = 7,500 ug/kg or site background). The NYS TAGM metal levels are derived from background values for soils in the eastern United States or New York State. These values are not useful as background soil values in St. Thomas.

According to the NYS TAGM, site-specific background values are to be used if available. On Page 9 of USEPA's comments, a specific comment for Page 5-3 states the "two times rule" should be used to identify chemicals of concern. The USEPA comments explained "if the mean of the site data exceeds two times the mean of the background data, then the element should be included as a chemical of concern."

As a reminder, the soil levels provided by USEPA were intended to address the potential impact to groundwater pathways (which was not evaluated by the baseline risk assessment). The USEPA comments also provided soil risk-based preliminary remedial goals (PRGs) for ingestion and inhalation pathways for manganese in residential (1,360 mg/kg) and commercial/industrial (9,500 mg/kg) areas.

Geraghty & Miller believes it is important to clarify the metals soil standards with the USEPA to avoid revision and re-submittal of the Final RI report. We believe the soil standards requested by the USEPA (2x the average background value) listed in Table 1 are inappropriate as indicated by the exceedence of these values at several properties, including non-source and likely non-impacted areas (i.e., churches and parking lots). It should be noted that 2x the average value often is approximately equal to the maximum background concentration. The use of the 2x the average value results in identifying many metals, most or all of which are naturally occurring, as chemicals of concern. It is our opinion that all of the metal concentrations detected are due to natural variations in metal concentrations in soil.

The NYS TAGM values were designated by USEPA to be used as soil standards for organic contaminants that may potentially impact groundwater above drinking water standards. Because metals adsorb onto soils and very little migration to groundwater occurs (as evidenced by low groundwater metal concentrations), the evaluation of the impact to groundwater pathway from metals in soils is not necessary.

The more likely exposure pathway for metals in soil is through ingestion and inhalation of airborne soil (dust). These pathways were evaluated on a site-specific basis by the USEPA in the Draft Endangerment Assessment. Geraghty & Miller believes metal soil concentrations identified as a concern based on risk assessment should be discussed in the RI.

Section 7.0 of the Final RI Report was intended to be a summary of USEPA's risk assessment. If the final risk assessment (or at least the final risk assessment standards) are not provided by the USEPA by January 18th, we recommend the deletion of Section 7.0. (This would not allow for discussion of chemicals of concern based on the risk assessment).

Using the USEPA recommended standards (2x above average background) the following properties exceed these values.

<u>Property</u>	<u>Metals Present Greater than 2x Avg. Background</u>
VIHA	Lead, <u>zinc</u> , arsenic
Curriculum Center	<u>Arsenic</u> , lead, <u>zinc</u> , copper, chromium, silver, <u>potassium</u>
Ramsay	Lead, potassium, zinc, barium, sodium
Texaco	Arsenic and potassium
Tillett	<u>Arsenic</u> , barium, copper, <u>potassium</u> , silver, zinc, <u>lead</u>
Four Winds Plaza	Arsenic, barium, lead, manganese, potassium
Western Auto	<u>Lead</u> , sodium, arsenic, <u>zinc</u> , barium, potassium
Vitelco	Potassium
Bsso Tutu	Arsenic
God of Holiness	Potassium
Assembly of God	Sodium
Lutheran Church	Barium, copper, potassium, <u>sodium</u>
O'Henry	<u>Barium</u> , manganese, potassium, zinc, <u>arsenic</u>

The metals underlined above are present at concentrations above 5 times the maximum background value. These standards (5x maximum background) provide a more realistic comparison and several of the non-suspect properties are eliminated.

Table 1. Comparison of Average Background Metal Concentrations with Maximum Background Concentrations, Tutu Wells Site, F. Thomas, U.S. Virgin Islands.

Metal	Background and Samples				Average Background Concentration	Twice Average Background Concentration	Maximum Background Concentration
	SS-1 (2.0' - 4.0')	SS-2 (2.0' - 4.0')	SS-8 (2.0' - 4.0')	B-7 (2.0' - 4.0')			
Aluminum	23600	16100	21500	28400	22400	44800	28400
Antimony	6.1	4.2	14.7	5.9	7.725	15.45	14.7
Arsenic	0.44	0.42	0.99	1	0.7125	1.425	1
Barium	41.9	30.1	29.3	36.9	34.55	69.1	41.9
Calcium	7500	9630	144000	51600	70082.5	140165	144000
Chromium	4	25.8	16.2	28.6	23.5	47	28.6
Cobalt	7	18	16.9	23.4	21	42	25.7
Copper	55.3	40.3	43.1	73.1	52.95	105.9	73.1
Cyanide, total	1.2	0.52	1.1	0.52	0.835	1.67	1.2
Iron	31300	22600	25400	35400	28675	57350	35400
Lead	2.1	1.7	2.5	19.8	6.525	13.05	19.8
Magnesium	20500	13200	21400	21500	19150	38300	21500
Manganese	763	535	888	828	753.5	1507	888
Nickel	18.9	15.5	12.9	17.8	16.275	32.55	18.9
Potassium	412	568	325	460	441.25	882.5	568
Silver	0.98	0.99	1.7	0.83	1.125	2.25	0.99
Sodium	557	157	187	561	365.5	731	561
Vanadium	109	74.9	82.1	94.8	90.2	180.4	109
Zinc	50.6	40.1	43.8	62.4	49.225	98.45	62.4

All values in parts per million (ppm), equivalent to milligrams per kilogram.

TUT 006 0493

Table 4-12. Maximum Natural Concentrations of Metals and Cyanide in Background Soil Samples, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.

Component Name	Sample ID	Results (mg/kg)	SA
Aluminum	B-7 (2 to 4 feet)	28400	142000
Antimony	SS-8	14.7	73.5
Arsenic	B-7 (2 to 4 feet)	1	5
Barium	SS-1	41.9	209.5
Calcium	SS-8	144000	720,000
Chromium	B-7 (2 to 4 feet)	28.6	143
Cobalt	SS-1	25.7	128.5
Copper	B-7 (2 to 4 feet)	73.1	365.5
Cyanide, Total	SS-1	1.2	6
Iron	B-7 (2 to 4 feet)	35400	177,000
Lead	B-7 (2 to 4 feet)	19.8	99
Magnesium	B-7 (2 to 4 feet)	21500	107,500
Manganese	SS-8	888	4440
Nickel	SS-1	18.9	94.5
Potassium	SS-2	568	2840
Silver	SS-2	0.99	4.95
Sodium	B-7 (2 to 4 feet)	561	2805
Vanadium	SS-1	109	545
Zinc	B-7 (2 to 4 feet)	62.4	312

Background samples were collected from four locations SS-1, SS-2, SS-8, and B-7 (2 to 4 feet).

ID Identification.

mg/kg Milligrams per kilogram (parts per million (ppm)).