

Arc Ecology

Environment, Economy, Society, & Peace

May 24, 2004

Keith Forman
BRAC Environmental Coordinator
Southwest Division
Naval Facilities Engineering Command
BRAC Operations
1230 Columbia Street, Suite 1100
San Diego, CA 92101-8517

Re: Draft Final Finding of Suitability to Transfer for Parcel A, Revision 2, Hunters Point Shipyard, dated February 2004.

Dear Mr. Forman:

Thank you for providing Arc Ecology with the opportunity to review the *Draft Final Finding of Suitability to Transfer for Parcel A, Revision 2, Hunters Point Shipyard*, dated February 2004. Our comments are below.

- 1. There are carcinogenic and non-carcinogenic health risks above EPA's acceptable levels at the majority of IR and SI sites on Parcel A largely due to elevated levels of metals in the soil. Arc Ecology believes strongly that risks from metals in soils at Parcel A should be disclosed in the Finding of Suitability to Transfer (FOST) to allow future owners of the property to make informed decisions about the use of the property.**
According to Section 6, the Notice of Hazardous Substances, "There are no known releases of hazardous substances at Parcel A at a quantity greater than or equal to the CERCLA reportable quantity" (page 24). While the data provided thus far has not clearly demonstrated that the high levels of metals are a result of Navy activity, the Navy, being fully aware of these risks, has a responsibility to disclose this information in order to fully protect the health of future workers and residents of Parcel A. Indeed, in the response to Arc Ecology's comments on the *Draft Parcel A Finding of Suitability to Transfer, Revision 2, Hunters Point Shipyard, San Francisco, California*, dated March 26, 2002, the Navy agreed to revise the FOST to include the residual risk at Parcel A that was previously presented in the RI and the ROD, however this has not been included. Additionally, an explanation of why the Navy believes they are not responsible for the cleanup of these contaminants under CERCLA should be included.
Attachment 1 shows the carcinogenic and non-carcinogenic health risks from metals at each of these sites, which have been calculated using both the 1995 and 2002 preliminary

remediation goals from Region IX EPA. The risks calculated are for a residential scenario but do not include the risks from the consumption of homegrown produce.

2. **The Navy should disclose of the possibility of finding additional sandblast grit in the FOST and state that the Navy is responsible for remediating any additional sandblast grit discovered on Parcel A during redevelopment.** During the site inspections and remedial investigation, contaminated sandblast grit was discovered under pipes at IR-59 and beneath two landscaped medians next to building 901 (SI 19). Both of these areas of sandblast grit were removed. However, a comprehensive survey for other areas of sandblast grit on Parcel A was not conducted. The use of sandblast grit as backfill and bedding material was not uncommon on military facilities. For this reason, it seems possible that sandblast grit will be found at other locations on Parcel A.
3. **It is unclear what the regulatory procedure will be for sites that were a part of Parcel A under the ROD that are now located within parcels for which no Record of Decision exists.** As stated in Section 2, the boundary of Parcel A has changed several times since the Record of Decision (ROD) was signed in 1995. Please include an explanation of how these sites will be handled in the future under the CERCLA process.
4. **An explanation of how it was determined that the storm water and sewer system lines in Parcel A are not a part of the Radiological Affairs Support Office's (RASO) recommendation for a radiological survey should be included in the FOST.** According to Section 2, the Historical Radiological Assessment (HRA) recommended a survey for the sanitary sewer main lines along Fisher and Spear Avenues that flow into the pump station and the main line along Crisp Avenue that flows out of the pump station (page 6). However, the recommendation in Section 8 of the draft final HRA for the sanitary sewer system and storm drain lines is less specific. It reads, "Scoping and Characterization Surveys of systems associated with NRDL sites or sites associated with radium use" (pages 8-218 – 8-222). There has been some concern raised by the community about the possibility for radiological contamination in the storm water and sewer system lines in Parcel A. To give greater assurance to the community, an explanation of how it was determined that the storm water and sewer system lines in Parcel A are not a part of RASO's recommendation should be included in the FOST. Preferably, an exemption letter from RASO for the lines that fall within the current Parcel A boundaries should be provided.
5. **It is unclear whether any sampling has been done within the subparcels that straddle two parcels to ensure that the neighboring areas do not impact them.** As described in Section 5, six of the fifteen subparcels from the Environmental Baseline Survey lie either entirely or partially in Parcel A. We are concerned that there are potential data gaps along the parcel borders that divide the subparcels. In particular, we are concerned about subparcels N1A and N3A due to their proximity to IR-18 on Parcel B. IR-18 is a waste disposal area that has not been fully characterized. If the Navy does not feel there are data gaps in these subparcels, please provide adequate justification, such as previous data collected, location of relevant samples, etc.

