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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 539

TECHNICAL MEMORANDUM

CH2MHILL

Additional BRAC Sampling Data Results

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1. Introduction

In the September and October, 1997, BRAC Cleanup Team (BCT) Meetings, additional data needs were identified by the BCT for characterization of BRAC parcels. Specific characterization needs were discussed to establish the Environmental Condition of Property (ECP) rankings of BRAC Subparcels that were suspected of potential management or release of hazardous material. The data needs are summarized in Table 1.

Additional sampling at the Golf Course, ballfield, and playground areas was also discussed. These data were reported in the Final Streamlined Risk Assessment for Parcel 3, DDMT (CEHNC; January, 1999) and will not be discussed herein. Also additional dieldrin sampling was performed in Parcels 2 and 15. Pesticide concentrations at these locations were below the site-specific criteria for dieldrin (0.360 mg/kg) and both residential and industrial risk-based criteria for DDT and DDE. The data will be discussed in the Main Installation Remedial Investigation (RI).

The purpose of this memorandum is to present the additional BRAC data, evaluate it against screening criteria, and thus provide a basis for the BCT to evaluate the ECP categories for these subparcels.

2. Discussion of Results

Sample locations presented in Table 1 are plotted in Figure 1. Comparison of the surface soil data to both residential and industrial land use criteria is presented in Table 2. Table 2 presents all detected concentrations and identifies parameters that exceed land-use specific criteria (bold data exceed only residential criteria, bold italic data exceed both residential and industrial criteria). Risk-based criteria in Table 2 were updated based on the most recent (October, 1998) Region III risk-based criteria (RBC). The BCT value for chromium (39 mg/kg) was updated to 23 mg/kg, the most recent Region III screening RBC (at hazard index of 0.1) for chromium III.

2.1. Parcel 31

Table 2 indicates that there are no parameters that exceed the industrial land use criteria. Metals antimony, iron and chromium benzo(a)pyrene exceed residential land use criteria. Antimony concentrations exceed the background-based BCT criteria by no more than 30%. Chromium concentrations exceed the residential RBC criteria by no more than 50% at two of the four locations. Iron concentrations do not exceed the background value of 37,040 mg/kg. Benzo(a)pyrene, the only PAH exceeding criteria, exceeds the residential criteria by about 100%.

2.2. Parcel 26.1 – Building 970

PAH compounds are elevated above residential and industrial criteria in both samples taken at the edge of the concrete pad comprising the open storage are of Building 970. Iron concentrations do not exceed background.

2.3. Parcel 30.2 – Building 925

Table 2 indicates that there are no parameters exceeding the industrial land use criteria in the two samples taken near the southwest and southeast corners of Building 925. PAH compounds exceed the residential criteria in both samples. Antimony barely exceeds the background-based BCT criteria by less than 10% in both samples. Aluminum and iron concentrations are below background values (aluminum background is 23,810 mg/kg). Volatile organic compounds (VOC) were not detected.

2.4. Parcel 10.2 – Oil Spill

Total petroleum hydrocarbon concentrations were detected below the Tennessee Department of Environment and Conservation (TDEC) Underground Storage Tank (UST) Program criteria of 100 mg/kg for petroleum contaminated soil. In one sample, arsenic exceeds the 20 mg/kg background-based BCT criteria by a factor of 175% and antimony barely exceeds the BCT criteria by 6%. PAH compounds exceed the residential RBCs in both samples. Dieldrin is detected but at concentrations below the 390 mg/kg DDMT criteria. Aluminum and iron concentrations are below background.

2.5. Parcel 33.8 – Building 863 Battery Storage Operations

There are no metals concentrations exceeding criteria in the surface soil. Iron concentrations are below background.

3. Recommendations

3.1. Parcel 31

Since industrial criteria are not exceeded, Parcel 31 can be transferred for industrial uses. Exceedence of residential screening criteria is not extreme or widespread. Risk associated with PAHs is being evaluated in the Main Installation Baseline Risk Assessment.

3.2. Parcel 26.1 – Building 970

PAH compounds will require risk assessment, currently being performed in the Main Installation baseline risk assessment, before the risk to human health can be establised at Parcel 26.1. PAH compounds are being evaluated as a sitewide constituent.

3.3. Parcel 30.2 – Building 925

Since industrial criteria are not exceeded, Parcel 31 can be transferred for industrial uses. Risk associated with PAHs is being evaluated in the Main Installation baseline risk assessment and will establish the residential land-use risk associated with exposure to PAH compounds.

3.4. Parcel 10.2 – Oil Spill

Further evaluation of the elevated arsenic concentration should be performed to evaluate the human health risk potential. This evaluation is taking place in the Main Installation RI.

3.5. Parcel 33.8 – Building 863 Battery Operations

Metals data do not indicate any impact the environment from battery storage and handling operations in Building 863.

Table 1. Summary of Additional BRAC Data Collection			
Data Need	**Purpose**	**Samples**	**Analyses**
Additional surface soil (0-1 ft) sampling at Parcel 31.	Provide additional data in large Parcel without adequate BRAC sample coverage. Discussed in October BCT.	B(31.1), C(31.1), D(31.1), E(31.1)	ICP Metals (SW6010), Mercury (SW7471), Pest/PCBs (SW8080), VOA (SW8260), SVOA (SW8270)
Additional surface soil sampling at Parcel 26.2.	Determine if there is any impact to surface soils from operations in Bldg 970. Samples taken in runoff areas. Discussed in October BCT.	A(26.2), B(26.2)	
Additional surface soil sampling at Parcel 30.2.	Evaluate spill of volatile compounds in area south of Bldg 925. Collect samples in area most likely affected by spill. Discussed in September BCT.	A(30.2), B(30.2)	
Additional soil sampling at Parcel 10.2.	Evaluate reported hydraulic oil spill near intersection of 5th and G Streets.	E(10.2), F(10.2)	TCL, TAL, Total Petroleum Hydrocarbons
Evaluate battery recharge operations at Parcel 33.8.	Determine if metals have been released from building. Sample likely drainage areas from building.	A(33.8), B(33.8)	Metals by ICP (SW6010)

