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File: 541.460.000n
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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 529

File: 541.460.000.a
C.H. 529

TECHNICAL MEMORANDUM

CH2M HILL

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DATE: July 20, 1997

SUBJECT: Criteria and Background Data for DDMT Screening and BRAC Sites Evaluation

During the July 2nd, 1997, Base Cleanup Team (BCT) meeting, a process for evaluating BRAC and Screening Sites data was developed. Two steps in the process were to review background data and update screening criteria, if necessary. Background parameters with background concentrations exceeding screening criteria were identified. Following the terminology developed in the meeting to classify constituents (each parameter falls into one of four categories based on the possible combinations of exceeding background values and screening criteria [see Figure 1]), such background parameters were termed "Quad 3" parameters in the meeting An evaluation of BRAC and Screening Sites data was performed and the number of Quad 3 parameters for each media sampled is summarized in Table 1

The background values for Quad 3 parameters proposed in the draft *Background Sampling Program Technical Memorandum* (September 1996) are presented in Table 2. Alternate background values are proposed for some parameters based on removal of outliers or exclusion of background samples taken from the perimeter of DDMT. Evaluation of the perimeter and offsite surface soil data in the draft *Background Sampling Program Technical Memorandum* (September 1996) suggested statistically significant differences in the mean values from each population of data The lowest mean value, generally the offsite mean value, was proposed for each appropriate parameter. Outliers were identified in the datasets and removed so that more conservative (lower) background values will be used in the evaluation.

	Parameter Does Not Exceed Background Value	Parameter Exceeds Background Value
Parameter Does Not Exceed Screening Criteria	*Quad 1*	*Quad 2*
Parameter Exceeds Screening Criteria	*Quad 3*	*Quad 4*

Figure 1 Classification Scheme for BRAC and Screening Site Parameters.

Additionally, pesticides that were historically used at the base and elsewhere in the Memphis area were also included for background evaluations. These include persistent, accumulative pesticides such as DDT and its degradation produces (DDD and DDE), and dieldrin.

Screening criteria, except terrestrial ecology, that will be used in the evaluation are the Region III Risk Based Criteria (RBC). Following Region III and IV procedures, non-carcinogenic parameters were screened at 1/10th the RBC value. Terrestrial ecology screening criteria developed by the Oak Ridge National Laboratory will be used.

Table 1. Number of Detections Where Background Value Exceeds Screening Criteria (Quad 3) All Parameters			
Parameter	**# Quad 3**	**Matrix**	**Anthropogenic?**
1,1,2,2-Tetrachloroethane	9	SS	Y
4,4'-DDD	18	SD	Y
4,4'-DDE	3	SD	Y
4,4'-DDT	29	SD	Y
4,4'-DDT	4	SW	Y
Acenaphthene	11	SD	Y/N
Aluminum	18	SS	
Aluminum	5	SW	
Aluminum, Dissolved	1	SW	
Anthracene	12	SD	Y/N
Antimony	2	SS	
Arsenic	18	SD	Y/N
Arsenic	66	SS	Y/N
Arsenic	20	SB	Y/N
Arsenic	8	SW	Y/N
Arsenic, Dissolved	6	SW	Y/N
Barium	24	SS	
Barium	38	SS	
Benzene	1	SB	Y
Benzo(a)anthracene	15	SD	Y
Benzo(a)anthracene	3	SS	Y
Benzo(a)pyrene	22	SS	Y
Benzo(a)pyrene	14	SD	Y
Benzo(a)pyrene	2	SB	Y
Benzo(b)fluoranthene	2	SS	Y
Benzo(k)fluoranthene	2	SB	Y
Beryllium	25	SS	
bis(2-Ethylhexyl)phthalate	2	SS	Y*
bis(2-Ethylhexyl)phthalate	1	SW	Y*
Cadmium	8	SD	
Calcium	1	SD	
Carbazole	2	SS	Y
Chromium, total	39	SB	
Chromium, total	55	SS	
Chromium, total	1	SD	
Chrysene	16	SD	
Chrysene	3	SS	Y
Copper	6	SD	
Copper	1	SW	
Copper, Dissolved	1	SW	
Dibenz(a,h)anthracene	10	SD	Y/N
Dibenz(a,h)anthracene	1	SS	Y/N
Dieldrin	22	SB	Y
Dieldrin	33	SS	Y
Endrin	17	SD	Y
Fluoranthene	14	SD	Y/N
Fluorene	16	SD	Y/N
Iron	25	SS	
Iron	1	SW	