6. **Difficulties with and weaknesses of the landfill gas control system should be disclosed in the FOST.** In the summary of the landfill gas time-critical removal action, the document states, "Gas control has been primarily achieved by passive venting; however, active extraction is occasionally used to ensure that landfill gas does not migrate north of the barrier." (Section 5.1.5, page 17) This sentence is not entirely true. Active extraction has been necessary at times because LFG has been detected north of the barrier.
7. **It is important to note that the results of the Johnson and Ettinger modeling have not yet gained regulatory approval.** Section 5.1.5 mentions that this modeling was used to evaluate risks to future residents from exposure to volatile organic compounds in indoor air along Crisp Avenue, however the results have not yet been approved.
8. Please update the FOST to include the latest information about Building 322 before conveying the property.

Minor Comments

9. Table 4, which shows the original and updated categorization of each subparcel, should provide the UST, asbestos, and radiation information for all listed buildings, IR sites, and SI sites that are not on Parcel A. As the table is currently laid out, only the sites in Parcel A are rated, giving the reader the impression that the adjacent off-parcel sites carry the same rating, which is often not the case. Please correct the table as necessary to avoid any confusion.
10. Section 5, ECP Area Type 4, page 10: "Soils containing the constituents listed in Table 6 were removed during a site investigation of site inspection (SI) site 19 that is wholly contained within Subparcel H-48A." It is SI 41 that is located within subparcel H-48A. A similar error was made in the discussion of subparcel H-OS, which lists SI 41 as being contained with the subparcel, when it should in fact list SI 19. Please correct the text as necessary.

Arc Ecology appreciates having the opportunity to review this document. If you have any questions about our comments, please contact me at (415) 495-1786 or lealoizos@mindspring.com

Sincerely,

Lea Loizos
Staff Scientist

Cc (electronic):

Michael Work, U.S. Environmental Protection Agency, Region IX
Tom Lanphar, California Department of Toxic Substances Control
Jim Ponton, California Regional Water Quality Control Board, San Francisco Bay Region
Amy Brownell, City of San Francisco, Department of Public Health
Lynne Brown, RAB Community Co-Chair

Scott Madison, CAC Chairperson

Cancer Risks and Hazard Indices, SI 19, Parcel A - 1995 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 1995 non-cancer PRG (mg/kg)	EPA 1995 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Antimony	9.05	1.2E+01	3.1E+01		0.394	
Arsenic*	11.1	9.1E+00	2.2E+01	3.2E-01	0.414	2.84E-05
Barium	314.36	1.5E+02	5.3E+03		0.028	
Beryllium*	0.71	4.0E-01	3.8E+02	1.4E-01	0.001	2.86E-06
Cadmium*	3.14	2.0E+00	9.0E+00	1.4E+03	0.222	1.43E-09
Chromium*	334.2	7.7E+02	3.8E+02	2.0E-01	2.021	3.84E-03
Cobalt*	47.64	8.4E+01	2.1E+06		0.000	
Copper*	124.31	1.5E+02	2.8E+03		0.053	
Lead	8.99	1.4E+01	1.3E+02		0.108	
Manganese*	1431	1.4E+03	3.8E+02		3.605	
Mercury*	2.28	2.0E-01	2.3E+01		0.009	
Molybdenum	2.68	1.9E+00	3.8E+02		0.005	
Nickel*	494.33	1.4E+03	1.5E+03	1.5E+02	0.933	9.33E-06
Selenium	1.95	NA	NA			
Silver	1.43	6.8E-01	3.8E+02		0.002	
Thallium*	0.81	NA	6.1E+00			
Vanadium	117.17	9.3E+01	5.4E+02		0.171	
Zinc	109.86	2.3E+02	2.3E+04		0.010	
TOTAL					7.975	3.88E-03

* denotes PRGs that have changed since 1995. The most significant changes are seen in chromium, cadmium, and nickel. The reasons for some of these changes are as follows:

Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or <http://www.atsdr.cdc.gov/toxfaq.html>.