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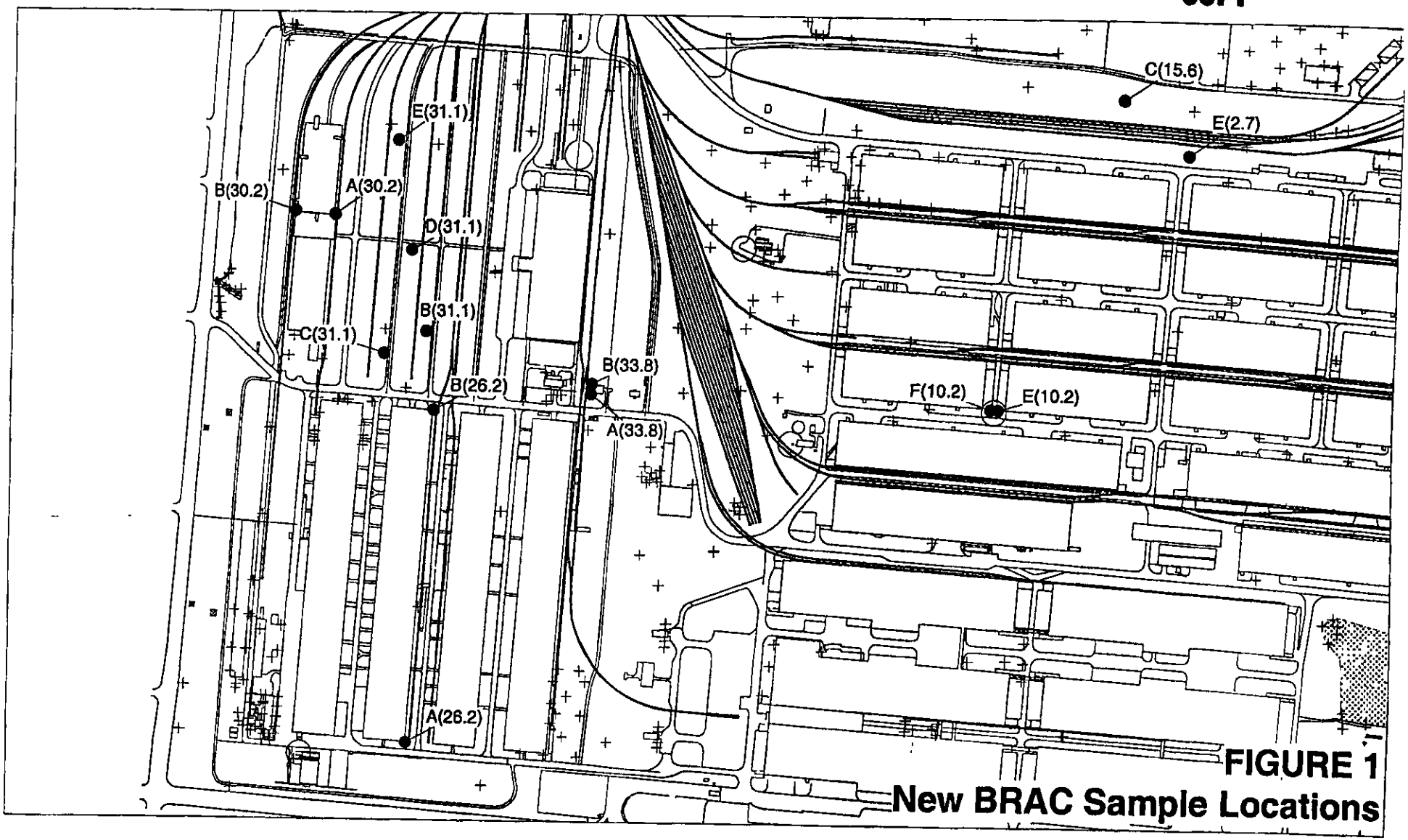