Table 1. Number of Detections Where Background Value Exceeds Screening Criteria (Quad 3) All Parameters			
Parameter	**# Quad 3**	**Matrix**	**Anthropogenic?**
Iron	7	SD	
Lead	5	SW	
Lead	13	SD	
Lead	188	SS	
Lead	38	SB	
Lead, Dissolved	2	SW	
Manganese	21	SS	
Mercury	2	SD	
Nickel	137	SS	
Nickel	28	SB	
Pentachlorophenol	1	SB	Y
Pentachlorophenol	3	SW	Y
Pentachlorophenol	2	SS	Y
Phenanthrene	15	SD	Y/N
Pyrene	17	SD	Y/N
Silver, Dissolved	1	SW	
Thallium	4	SS	
Trichloroethene	6	SS	Y
Vanadium	27	SS	
Zinc	15	SD	
Zinc	41	SS	

Notes: SS = Surface Soil.
SB = Subsurface Soil.
SW = Surface Water.
SD = Sediment.
Y/N = Can be naturally occurring in low levels in plants.
Y* = Plasticers that can be contributed by sampling equipment.

Table 2. Alternate Background Data for Quad 3 Parameters.					
Parameter	**Matrix**	**Units**	**Draft Background[1]**	**Alternate Background**	**Comments**
Arsenic	SB	mg/kg	**17**		
Arsenic	SD	mg/kg	**12**		17 detections. No outliers.
Arsenic	SS	mg/kg	21 8	**16.5**	Offsite locations only. Dropped outlier of 27.7.
Arsenic	SW	ug/L	**18**		No outliers
Arsenic, Dissolved	SW	ug/L	**12.4**		No outliers
Barium	SB	mg/kg	**300**		No outliers
Barium	SS	mg/kg	253	**234**	Offsite locations only
Beryllium	SS	mg/kg	**1.1**		No outliers. Perimeter and offsite values nearly identical
Cadmium	SD	mg/kg	**28.9**		Only 3 detections.
Chromium	SB	mg/kg	**26.4**		No outliers.
Chromium	SD	mg/kg	38	**20**	Dropped 2 outliers (174 and 40).
Chromium	SS	mg/kg	27 4	**24.8**	Based on offsite mean of 12 4.
Copper	SD	mg/kg	271	**58**	Dropped 2 outliers (512 and 1250 -- both are J qualified)
Dieldrin	SS	ug/kg	530	**86**	Nonparametric distribution -- Maximum value proposed. Alternate value is maximum of three offsite dieldrin detections.
p,p'-DDD	SD	ug/kg	**6.1**		
p,p'-DDD	SS	ug/kg	**6.7**		
p,p'-DDE	SD	ug/kg	**7.2**		
p,p'-DDE	SS	ug/kg	**160**		
p,p'-DDT	SS	ug/kg	**74**		
Lead	SD		69	**35.2**	Removed 2 outliers.
Lead	SS	mg/kg	42 6	**30**	Offsite values only with 73 3 mg/kg outlier removed.
Lead	SW	ug/L	**18.6**		Twice mean detected. No outliers.
Lead, Dissolved	SW	ug/L	**11.3**		Maximum detected. Only one detected.
Mercury	SD	mg/kg	**4**		Only one detection.
Nickel	SS	mg/kg	33	**30**	No outliers. Offsite values only
Nickel	SB	mg/kg	**37**		No positive outliers

Table 2. Alternate Background Data for Quad 3 Parameters.					
Parameter	**Matrix**	**Units**	**Draft Background[1]**	**Alternate Background**	**Comments**
Vanadium	SS	mg/kg	52	**48.4**	No outliers. Offsite values only.

Notes. [1]Based on twice the mean detected value for all 22 inorganic samples collected.
Bolded values will be used in BRAC and Screening Site evaluation.
SS = Surface Soil
SB = Subsurface Soil
SW = Surface Water
SD = Sediment

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