Cancer Risks and Hazard Indices, SI 19, Parcel A - 2002 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 2002 non-cancer PRG (mg/kg)	EPA 2002 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Antimony	9.05	1.2E+01	3.1E+01		0.394	
Arsenic*	11.1	9.1E+00	2.2E+01	3.9E-01	0.414	2.33E-05
Barium	314.36	1.5E+02	5.4E+03		0.027	
Beryllium*	0.71	4.0E-01	1.5E+02	1.1E+03	0.003	3.64E-10
Cadmium*	3.14	2.0E+00	3.7E+01	1.4E+03	0.054	1.43E-09
Chromium*	334.2	7.7E+02	2.1E+02	2.2E+02	3.657	3.49E-06
Cobalt*	47.64	8.4E+01	1.4E+03	9.0E+02	0.060	9.37E-08
Copper*	124.31	1.5E+02	3.1E+03		0.048	
Lead	8.99	1.4E+01	1.5E+02		0.093	
Manganese*	1431	1.4E+03	1.8E+03		0.761	
Mercury*	2.28	2.0E-01	6.1E+00		0.033	
Molybdenum	2.68	1.9E+00	3.9E+02		0.005	
Nickel*	494.33	1.4E+03	1.6E+03		0.875	
Selenium	1.95	NA	3.9E+02			
Silver	1.43	6.8E-01	3.9E+02		0.002	
Thallium*	0.81	NA	5.2E+00			
Vanadium	117.17	9.3E+01	5.5E+02		0.168	
Zinc	109.86	2.3E+02	2.3E+04		0.010	
TOTAL					6.603	2.69E-05

* denotes PRGs that have changed since 1995. The most significant changes are seen in chromium, cadmium, and nickel. The reasons for some of these changes are as follows:

Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or <http://www.atsdr.cdc.gov/toxfaq.html>.

Cancer Risks and Hazard Indices, SI 41, Parcel A - 1995 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 1995 non-cancer PRG (mg/kg)	EPA cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Antimony	9.05	6.1E+00	3.1E+01		0.196	
Arsenic*	11.1	9.0E+00	2.2E+01	3.2E-01	0.408	2.81E-05
Barium	314.36	1.3E+03	5.3E+03		0.253	
Beryllium*	0.71	4.8E-01	3.8E+02	1.4E-01	0.001	3.43E-06
Cadmium*	3.14	1.4E+00	9.0E+00	1.4E+03	0.156	1.00E-09
Chromium*	804.9	4.1E+02	3.8E+02	2.0E-01	1.066	2.03E-03
Cobalt*	92.23	9.3E+01	2.1E+06		0.000	
Copper*	124.31	1.6E+02	2.8E+03		0.057	
Lead	8.99	1.9E+02	1.3E+02		1.431	
Manganese*	1431	7.7E+03	3.8E+02		20.360	
Mercury*	2.28	2.3E-01	2.3E+01		0.010	
Molybdenum	2.68	1.4E+00	3.8E+02		0.004	
Nickel*	1656.51	1.7E+03	1.5E+03	1.5E+02	1.127	1.13E-05
Selenium	1.95	7.7E-01	NA			
Silver	1.43	NA	3.8E+02			
Thallium*	0.81	5.7E-01	6.1E+00		0.093	
Vanadium	117.17	9.1E+01	5.4E+02		0.168	
Zinc	109.86	3.3E+02	2.3E+04		0.015	
TOTAL					25.344	2.07E-03

* denotes PRGs that have changed since 1995. The most significant changes are seen in chromium, cadmium, and nickel. The reasons for some of these changes are as follows:

Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or

<http://www.atsdr.cdc.gov/toxfaq.html>.