FIGURE 1
New BRAC Sample Locations

Tabl 2. Additional BRAC Data Evaluation

All Data Collected January 6-8 1998

Detected Concentrations Only

Units are in mg/kg

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
E(2.7)	DIELDRIN	0.22	=	0.39	0.39	BCT	0.56	0.56
E(10.2)	ACENAPHTHENE	0.29	J	1200	470	HI=0.1	0.00	0.00
E(10.2)	**ALUMINUM**	**9020**	=	**100000**	**7800**	**HI=0.1**	**0.09**	**1.16**
E(10.2)	ANTHRACENE	0.54	J	61000	2300	HI=0.1	0.00	0.00
E(10.2)	**ANTIMONY**	**8**	J	**82**	**7**	**HI=0.1/BCT**	**0.10**	**1.14**
E(10.2)	**ARSENIC**	**39.6**	=	**20**	**20**	**BCT**	**1.98**	**1.98**
E(10.2)	BARIUM	97.2	=	14000	550	HI=0.1	0.01	0.18
E(10.2)	**BENZO(a)ANTHRACENE**	**2**	=	**7.8**	**0.87**	**HI=0.1**	**0.26**	**2.30**
E(10.2)	**BENZO(a)PYRENE**	**1.8**	=	**7.8**	**0.088**	**Indust/BCT**	**0.23**	**20.45**
E(10.2)	BENZO(b)FLUORANTHENE	2	=	78	8.7	HI=0.1	0.03	0.23
E(10.2)	BENZO(g,h,I)PERYLENE	1.3	=	6100	230	HI=0.1	0.00	0.01
E(10.2)	BENZO(k)FLUORANTHENE	1.6	=	78	8.7	HI=0.1	0.02	0.18
E(10.2)	CADMIUM	0.22	J	200	7.8	HI=0.1	0.00	0.03
E(10.2)	CALCIUM	2960	=	NA	NA	NA	NA	NA
E(10.2)	CARBAZOLE	0.61	J	290	32	HI=0.1	0.00	0.02
E(10.2)	CHROMIUM	12.7	=	610	23	Updated BCT	0.02	0.55
E(10.2)	CHRYSENE	2.2	=	780	87	HI=0.1	0.00	0.03
E(10.2)	COBALT	5.8	J	12000	470	HI=0.1	0.00	0.01
E(10.2)	COPPER	15.3	=	8200	310	HI=0.1	0.00	0.05
E(10.2)	DDE	0.65	=	17	1.9	HI=0.1	0.04	0.34
E(10.2)	DDT	0.24	=	17	1.9	HI=0.1	0.01	0.13
E(10.2)	DIBENZOFURAN	0.12	J	820	31	HI=0.1	0.00	0.00
E(10.2)	DIELDRIN	0.086	J	0.39	0.39	BCT	0.22	0.22
E(10.2)	FLUORANTHENE	5	=	8200	310	HI=0.1	0.00	0.02
E(10.2)	FLUORENE	0.23	J	8200	310	HI=0.1	0.00	0.00
E(10.2)	**INDENO(1,2,3-c,d)PYRENE**	**1.2**	=	**7.8**	**0.87**	**HI=0.1**	**0.15**	**1.38**
E(10.2)	**IRON**	**15200**	=	**61000**	**2300**	**HI=0.1**	**0.25**	**6.61**
E(10.2)	LEAD	37.9	J	1000	400	HI=0.1	0.04	0.09
E(10.2)	MAGNESIUM	1910	=	NA	NA	NA	NA	NA
E(10.2)	MANGANESE	415	=	2900	1100	HI=0.1	0.14	0.38
E(10.2)	MERCURY	0.05	=	61	2.3	HI=0.1	0.00	0.02
E(10.2)	NICKEL	13.5	J	4100	160	HI=0.1	0.00	0.08
E(10.2)	PETROLEUM HYDROCARBONS	64.1	=	100	100	IDEC UST	0.64	0.64
E(10.2)	PHENANTHRENE	3.1	=	6100	230	HI=0.1	0.00	0.01
E(10.2)	POTASSIUM	1940	=	NA	NA	NA	NA	NA
E(10.2)	PYRENE	3.6	=	610	230	HI=0.1	0.01	0.02
E(10.2)	VANADIUM	22.2	=	14000	550	HI=0.1	0.00	0.04
E(10.2)	ZINC	57	=	610000	23000	HI=0.1	0.00	0.00
E(10.2)	ACENAPHTHENE	0.093	J	1200	470	HI=0.1	0.00	0.00
E(10.2)	**ALUMINUM**	**8440**	=	**100000**	**7800**	**HI=0.1**	**0.08**	**1.08**
E(10.2)	ANTHRACENE	0.16	J	61000	2300	HI=0.1	0.00	0.00
E(10.2)	**ANTIMONY**	**7.4**	J	**82**	**7**	**HI=0.1/BCT**	**0.09**	**1.06**
E(10.2)	**ARSENIC**	**54.9**	=	**20**	**20**	**BCT**	**2.75**	**2.75**
E(10.2)	BARIUM	82.7	=	14000	550	HI=0.1	0.01	0.15
E(10.2)	**BENZO(a)PYRENE**	**0.7**	=	**7.8**	**0.088**	**Indust/BCT**	**0.09**	**7.95**
E(10.2)	BENZO(b)FLUORANTHENE	0.7	=	78	8.7	HI=0.1	0.01	0.08
E(10.2)	BENZO(g,h,I)PERYLENE	0.49	=	6100	230	HI=0.1	0.00	0.00
E(10.2)	BENZO(k)FLUORANTHENE	0.64	=	78	8.7	HI=0.1	0.01	0.07
E(10.2)	CADMIUM	0.23	J	200	7.8	HI=0.1	0.00	0.03
E(10.2)	CALCIUM	2360	=	NA	NA	NA	NA	NA

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
F(10.2)	CARBAZOLE	0.17	J	290	32	HI=0.1	0.00	0.01
F(10.2)	CHROMIUM	11.9	=	610	23	Updated BCT	0.02	0.52
F(10.2)	CHRYSENE	0.78	=	780	87	HI=0.1	0.00	0.01
F(10.2)	COBALT	5.5	J	12000	470	HI=0.1	0.00	0.01
F(10.2)	COPPER	15.5	=	8200	310	HI=0.1	0.00	0.05
F(10 2)	DDE	0.2	=	17	1.9	HI=0.1	0.01	0.11
F(10.2)	DDT	0.084	=	17	1.9	HI=0.1	0.00	0.04
F(10.2)	DIELDRIN	0.11	=	0.39	0.39	BCT	0.28	0.28
F(10.2)	FLUORANTHENE	1.5	=	8200	310	HI=0.1	0.00	0.00
F(10.2)	FLUORENE	0.066	J	8200	310	HI=0.1	0.00	0.00
F(10 2)	INDENO(1,2,3-c,d)PYRENE	0.48	=	7.8	0.87	HI=0.1	0.06	0.55
F(10.2)	**IRON**	**14100**	**=**	**61000**	**2300**	**HI=0.1**	**0.23**	**6.13**
F(10.2)	LEAD	31.1	J	1000	400	HI=0.1	0.03	0.08
F(10 2)	MAGNESIUM	1670	=	NA	NA	NA	NA	NA
F(10.2)	MANGANESE	379	=	2900	1100	HI=0.1	0.13	0.34
F(10.2)	NICKEL	13.5	J	4100	160	HI=0.1	0.00	0.08
F(10.2)	PETROLEUM HYDROCARBONS	15.7	=	100	100	IDEC UST	0.16	0.16
F(10.2)	PHENANTHRENE	0.97	=	6100	230	HI=0.1	0.00	0.00
F(10 2)	POTASSIUM	2070	=	NA	NA	NA	NA	NA
F(10.2)	PYRENE	1.4	=	610	230	HI=0.1	0.00	0.01
F(10.2)	TOLUENE	0.002	J	4100	1600	HI=0.1	0.00	0.00
F(10.2)	VANADIUM	21.5	=	14000	550	HI=0.1	0.00	0.04
F(10.2)	ZINC	51.9	=	610000	23000	HI=0.1	0.00	0.00
C(15.6)	DDE	0.014	J	17	1.9	HI=0.1	0.00	0.01
C(15.6)	DDT	0.016	J	17	1.9	HI=0.1	0.00	0.01
C(15 6)	DIELDRIN	0.13	=	0.39	0.39	BCT	0.33	0.33
A(26.2)	ACENAPHTHENE	1.9	J	1200	470	HI=0.1	0.00	0.00
A(26.2)	ALUMINUM	2940	=	100000	7800	HI=0.1	0.03	0.38
A(26.2)	ANTHRACENE	3 7	J	61000	2300	HI=0.1	0.00	0.00
A(26.2)	ANTIMONY	3.5	J	82	7	HI=0.1/BCT	0.04	0.50
A(26.2)	BARIUM	122	=	14000	550	HI=0.1	0.01	0.22
A(26.2)	***BENZO(a)ANTHRACENE***	***16***	***=***	***7.8***	***0.87***	***HI=0.1***	***2.05***	***18.39***
A(26.2)	***BENZO(a)PYRENE***	***15***	***=***	***7.8***	***0.088***	***Indust/BCT***	***1.92***	***170.45***
A(26.2)	**BENZO(b)FLUORANTHENE**	**15**	**=**	**78**	**8.7**	**HI=0.1**	**0.19**	**1.72**
A(26 2)	BENZO(g,h,I)PERYLENE	9	=	6100	230	HI=0.1	0.00	0.04
A(26.2)	**BENZO(k)FLUORANTHENE**	**16**	**=**	**78**	**8.7**	**HI=0.1**	**0.21**	**1.84**
A(26.2)	BERYLLIUM	0.18	J	410	1.6	HI=0.1	0.00	0.11
A(26.2)	CADMIUM	0.38	J	200	7.8	HI=0.1	0.00	0.05
A(26 2)	CALCIUM	223000	=	NA	NA	NA	NA	NA
A(26.2)	CARBAZOLE	4.6	J	290	32	HI=0.1	0.02	0.14
A(26.2)	CHROMIUM	12.2	=	610	23	Updated BCT	0.02	0.53
A(26 2)	CHRYSENE	18	=	780	87	HI=0.1	0.02	0.21
A(26.2)	COBALT	1.5	J	12000	470	HI=0.1	0.00	0.00
A(26.2)	COPPER	7.8	=	8200	310	HI=0.1	0.00	0.03
A(26.2)	DIBENZOFURAN	1	J	820	31	HI=0.1	0.00	0.03
A(26.2)	FLUORANTHENE	30	=	8200	310	HI=0.1	0.00	0.10
A(26.2)	FLUORENE	2	J	8200	310	HI=0.1	0.00	0.01
A(26.2)	***INDENO(1,2,3-c,d)PYRENE***	***9.2***	***=***	***7.8***	***0.87***	***HI=0.1***	***1.18***	***10.57***
A(26.2)	IRON	5490	=	61000	2300	HI=0.1	0.09	2.39
A(26.2)	LEAD	15 4	J	1000	400	HI=0.1	0.02	0.04
A(26.2)	MAGNESIUM	10900	=	NA	NA	NA	NA	NA
A(26.2)	MANGANESE	194	=	2900	1100	HI=0.1	0.07	0.18
A(26.2)	METHYLENE CHLORIDE	0.006	J	760	85	HI=0.1	0.00	0.00
A(26.2)	NAPHTHALENE	0.63	J	4100	160	HI=0.1	0.00	0.00
A(26 2)	NICKEL	8.2	J	4100	160	HI=0.1	0.00	0.05
A(26.2)	PHENANTHRENE	21	=	6100	230	HI=0.1	0.00	0.09

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
A(26.2)	POTASSIUM	4650	J	NA	NA	NA	NA	NA
A(26 2)	PYRENE	25	=	610	230	HI=0.1	0.04	0.11
A(26.2)	SODIUM	784	J	NA	NA	NA	NA	NA
A(26.2)	VANADIUM	6.8	=	14000	550	HI=0.1	0.00	0.01
A(26 2)	ZINC	56.2	=	610000	23000	HI=0.1	0.00	0.00
B(26.2)	ACENAPHTHENE	5	J	1200	470	HI=0.1	0.00	0.01
B(26.2)	ALUMINUM	3040	=	100000	7800	HI=0.1	0.03	0.39
B(26.2)	ANTHRACENE	11	J	61000	2300	HI=0.1	0.00	0.00
B(26.2)	ANTIMONY	2.6	J	82	7	HI=0.1/BCT	0.03	0.37
B(26.2)	ARSENIC	0.43	J	20	20	BCT	0.02	0.02
B(26.2)	BARIUM	93.3	=	14000	550	HI=0.1	0.01	0.17
B(26.2)	***BENZO(a)ANTHRACENE***	***40***	***=***	***7.8***	***0.87***	***HI=0.1***	***5.13***	***45.98***
B(26.2)	***BENZO(a)PYRENE***	***37***	***=***	***7.8***	***0.088***	***Indust/BCT***	***4.74***	***420.45***
B(26.2)	**BENZO(b)FLUORANTHENE**	**39**	**=**	**78**	**8.7**	**HI=0.1**	**0.50**	**4.48**
B(26.2)	BENZO(g,h,i)PERYLENE	22	=	6100	230	HI=0.1	0.00	0.10
B(26.2)	**BENZO(k)FLUORANTHENE**	**34**	**=**	**78**	**8.7**	**HI=0.1**	**0.44**	**3.91**
B(26.2)	BERYLLIUM	0.05	J	410	1.6	HI=0.1	0.00	0.03
B(26.2)	CADMIUM	0.53	J	200	7.8	HI=0.1	0.00	0.07
B(26.2)	CALCIUM	227000	=	NA	NA	NA	NA	NA
B(26.2)	CARBAZOLE	10	J	290	32	HI=0.1	0.03	0.31
B(26.2)	CHROMIUM	12	=	610	23	Updated BCT	0.02	0.52
B(26.2)	CHRYSENE	46	=	780	87	HI=0.1	0.06	0.53
B(26.2)	COBALT	0.88	J	12000	470	HI=0.1	0.00	0.00
B(26.2)	COPPER	6.3	=	8200	310	HI=0.1	0.00	0.02
B(26.2)	DIBENZOFURAN	2.4	J	820	31	HI=0.1	0.00	0.08
B(26 2)	FLUORANTHENE	71	=	8200	310	HI=0.1	0.01	0.23
B(26.2)	FLUORENE	4.8	J	8200	310	HI=0.1	0.00	0.02
B(26.2)	***INDENO(1,2,3-c,d)PYRENE***	***22***	***=***	***7.8***	***0.87***	***HI=0.1***	***2.82***	***25.29***
B(26.2)	**IRON**	**3960**	**=**	**61000**	**2300**	**HI=0.1**	**0.06**	**1.72**
(26.2)	LEAD	42.3	J	1000	400	HI=0.1	0.04	0.11
(26 2)	MAGNESIUM	8490	=	NA	NA	NA	NA	NA
(26.2)	MANGANESE	90.3	=	2900	1100	HI=0.1	0.03	0.08
(26.2)	METHYLENE CHLORIDE	0.002	J	760	85	HI=0.1	0.00	0.00
(26.2)	NICKEL	4.9	J	4100	160	HI=0.1	0.00	0.03
(26.2)	PHENANTHRENE	52	=	6100	230	HI=0.1	0.01	0.23
(26.2)	POTASSIUM	4440	J	NA	NA	NA	NA	NA
(26.2)	PYRENE	71	=	610	230	HI=0.1	0.12	0.31
(26.2)	SODIUM	863	J	NA	NA	NA	NA	NA
(26.2)	VANADIUM	6.8	=	14000	550	HI=0.1	0.00	0.01
(26.2)	ZINC	81.2	=	610000	23000	HI=0.1	0.00	0.00
(30.2)	ALPHA-CHLORDANE	0.012	=	16	1.8	HI=1	0.00	0.01
(30.2)	**ALUMINUM**	**9880**	**=**	**100000**	**7800**	**HI=0.1**	**0.10**	**1.27**
(30.2)	**ANTIMONY**	**7.6**	**J**	**82**	**7**	**HI=0.1/BCT**	**0.09**	**1.09**
(30.2)	ARSENIC	6.9	=	20	20	BCT	0.35	0.35
(30.2)	BARIUM	103	=	14000	550	HI=0.1	0.01	0.19
(30 2)	BENZO(a)ANTHRACENE	0.26	J	7.8	0.87	HI=0.1	0.03	0.30
(30.2)	**BENZO(a)PYRENE**	**0.3**	**J**	**7.8**	**0.088**	**Indust/BCT**	**0.04**	**3.41**
(30.2)	BENZO(b)FLUORANTHENE	0.45	=	78	8.7	HI=0.1	0.01	0.05
(30 2)	BENZO(g,h,i)PERYLENE	0.31	J	6100	230	HI=0.1	0.00	0.00
(30.2)	BENZO(k)FLUORANTHENE	0.35	J	78	8.7	HI=0.1	0.00	0.04
(30.2)	bis(2-ETHYLHEXYL) PHTHALATE	0.1	J	410	46	HI=0.1	0.00	0.00
(30 2)	CADMIUM	0.24	J	200	7.8	HI=0.1	0.00	0.03
(30.2)	CALCIUM	21100	=	NA	NA	NA	NA	NA
(30.2)	CHROMIUM	15.4	=	610	23	Updated BCT	0.03	0.67
(30.2)	CHRYSENE	0.38	J	780	87	HI=0.1	0.00	0.00
(30 2)	COBALT	5.5	J	12000	470	HI=0.1	0.00	0.01