Cancer Risks and Hazard Indices, SI 41, Parcel A - 2002 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 2002 non-cancer PRG (mg/kg)	EPA 2002 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Antimony	9.05	6.1E+00	3.1E+01		0.196	
Arsenic*	11.1	9.0E+00	2.2E+01	3.9E-01	0.408	2.30E-05
Barium	314.36	1.3E+03	5.4E+03		0.248	
Beryllium*	0.71	4.8E-01	1.5E+02	1.1E+03	0.003	4.36E-10
Cadmium*	3.14	1.4E+00	1.7E+00	1.4E+03	0.824	1.00E-09
Chromium*	804.9	4.1E+02	2.1E+02	2.2E+02	1.929	1.84E-06
Cobalt*	92.23	9.3E+01	1.4E+03	9.0E+02	0.067	1.03E-07
Copper*	124.31	1.6E+02	3.1E+03		0.051	
Lead	8.99	1.9E+02	1.5E+02		1.240	
Manganese*	1431	7.7E+03	1.8E+03		4.298	
Mercury*	2.28	2.3E-01	6.1E+00		0.038	
Molybdenum	2.68	1.4E+00	3.9E+02		0.004	
Nickel*	1656.51	1.7E+03	1.6E+03		1.056	
Selenium	1.95	7.7E-01	3.9E+02		0.002	
Silver	1.43	NA	3.9E+02			
Thallium*	0.81	5.7E-01	5.2E+00		0.110	
Vanadium	117.17	9.1E+01	5.5E+02		0.165	
Zinc	109.86	3.3E+02	2.3E+04		0.015	
TOTAL					10.653	2.50E-05

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Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or <http://www.atsdr.cdc.gov/toxfaq.html>.

Cancer Risks and Hazard Indices, SI-43, Parcel A - 1995 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 1995 non- cancer PRG (mg/kg)	EPA 1995 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Antimony	9.05	7.42	3.1E+01		0.239	
Arsenic*	11.1	15.03	2.2E+01	3.2E-01	0.683	4.70E-05
Barium	314.36	120.23	5.3E+03		0.023	
Beryllium*	0.71	0.33	3.8E+02	1.4E-01	0.001	2.36E-06
Cadmium*	3.14	1.04	9.0E+00	1.4E+03	0.116	7.43E-10
Chromium*	1140.42	770.73	3.8E+02	2.0E-01	2.028	3.85E-03
Cobalt*	119.84	81.6	2.1E+06		0.000	
Copper*	124.31	54.95	2.8E+03		0.020	
Lead	8.99	350.39	1.3E+02		2.695	
Manganese*	1431	858.15	3.8E+02		2.258	
Mercury*	2.28	0.09	2.3E+01		0.004	
Molybdenum	2.68	2.54	3.8E+02		0.007	
Nickel*	2675.55	2793.33	1.5E+03	1.5E+02	1.862	1.86E-05
Selenium	1.95	NA	NA			
Silver	1.43	0.31	3.8E+02		0.001	
Thallium*	0.81	NA	6.1E+00			
Vanadium	117.17	69.17	5.4E+02		0.128	
Zinc	109.86	120.71	2.3E+04		0.005	
TOTAL					10.070	3.92E-03

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Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or <http://www.atsdr.cdc.gov/toxfaq.html>.

Cancer Risks and Hazard Indices, SI 43, Parcel A - 2002 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 2002 non-cancer PRG (mg/kg)	EPA 2002 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Antimony	9.05	7.42	3.1E+01		0.239	
Arsenic*	11.1	15.03	2.2E+01	3.9E-01	0.683	3.85E-05
Barium	314.36	120.23	5.4E+03		0.022	
Beryllium*	0.71	0.33	1.5E+02	1.1E+03	0.002	3.00E-10
Cadmium*	3.14	1.04	1.7E+00	1.4E+03	0.612	7.43E-10
Chromium*	1140.42	770.73	2.1E+02	2.2E+02	3.670	3.50E-06
Cobalt*	119.84	81.6	1.4E+03	9.0E+02	0.058	9.07E-08
Copper*	124.31	54.95	3.1E+03		0.018	
Lead	8.99	350.39	1.5E+02		2.336	
Manganese*	1431	858.15	1.8E+03		0.477	
Mercury*	2.28	0.09	6.1E+00		0.015	
Molybdenum	2.68	2.54	3.9E+02		0.007	
Nickel*	2675.55	2793.33	1.6E+03		1.746	
Selenium	1.95	NA	3.9E+02			
Silver	1.43	0.31	3.9E+02		0.001	
Thallium*	0.81	NA	5.2E+00			
Vanadium	117.17	69.17	5.5E+02		0.126	
Zinc	109.86	120.71	2.3E+04		0.005	
TOTAL					10.017	4.21E-05