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
A(30.2)	COPPER	16.5	=	8200	310	HI=0.1	0.00	0.05
A(30.2)	DDE	0.016	=	17	1.9	HI=0.1	0.00	0.01
A(30.2)	DDT	0.041	=	17	1.9	HI=0.1	0.00	0.02
A(30.2)	DIBENZ(a,h)ANTHRACENE	0.061	J	0.78	0.087	HI=0.1	0.08	0.70
A(30.2)	DIELDRIN	0.014	J	0.39	0.39	BCT	0.04	0.04
A(30.2)	FLUORANTHENE	0.33	J	8200	310	HI=0.1	0.00	0.00
A(30.2)	GAMMA-CHLORDANE	0.014	=	16	1.8	HI=0.1	0.00	0.01
A(30.2)	INDENO(1,2,3-c,d)PYRENE	0.27	J	7.8	0.87	HI=0.1	0.03	0.31
A(30.2)	**IRON**	**15600**	**=**	**61000**	**2300**	**HI=0.1**	**0.26**	**6.78**
A(30.2)	LEAD	25.6	J	1000	400	HI=0.1	0.03	0.06
A(30.2)	MAGNESIUM	2590	=	NA	NA	NA	NA	NA
A(30.2)	MANGANESE	516	=	2900	1100	HI=0.1	0.18	0.47
A(30.2)	METHYLENE CHLORIDE	0.002	J	760	85	HI=0.1	0.00	0.00
A(30.2)	NICKEL	12.7	J	4100	160	HI=0.1	0.00	0.08
A(30.2)	PHENANTHRENE	0.083	J	6100	230	HI=0.1	0.00	0.00
A(30.2)	POTASSIUM	1980	=	NA	NA	NA	NA	NA
A(30.2)	PYRENE	0.38	J	610	230	HI=0.1	0.00	0.00
A(30.2)	TOLUENE	0.016	=	4100	1600	HI=0.1	0.00	0.00
A(30.2)	TOTAL XYLENES	0.002	J	4100000	160000	HI=0.1	0.00	0.00
A(30.2)	VANADIUM	23.4	=	14000	550	HI=0.1	0.00	0.04
A(30.2)	ZINC	53.8	=	610000	23000	HI=0.1	0.00	0.00
B(30.2)	ACENAPHTHENE	1.2	J	1200	470	HI=0.1	0.00	0.00
B(30.2)	**ALUMINUM**	**9440**	**=**	**100000**	**7800**	**HI=0.1**	**0.09**	**1.21**
B(30.2)	ANTHRACENE	1.9	=	61000	2300	HI=0.1	0.00	0.00
B(30.2)	**ANTIMONY**	**7.3**	**J**	**82**	**7**	**HI=0.1/BCT**	**0.09**	**1.04**
B(30 2)	ARSENIC	6.8	=	20	20	BCT	0.34	0.34
B(30 2)	BARIUM	85.3	=	14000	550	HI=0.1	0.01	0.16
B(30.2)	**BENZO(a)ANTHRACENE**	**6.6**	**=**	**7.8**	**0.87**	**HI=0.1**	**0.85**	**7.59**
B(30.2)	**BENZO(a)PYRENE**	**6.3**	**=**	**7.8**	**0.088**	**Indust/BCT**	**0.81**	**71.59**
B(30.2)	BENZO(b)FLUORANTHENE	6.4	=	78	8.7	HI=0.1	0.08	0.74
B(30.2)	BENZO(g,h,i)PERYLENE	4.2	=	6100	230	HI=0.1	0.00	0.02
B(30 2)	BENZO(k)FLUORANTHENE	5.7	=	78	8.7	HI=0.1	0.07	0.66
B(30.2)	CADMIUM	0.42	J	200	7.8	HI=0.1	0.00	0.05
B(30 2)	CALCIUM	47800	=	NA	NA	NA	NA	NA
B(30.2)	CARBAZOLE	1.8	=	290	32	HI=0.1	0.01	0.06
B(30.2)	CHROMIUM	18.6	=	610	23	Updated BCT	0.03	0.81
B(30.2)	CHRYSENE	7.1	=	780	87	HI=0.1	0.01	0.08
B(30.2)	COBALT	5.5	J	12000	470	HI=0.1	0.00	0.01
B(30.2)	COPPER	15.3	=	8200	310	HI=0.1	0.00	0.05
B(30 2)	DIBENZOFURAN	0.44	J	820	31	HI=0.1	0.00	0.01
B(30.2)	FLUORANTHENE	13	=	8200	310	HI=0.1	0.00	0.04
B(30.2)	FLUORENE	0.77	J	8200	310	HI=0.1	0.00	0.00
B(30.2)	**INDENO(1,2,3-c,d)PYRENE**	**4.1**	**=**	**7.8**	**0.87**	**HI=0.1**	**0.53**	**4.71**
B(30.2)	**IRON**	**14500**	**=**	**61000**	**2300**	**HI=0.1**	**0.24**	**6.30**
B(30.2)	LEAD	44	J	1000	400	HI=0.1	0.04	0.11
B(30.2)	MAGNESIUM	3230	=	NA	NA	NA	NA	NA
B(30 2)	MANGANESE	348	=	2900	1100	HI=0.1	0.12	0.32
B(30 2)	METHYLENE CHLORIDE	0.002	J	760	85	HI=0.1	0.00	0.00
B(30.2)	NAPHTHALENE	0.38	J	4100	160	HI=0.1	0.00	0.00
B(30.2)	NICKEL	11	J	4100	160	HI=0.1	0.00	0.07
B(30.2)	PHENANTHRENE	9.7	=	6100	230	HI=0.1	0.00	0.04
B(30.2)	POTASSIUM	1910	=	NA	NA	NA	NA	NA
B(30.2)	PYRENE	12	=	610	230	HI=0.1	0.02	0.05
B(30.2)	TOLUENE	0.017	=	4100	1600	HI=0.1	0.00	0.00
B(30.2)	VANADIUM	20.9	=	14000	550	HI=0.1	0.00	0.04
B(30.2)	ZINC	69.9	=	610000	23000	HI=0.1	0.00	0.00