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A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

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Cancer Risks and Hazard Indices, IR 59, Parcel A - 1995 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 1995 non-cancer PRG (mg/kg)	EPA 1995 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Aluminum		11118.1	7.70E+04		0.144	
Antimony	9.05	NA	3.1E+01			
Arsenic*	11.1	4.52	2.2E+01	3.2E-01	0.205	1.41E-05
Barium	314.36	100.3	5.3E+03		0.019	
Beryllium*	0.71	NA	3.8E+02	1.4E-01		
Cadmium*	3.14	NA	9.0E+00	1.4E+03		
Chromium*	99.14	94.93	3.8E+02	2.0E-01	0.250	4.75E-04
Cobalt*	19.11	14.64	2.1E+06		0.000	
Copper*	124.31	17.05	2.8E+03		0.006	
Lead	8.99	70.66	1.3E+02		0.544	
Manganese*	1431	416.59	3.8E+02		1.096	
Mercury*	2.28	0.1	2.3E+01		0.004	
Molybdenum	2.68	NA	3.8E+02			
Nickel*	92.85	70.45	1.5E+03	1.5E+02	0.047	4.70E-07
Selenium	1.95	NA	NA			
Silver	1.43	NA	3.8E+02			
Thallium*	0.81	NA	6.1E+00			
Vanadium	117.17	51.88	5.4E+02		0.096	
Zinc	109.86	65.39	2.3E+04		0.003	
TOTAL					2.415	4.89E-04

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Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

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Cancer Risks and Hazard Indices, IR 59, Parcel A - 2002 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 2002 non-cancer PRG (mg/kg)	EPA 2002 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Aluminum		11118.1	7.6E+04		0.15	
Antimony	9.05	NA	3.1E+01			
Arsenic*	11.1	4.52	2.2E+01	3.9E-01	0.21	1.2E-05
Barium	314.36	100.3	5.4E+03		0.02	
Beryllium*	0.71	NA	1.5E+02	1.1E+03		
Cadmium*	3.14	NA	1.7E+00	1.4E+03		
Chromium*	99.14	94.93	2.1E+02	2.2E+02	0.45	4.3E-07
Cobalt*	19.11	14.64	1.4E+03	9.0E+02	0.01	1.6E-08
Copper*	124.31	17.05	3.1E+03		0.01	
Lead	8.99	70.66	1.5E+02		0.47	
Manganese*	1431	416.59	1.8E+03		0.23	
Mercury*	2.28	0.1	6.1E+00		0.02	
Molybdenum	2.68	NA	3.9E+02			
Nickel*	92.85	70.45	1.6E+03		0.04	
Selenium	1.95	NA	3.9E+02			
Silver	1.43	NA	3.9E+02			
Thallium*	0.81	NA	5.2E+00			
Vanadium	117.17	51.88	5.5E+02		0.09	
Zinc	109.86	65.39	2.3E+04		0.00	
TOTAL					1.70	1.2E-05

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 Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.
 A cancer PRG has now been developed for cobalt.
 There is no longer a cancer PRG for nickel as soluble salts.
 For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or