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
B(31.1)	ALUMINUM	4000	=	100000	7800	HI=0.1	0.04	0.51
B(31.1)	ANTIMONY	4.6	J	82	7	HI=0.1/BCT	0.06	0.66
B(31.1)	ARSENIC	3.7	=	20	20	BCT	0.19	0.19
B(31.1)	BARIUM	47.6	=	14000	550	HI=0.1	0.00	0.09
B(31.1)	CADMIUM	0.32	J	200	7.8	HI=0.1	0.00	0.04
B(31.1)	CALCIUM	25200	=	NA	NA	NA	NA	NA
B(31.1)	CHROMIUM	21.5	=	610	23	Updated BCT	0.04	0.93
B(31.1)	COBALT	1.5	J	12000	470	HI=0.1	0.00	0.00
B(31.1)	COPPER	7.1	=	8200	310	HI=0.1	0.00	0.02
B(31.1)	DDE	0.0088	J	17	1.9	HI=0.1	0.00	0.00
B(31.1)	DDT	0.058	=	17	1.9	HI=0.1	0.00	0.03
B(31.1)	DIELDRIN	0.0058	J	0.39	0.04	BCT	0.01	0.15
B(31.1)	**IRON**	**8440**	**=**	**61000**	**2300**	**HI=0.1**	**0.14**	**3.67**
B(31.1)	LEAD	67.2	J	1000	400	HI=0.1	0.07	0.17
B(31.1)	MAGNESIUM	1130	=	NA	NA	NA	NA	NA
B(31.1)	MANGANESE	90.3	=	2900	1100	HI=0.1	0.03	0.08
B(31.1)	METHYLENE CHLORIDE	0.002	J	760	85	HI=0.1	0.00	0.00
B(31.1)	NICKEL	4.4	J	4100	160	HI=0.1	0.00	0.03
B(31.1)	POTASSIUM	692	=	NA	NA	NA	NA	NA
B(31.1)	VANADIUM	10.9	=	14000	550	HI=0.1	0.00	0.02
B(31.1)	ZINC	99.8	=	610000	23000	HI=0.1	0.00	0.00
C(31.1)	ALUMINUM	4380	=	100000	7800	HI=0.1	0.04	0.56
C(31.1)	ANTIMONY	3.5	J	82	7	HI=0.1/BCT	0.04	0.50
C(31.1)	ARSENIC	2.4	J	20	20	BCT	0.12	0.12
C(31.1)	BARIUM	29.5	=	14000	550	HI=0.1	0.00	0.05
C(31.1)	BENZO(a)ANTHRACENE	0.16	J	7.8	0.87	HI=0.1	0.02	0.18
C(31.1)	**BENZO(a)PYRENE**	**0.18**	**J**	**7.8**	**0.088**	**Indust/BCT**	**0.02**	**2.05**
C(31.1)	BENZO(b)FLUORANTHENE	0.22	J	78	8.7	HI=0.1	0.00	0.03
C(31.1)	BENZO(g,h,i)PERYLENE	0.11	J	6100	230	HI=0.1	0.00	0.00
C(31.1)	BENZO(k)FLUORANTHENE	0.19	J	78	8.7	HI=0.1	0.00	0.02
C(31.1)	BERYLLIUM	0.07	J	410	1.6	HI=0.1	0.00	0.04
C(31.1)	bis(2-ETHYLHEXYL) PHTHALATE	0.043	J	410	46	HI=0.1	0.00	0.00
C(31.1)	CADMIUM	0.3	J	200	7.8	HI=0.1	0.00	0.04
C(31.1)	CALCIUM	4650	=	NA	NA	NA	NA	NA
C(31.1)	**CHROMIUM**	**35.3**	**=**	**610**	**23**	**Updated BCT**	**0.06**	**1.53**
C(31.1)	CHRYSENE	0.21	J	780	87	HI=0.1	0.00	0.00
C(31.1)	COBALT	1	J	12000	470	HI=0.1	0.00	0.00
C(31.1)	COPPER	8	=	8200	310	HI=0.1	0.00	0.03
C(31.1)	DDE	0.3	J	17	1.9	HI=0.1	0.02	0.16
C(31.1)	DDT	0.67	J	17	1.9	HI=0.1	0.04	0.35
C(31.1)	DIBENZ(a,h)ANTHRACENE	0.046	J	0.78	0.087	HI=0.1	0.06	0.53
C(31.1)	FLUORANTHENE	0.35	J	8200	310	HI=0.1	0.00	0.00
C(31.1)	INDENO(1,2,3-c,d)PYRENE	0.11	J	7.8	0.87	HI=0.1	0.01	0.13
C(31.1)	**IRON**	**4350**	**=**	**61000**	**2300**	**HI=0.1**	**0.07**	**1.89**
C(31.1)	LEAD	208	J	1000	400	HI=0.1	0.21	0.52
C(31.1)	MAGNESIUM	351	J	NA	NA	NA	NA	NA
C(31.1)	MANGANESE	47.8	=	2900	1100	HI=0.1	0.02	0.04
C(31.1)	MERCURY	0.05	=	61	2.3	HI=0.1	0.00	0.02
C(31.1)	METHYLENE CHLORIDE	0.002	J	760	85	HI=0.1	0.00	0.00
C(31.1)	NICKEL	3.3	J	4100	160	HI=0.1	0.00	0.02
C(31.1)	PENTACHLOROPHENOL	0.048	J	48	5.3	HI=0.1	0.00	0.01
C(31.1)	PHENANTHRENE	0.19	J	6100	230	HI=0.1	0.00	0.00
C(31.1)	POTASSIUM	983	=	NA	NA	NA	NA	NA
C(31.1)	PYRENE	0.29	J	610	230	HI=0.1	0.00	0.00
C(31.1)	VANADIUM	9.7	=	14000	550	HI=0.1	0.00	0.02
C(31.1)	ZINC	66.3	=	610000	23000	HI=0.1	0.00	0.00

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
D(31.1)	ALUMINUM	792	=	100000	7800	HI=0.1	0.01	0.10
D(31.1)	ANTIMONY	1.8	J	82	7	HI=0.1/BCT	0.02	0.26
D(31.1)	BARIUM	8	J	14000	550	HI=0.1	0.00	0.01
D(31.1)	BENZO(a)ANTHRACENE	0.037	J	7.8	0.87	HI=0.1	0.00	0.04
D(31.1)	BENZO(a)PYRENE	0.04	J	7.8	0.088	Indust/BCT	0.01	0.45
D(31.1)	BENZO(b)FLUORANTHENE	0.049	J	78	8.7	HI=0.1	0.00	0.01
D(31.1)	BENZO(k)FLUORANTHENE	0.04	J	78	8.7	HI=0.1	0.00	0.00
D(31.1)	BERYLLIUM	0.03	J	410	1.6	HI=0.1	0.00	0.02
D(31.1)	bis(2-ETHYLHEXYL) PHTHALATE	0.069	J	410	46	HI=0.1	0.00	0.00
D(31.1)	CADMIUM	0.53	J	200	7.8	HI=0.1	0.00	0.07
D(31.1)	CALCIUM	306000	=	NA	NA	NA	NA	NA
D(31.1)	CHROMIUM	7	J	610	23	Updated BCT	0.01	0.30
D(31.1)	CHRYSENE	0.048	J	780	87	HI=0.1	0.00	0.00
D(31.1)	COBALT	0.34	J	12000	470	HI=0.1	0.00	0.00
D(31.1)	COPPER	2.8	=	8200	310	HI=0.1	0.00	0.01
D(31.1)	DDE	0.0043	=	17	1.9	HI=0.1	0.00	0.00
D(31.1)	DDT	0.006	=	17	1.9	HI=0.1	0.00	0.00
D(31.1)	FLUORANTHENE	0.062	J	8200	310	HI=0.1	0.00	0.00
D(31.1)	IRON	1860	=	61000	2300	HI=0.1	0.03	0.81
D(31.1)	LEAD	8.7	J	1000	400	HI=0.1	0.01	0.02
D(31.1)	MAGNESIUM	4500	J	NA	NA	NA	NA	NA
D(31.1)	MANGANESE	42.4	=	2900	1100	HI=0.1	0.01	0.04
D(31.1)	METHYLENE CHLORIDE	0.005	J	760	85	HI=0.1	0.00	0.00
D(31.1)	NICKEL	4.9	J	4100	160	HI=0.1	0.00	0.03
D(31.1)	POTASSIUM	2540	J	NA	NA	NA	NA	NA
D(31.1)	PYRENE	0.057	J	610	230	HI=0.1	0.00	0.00
D(31.1)	SODIUM	810	J	NA	NA	NA	NA	NA
D(31.1)	VANADIUM	4.2	J	14000	550	HI=0.1	0.00	0.01
D(31.1)	ZINC	40.8	=	610000	23000	HI=0.1	0.00	0.00
E(31.1)	ALUMINUM	4310	=	100000	7800	HI=0.1	0.04	0.55
E(31.1)	**ANTIMONY**	**8.9**	**J**	82	**7**	**HI=0.1/BCT**	**0.11**	**1.27**
E(31.1)	ARSENIC	4.3	=	20	20	BCT	0.22	0.22
E(31.1)	BARIUM	18	J	14000	550	HI=0.1	0.00	0.03
E(31.1)	BENZO(a)PYRENE	0.05	J	7.8	0.088	Indust/BCT	0.01	0.57
E(31.1)	BENZO(b)FLUORANTHENE	0.059	J	78	8.7	HI=0.1	0.00	0.01
E(31.1)	BENZO(g,h,i)PERYLENE	0.041	J	6100	230	HI=0.1	0.00	0.00
E(31.1)	BENZO(k)FLUORANTHENE	0.051	J	78	8.7	HI=0.1	0.00	0.01
E(31.1)	BERYLLIUM	0.03	J	410	1.6	HI=0.1	0.00	0.02
E(31.1)	bis(2-ETHYLHEXYL) PHTHALATE	0.13	J	410	46	HI=0.1	0.00	0.00
E(31.1)	CADMIUM	0.61	=	200	7.8	HI=0.1	0.00	0.08
E(31.1)	CALCIUM	1940	=	NA	NA	NA	NA	NA
E(31.1)	**CHROMIUM**	**29.5**	**=**	**610**	**23**	**Updated BCT**	**0.05**	**1.28**
E(31.1)	CHRYSENE	0.053	J	780	87	HI=0.1	0.00	0.00
E(31.1)	COBALT	2	J	12000	470	HI=0.1	0.00	0.00
E(31.1)	COPPER	12.2	=	8200	310	HI=0.1	0.00	0.04
E(31.1)	DDE	0.007	J	17	1.9	HI=0.1	0.00	0.00
E(31.1)	DDT	0.019	=	17	1.9	HI=0.1	0.00	0.01
E(31.1)	DIELDRIN	0.0023	J	0.39	0.39	BCT	0.01	0.01
E(31.1)	FLUORANTHENE	0.074	J	8200	310	HI=0.1	0.00	0.00
E(31.1)	**IRON**	**14300**	**=**	**61000**	**2300**	**HI=0.1**	**0.23**	**6.22**
E(31.1)	LEAD	63.7	J	1000	400	HI=0.1	0.06	0.16
E(31.1)	MAGNESIUM	338	J	NA	NA	NA	NA	NA
E(31.1)	MANGANESE	76.4	=	2900	1100	HI=0.1	0.03	0.07
E(31.1)	METHYLENE CHLORIDE	0.002	J	760	85	HI=0.1	0.00	0.00
E(31.1)	NICKEL	5.1	J	4100	160	HI=0.1	0.00	0.03
E(31.1)	POTASSIUM	607	=	NA	NA	NA	NA	NA