Cancer Risks and Hazard Indices, IR 59 JAI, Parcel A - 1995 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 1995 non-cancer PRG (mg/kg)	EPA 1995 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Aluminum		1.6E+04	7.6E+04		0.21	
Antimony	9.05	1.4E+00	3.1E+01		0.05	
Arsenic*	11.1	3.7E+00	2.2E+01	3.2E-01	0.17	1.2E-05
Barium	314.36	1.4E+02	5.3E+03		0.03	
Beryllium*	0.71	3.4E-01	3.8E+02	1.4E-01	0.00	2.4E-06
Cadmium*	3.14	5.0E-01	9.0E+00	1.4E+03	0.06	3.6E-10
Chromium*	417.95	3.4E+02	3.8E+02	2.0E-01	0.89	1.7E-03
Cobalt*	56.35	3.5E+01	2.1E+06		0.00	
Copper*	124.31	3.1E+01	2.8E+03		0.01	
Lead	8.99	1.0E+01	1.3E+02		0.08	
Manganese*	1431	5.7E+02	3.8E+02		1.50	
Mercury*	2.28	6.0E-02	2.3E+01		0.00	
Molybdenum	2.68	NA	3.8E+02			
Nickel*	672.31	5.9E+02	1.5E+03	1.5E+02	0.39	3.9E-06
Selenium	1.95	NA	NA			
Silver	1.43	4.9E-01	3.8E+02		0.00	
Thallium*	0.81	2.9E-01	6.1E+00		0.05	
Vanadium	117.17	5.5E+01	5.4E+02		0.10	
Zinc	109.86	6.2E+01	2.3E+04		0.00	
TOTAL					3.54	1.7E-03

* denotes PRGs that have changed since 1995. The most significant changes are seen in chromium, cadmium, and nickel. The reasons for some of these changes are as follows:
 Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.
 A cancer PRG has now been developed for cobalt.
 There is no longer a cancer PRG for nickel as soluble salts.
 For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or <http://www.atsdr.cdc.gov/toxfaq.html>.

Cancer Risks and Hazard Indices, IR 59-JAI, Parcel A - 2002 PRGs

Chemical of Concern	HPAL (mg/kg)	Exposure Point Concentration (mg/kg)	EPA 2002 non-cancer PRG (mg/kg)	EPA 2002 cancer PRG (mg/kg)	Hazard Quotient	Cancer Risk
Aluminum		1.6E+04	7.6E+04		0.211	
Antimony	9.05	1.4E+00	3.1E+01		0.045	
Arsenic*	11.1	3.7E+00	2.2E+01	3.9E-01	0.168	9.49E-06
Barium	314.36	1.4E+02	5.4E+03		0.026	
Beryllium*	0.71	3.4E-01	1.5E+02	1.1E+03	0.002	3.09E-10
Cadmium*	3.14	5.0E-01	1.7E+00	1.4E+03	0.294	3.57E-10
Chromium*	417.95	3.4E+02	2.1E+02	2.2E+02	1.619	1.55E-06
Cobalt*	56.35	3.5E+01	1.4E+03	9.0E+02	0.025	3.89E-08
Copper*	124.31	3.1E+01	3.1E+03		0.010	
Lead	8.99	1.0E+01	1.5E+02		0.067	
Manganese*	1431	5.7E+02	1.8E+03		0.317	
Mercury*	2.28	6.0E-02	6.1E+00		0.010	
Molybdenum	2.68	NA	3.9E+02			
Nickel*	672.31	5.9E+02	1.6E+03		0.369	
Selenium	1.95	NA	3.9E+02			
Silver	1.43	4.9E-01	3.9E+02		0.001	
Thallium*	0.81	2.9E-01	5.2E+00		0.056	
Vanadium	117.17	5.5E+01	5.5E+02		0.100	
Zinc	109.86	6.2E+01	2.3E+04		0.003	
TOTAL					3.322	1.11E-05

* denotes PRGs that have changed since 1995. The most significant changes are seen in chromium, cadmium, and nickel. The reasons for some of these changes are as follows:

Chromium was previously thought to be a carcinogen by the oral route of exposure, but that cannot be determined with current research, according to the EPA. This has caused the PRG to be less stringent.

A cancer PRG has now been developed for cobalt.

There is no longer a cancer PRG for nickel as soluble salts.

For more toxicology information on a particular metal, visit <http://www.epa.gov/iris/> or <http://www.atsdr.cdc.gov/toxfaq.html>.