Station	ParamName	Value	Qual	Indus-trial Criteria	Resid-ential Criteria	Criteria Basis	Indust. Criteria/ Value	Resid. Criteria/ Value
E(31.1)	PYRENE	0.066	J	610	230	HI=0.1	0.00	0.00
E(31.1)	VANADIUM	15.9	=	14000	550	HI=0.1	0.00	0.03
E(31.1)	ZINC	60.5	=	610000	23000	HI=0.1	0.00	0.00
A(33.8)	ALUMINUM	6310	=	100000	7800	HI=0.1	0.06	0.81
A(33.8)	ANTIMONY	2.2	J	82	7	HI=0.1/BCT	0.03	0.31
A(33.8)	ARSENIC	1.1	J	20	20	BCT	0.06	0.06
A(33.8)	BARIUM	14.9	J	14000	550	HI=0.1	0.00	0.03
A(33.8)	CADMIUM	0.15	J	200	7.8	HI=0.1	0.00	0.02
A(33.8)	CALCIUM	176000	=	NA	NA	NA	NA	NA
A(33.8)	CHROMIUM	8	=	610	23	Updated BCT	0.01	0.35
A(33.8)	COBALT	0.73	J	12000	470	HI=0.1	0.00	0.00
A(33.8)	COPPER	3.6	=	8200	310	HI=0.1	0.00	0.01
A(33.8)	**IRON**	**5280**	=	**61000**	**2300**	**HI=0.1**	**0.09**	**2.30**
A(33.8)	LEAD	6.6	J	1000	400	HI=0.1	0.01	0.02
A(33.8)	MAGNESIUM	3490	=	NA	NA	NA	NA	NA
A(33.8)	MANGANESE	40.9	=	2900	1100	HI=0.1	0.01	0.04
A(33.8)	NICKEL	4.8	J	4100	160	HI=0.1	0.00	0.03
A(33.8)	POTASSIUM	1810	J	NA	NA	NA	NA	NA
A(33.8)	SODIUM	348	J	NA	NA	NA	NA	NA
A(33.8)	VANADIUM	10.7	=	14000	550	HI=0.1	0.00	0.02
A(33.8)	ZINC	18.7	=	610000	23000	HI=0.1	0.00	0.00
B(33.8)	ALUMINUM	674	=	100000	7800	HI=0.1	0.01	0.09
B(33.8)	ANTIMONY	1.3	J	82	7	HI=0.1/BCT	0.02	0.19
B(33.8)	BARIUM	6.7	J	14000	550	HI=0.1	0.00	0.01
B(33.8)	CADMIUM	0.25	J	200	7.8	HI=0.1	0.00	0.03
B(33.8)	CALCIUM	288000	=	NA	NA	NA	NA	NA
B(33.8)	CHROMIUM	5	J	610	23	Updated BCT	0.01	0.22
B(33.8)	COBALT	0.25	J	12000	470	HI=0.1	0.00	0.00
B(33.8)	COPPER	1.4	J	8200	310	HI=0.1	0.00	0.00
B(33.8)	IRON	1360	=	61000	2300	HI=0.1	0.02	0.59
B(33.8)	LEAD	5.6	J	1000	400	HI=0.1	0.01	0.01
B(33.8)	MAGNESIUM	4150	J	NA	NA	NA	NA	NA
B(33.8)	MANGANESE	38.4	=	2900	1100	HI=0.1	0.01	0.03
B(33.8)	NICKEL	3.8	J	4100	160	HI=0.1	0.00	0.02
B(33.8)	POTASSIUM	3140	J	NA	NA	NA	NA	NA
B(33.8)	SODIUM	823	J	NA	NA	NA	NA	NA
B(33.8)	VANADIUM	3.4	J	14000	550	HI=0.1	0.00	0.01
B(33.8)	ZINC	13.7	=	610000	23000	HI=0.1	0.00	0.00

Note: ***Bold Italic*** parameters exceed both residential and industrual land-use criteria.
Bold-only parameters exceed only residential land-use criteria.

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE