

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

February 2003

Revised November 2006

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)**

Current Human Exposures Under Control

Facility Name: Tecumseh Redevelopment Inc. (formerly Bethlehem Steel Corp) – Riders Disposal Area
Facility Address: East Taylor Township/Johnstown PA
Facility EPA ID #: PAD004344222

1. Has all available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been considered in this EI determination?

If yes - check here and continue with #2 below.
 If no – re-evaluate existing data, or
 if data are not available skip to #6 and enter "IN" (more information needed) status code

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Controls" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program, the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS

status codes must be changed when the regulatory authorities become aware of contrary information).

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

2. Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated"¹ above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale/Key Contaminants</u>
Groundwater	X			Parameters exceed MCLs at 25 Pa. Code Chapter 250 in groundwater downgradient from the disposal areas.
Air (indoors) ²		X		No indoor structures at the site.
Surface Soil (e.g., <2 ft)		X		Landfills covered/capped; impoundment clean closed; SPL area contains no surficial residue from HW land application.
Surface Water	X			Seeps from site discharge into Hinckston Run
Sediment	X			Sediment at seep discharge locations sampled
Subsurface Soil (e.g., >2 ft)	X			SPL area may potentially still contain residue from HW land application.
Air (outdoors)		X		None – disposal areas contain predominantly inorganic wastes and are covered or have no wastes exposed.

If no (for all media) – skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient support documentation demonstrating that these "levels" are not exceeded.

YES

If yes (for any media) – continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

If unknown (for any media) – skip to #6 and enter "IN" status code.

See Below

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Rationale and Reference(s): Site 4 Residual Waste Landfill			
Parameter	25Pa. Code Chapter 250 (TDS <2500ppm, Non-Residential)	BSC Upgradient Well Concentration	BSC Highest Downgradient Well Concentration
Sulfate	500ppm	900ppm W-22; 45ppm W-21	2200ppm W-19
Iron (total)	0.3ppm	670ppm W-22; 150ppm W-21	340ppm W-19
Chloride	250ppm	22ppm W-22; 9ppm W-21	110ppm W-20
Chromium (total)	100ppb	2ppb W-22 and W-21	22ppb W-19
Manganese (total)	0.05ppm	21.7ppm W-22; 0.1ppm W-21	47.3ppm W-19

Data is from 1st quarter 2002 sampling by BSC. W-19, 20 and 22 are screened in slag. W-21 is screened in bedrock.

Time-trend data from BSC indicates that the concentrations represented by the 1st quarter 2002 data have been fairly consistent and does not appear to reveal any consistent trends since the Site 4 closure plan was approved in 1996. The landfill was closed in 1997, but not capped. DEP agreed to defer capping of this landfill to allow BSC to try and demonstrate that the soil cover over the landfill provided sufficient protection from precipitation infiltration and improvement to groundwater conditions. However, it is apparent that the groundwater remains impacted, continuing to exceed some regulatory standards and also exhibiting statistically significant differences from true upgradient conditions. BSC has used data from wells at the Riders site for their statistical analysis which has not shown as much of a significant difference in downgradient conditions. However these additional wells, side and upgradient of Site 4 are not hydrogeologically connected to Site 4 and should not be considered in evaluating impacts from this landfill. A comparison of statistical data (upper tolerance levels) from the two true upgradient wells (W-21 and W-22) reveals more significant differences in the water in downgradient wells W-19 and W-20. Time-trend plot and chemical summary data for the parameters identified above are attached to this report. BSC has determined that the downgradient wells periodically exhibit statistically significant differences for zinc, ammonia, and iron. However, zinc does not appear to be at levels of regulatory concern at this time. BSC continues to monitor this landfill as required by the 1996 approved closure plan. Tecumseh Redevelopment Inc (TRI) capped the Site 4 landfill in late 2005.

Rationale and Reference(s): EAF Dust Landfill/SPL Area			
Parameter	25 Pa. Code Chapter 250 (TDS<2500ppm, Non-Residential)	BSC Upgradient Well Concentration	BSC Highest Downgradient Well Concentration
Sulfate	500ppm	550ppm W-5A; 1000ppm W-17	1100ppm W-18
Iron (total)	0.3ppm	89.7ppm W-5A; 57.3ppm W-17	215ppm W-10
Chloride	250ppm	16ppm W-5A; 19ppm W-17	300ppm W-8B
Manganese (total)	0.05ppm	14ppm W-5A; 1.9ppm W-17	38.3ppm W-18
Chromium (total)	100ppb	12ppb W-5A; 10ppb W-17	47ppb W-10

Data is from 1st quarter 2002 sampling by BSC. W-5A, 10 and 17 are screened in bedrock. W-8B and 18 are screened in slag.

The EAF Dust Landfill (closed and capped) and the Spent Pickle Liquor (SPL) Area (inactive, but expected to be mined out) are hydrogeologically connected in that the same groundwater flow zones are being monitored for both and the flow direction is the same under both units. The SPL Area is situated upgradient of the EAF Dust Landfill. Both units are monitored by the same upgradient wells (5A and 17) but have separate downgradient wells, although the SPL downgradient wells are upgradient of the EAF Dust Landfill. Time-trend data supports the data shown in the above table as being fairly representative of groundwater conditions upgradient and downgradient of these units. Of note is that parameters such as lead and nitrate exhibit greater concentrations in the upgradient wells than and of the downgradient wells. Also, wells 10 and 18 are more sidegradient than downgradient (of the SPL Area). With respect to the parameters of interest noted above, the time trend data generally indicates either somewhat of a decreasing trend in downgradient water concentrations, which DEP attributes to the cessation of waste disposal activities (SPL Area early 1983 and EAF Dust Landfill 1985) and closure of the EAF Dust Landfill in 1993. The elevated chromium in well W-10 has been consistent

and has periodically even exceeded a statistically significant difference test, but is still below a regulatory standard. However, BSC is required to continue monitoring since impact to the groundwater from these units still has not been sufficiently reduced. With anticipated surface mining of the SPL Area and adjacent areas, groundwater conditions are expected to further improve due to the removal of slag and any remaining industrial waste constituents. BSC has determined that are periodic statistically significant differences in the wells downgradient of the HW units, but mainly secondary parameters such as fluoride, sodium and potassium.

Rationale and Reference(s): Riders/Hinckston Run Seeps				
Location	Parameter	BSC Result (1 st Q 2002)	DEP Results (November 2000)	25 Pa. Code Chapter 16 Water Quality/25 Pa. Code 250
558 (adjacent to FeMn landfill)	Zinc	0.12ppm (total) 0.09ppm (dissolved)	<10ppb (ND)	0.048ppm* dissolved (CaCO ₃ = 35ppm) Ch.16
	Chromium	<1ppb (ND total/dissolved)	<4.0ppb (ND)	16ppb (Cr ⁶ dissolved) Ch. 16
	Cyanide	<5ppb (ND)	14.2ppb	22ppb Ch. 16
	Chloride	6ppm	2ppm	250ppm Ch. 250
	Nitrate	0.25ppm	0.07ppm	10ppm Ch. 250
	Sulfate	200ppm	497ppm	500ppm Ch. 250
	Iron (total)	70ppb	24ppb	300ppb Ch. 250
	Manganese (total)	<10ppb (ND)	<10ppb (ND)	50ppb Ch. 250
	Aluminum (total)	0.17ppm	NS	200ppb Ch. 250
	Calcium (total)	56.4ppm	90.9ppm	NA
553 (adjacent to HW units)	Cyanide	<5ppb (ND)	<10ppb (ND)	22ppb
	Chromium	15ppb (total) 6ppb (dissolved)	15.3ppb (total)	16ppb (Cr ⁶ dissolved)
	Zinc	0.16ppm (total/dissolved)	0.209ppm (total)	0.0023ppm* dissolved (CaCO ₃ = 1ppm)
	Chloride	44ppm	42ppm	250ppm
	Nitrate	<0.1ppm (ND)	<0.02ppm (ND)	10ppm
	Sulfate	1300ppm	1550ppm	500ppm
	Iron (total)	30,700ppb	44,700ppb	300ppb
	Manganese (total)	33,700ppb	52,700ppb	50ppb
	Aluminum (total)	38.6ppm	NS	200ppb
	Calcium (total)	523.0ppm	555.0ppm	NA
552 (adjacent to HW units)	Cyanide	<5ppb (ND)	<10ppb (ND)	22ppb
	Chromium	13ppb (total) 8ppb (dissolved)	23.5ppb (total)	16ppb (Cr ⁶ dissolved)
	Zinc	0.29ppm (total/dissolved)	0.622ppm (total)	0.0023ppm* dissolved (CaCO ₃ = 1ppm)
	Cadmium	0.6ppb (total)	0.71ppb (total)	0.028ppb* dissolved (CaCO ₃ = 1ppm)
	Chloride	54ppm	52ppm	250ppm
	Nitrate	<0.1ppm (ND)	0.40ppm	10ppm
	Sulfate	1200ppm	1380ppm	500ppm
	Iron (total)	48,500ppb	78,200ppb	300ppb
	Manganese (total)	37,600ppb	76,200ppb	50ppb
	Aluminum (total)	58.4ppm	NS	200ppb
551 (downstream of HW units)	Calcium (total)	501.0ppm	530.0ppm	NA
	Cyanide	18ppb	10.3ppb	22ppb
	Chromium	1ppb (total/dissolved)	<4ppb (ND)	16ppb (Cr ⁶ dissolved)
	Zinc	0.03ppm	<0.01ppm (ND)	0.0023ppm*

		(total/dissolved)		dissolved (CaCO ₃ = 1ppm)
	Chloride	45ppm	41ppm	250ppm
	Nitrate	1.28ppm	1.06ppm	10ppm
	Sulfate	420ppm	277ppm	500ppm
	Iron (total)	<10ppb (ND)	<20ppb (ND)	300ppb
	Manganese (total)	<10ppb (ND)	<10ppb (ND)	50ppb
	Aluminum (total)	0.07ppm	NS	200ppb
	Calcium (total)	158ppm	208ppm	NA

*Determined using 25 Pa. Code Chapter 16 Table 1 calculations for water hardness (expressed as CaCO₃), per BSC 1st quarter 2002 sampling results.

The DEP data for the seeps (and for the sediment and stream data identified below) was obtained during November 2000 sampling with the US Fish & Wildlife Service and the PA Fish and Boat Commission. The USF&WS and PAFBC were interested in stream quality assessment of Hinckston Run and three tributaries that feed it downstream of Hinckston Run Reservoir. Note that tributary 3 is downstream of the waste disposal areas and data for this tributary is not included in the following table summaries (but is included in the attached reports).

Note that upstream (of the waste disposal units) seeps 560 and 559 and seep 555 (downstream of the Site 4 landfill and upstream of the hazardous waste units) were dry during the sampling episodes. No organics were detected. Cyanide was detected at the most upstream seep (558 adjacent to the closed FeMn sludge landfill) and downstream of the HW units, but below a Ch. 16 standard. Zinc was detected at all locations above a Ch. 16 standard. However, zinc has not been detected at significant concentrations in wells downgradient of the Riders site disposal units. Notably, sulfate, iron, manganese, aluminum and calcium are all significantly elevated in the seeps adjacent to the HW units, compared to the more upstream and downstream seep locations, with sulfate, iron and manganese exceeding 25 Pa. Code Ch. 250 standards for inorganics in groundwater (non-residential TDS <2500ppm). The values for these parameters do not show a meaningful decrease since April 1990, when DEP (then DER) sampled Hinckston Run and the seeps from the Riders site. The overall condition of the seeps from the Riders site do show a general improvement from DEP (then DER) data collected in 1973 and 1975 where cyanide was frequently detected and iron and manganese concentrations were significantly greater (and when all of the disposal units were in operation). The visual appearance has improved as well (no longer present are "black alkaline" and "waste acid" seep conditions). When compared to groundwater data which indicates elevated downgradient concentrations of iron, manganese and sulfate, it appears that the Riders disposal units continue to impact the seeps entering into Hinckston Run, aside from any impacts from AMD-type conditions from past upgradient surface mining activities (Riders was deep mined but at elevations below seep discharge levels). Time trend data from BSC generally supports these conclusions. **Based on data provided in TRI's March 2006 annual report, chemical concentrations in the seeps continue to show a decreasing trend. Of particular note is that at Seep 553, which adjacent to the HW units, the concentrations of sulfate, chloride, total aluminum, zinc, manganese and total/dissolved chromium are the lowest in 12 years of monitoring (based on TRI's March 2006 report).**

Rationale and Reference(s):		Hinckston Run Sediment	
Location	Parameter	DEP Result (November 2000)	
HR01 (upstream of HR Reservoir)	Zinc	241ppm	
	Chromium	48.5ppm	
	Cadmium	1.8ppm	
	Aluminum	15,815ppm	
	Calcium	2829ppm	
	Cyanide	0.0146ppm*	
	PCB	<2.5ppm (ND)	
	Iron	82,827ppm	
	Manganese	3254ppm	
HR02/561 (upstream of site; downstream of HR reservoir)	Zinc	160ppm	
	Chromium	34.2ppm	
	Cadmium	<1.3ppm (ND)	

	Aluminum	35,969ppm
	Calcium	31,814ppm
	Cyanide	0.01ppm*
	PCB	<2.5ppm (ND)
	Iron	70,510ppm
	Manganese	1870ppm
HR03/550 (downstream of site)	Zinc	120ppm
	Chromium	21.8ppm
	Cadmium	0.7ppm
	Aluminum	21,432ppm
	Calcium	5618ppm
	Cyanide	0.0075ppm*
	PCB	<2.5ppm (ND)
	Iron	48,062ppm
	Manganese	1286ppm
560 (upstream of waste disposal units)	Zinc	203ppm
	Chromium	25.2ppm
	Cadmium	<2.7ppm (ND)
	Aluminum	39,953ppm
	Calcium	6006ppm
	Cyanide	0.026ppm *
	PCB	<2.5ppm (ND)
	Iron	113,960ppm
	Manganese	762ppm
559 (adjacent to FeMn Landfill)	Zinc	151ppm
	Chromium	38.2ppm
	Cadmium	<1.2ppm
	Aluminum	17,998ppm
	Calcium	20,372ppm
	Cyanide	0.038ppm*
	PCB	<2.5ppm (ND)
	Iron	141,230ppm
	Manganese	10,749ppm
558 (adjacent to FeMn Landfill, at seep discharge location)	Zinc	325ppm
	Chromium	44.4ppm
	Cadmium	1.5ppm
	Aluminum	21,669ppm
	Calcium	9450ppm
	Cyanide	0.027ppm*
	PCB	<2.5ppm (ND)
	Iron	76,493ppm
	Manganese	3373ppm
558(adjacent to FeMn Landfill in stream)	Zinc	112ppm
	Chromium	40ppm
	Cadmium	1.2ppm
	Aluminum	16,815ppm
	Calcium	20,100ppm
	Cyanide	0.009*
	PCB	<2.5ppm (ND)
	Iron	111,059ppm
	Manganese	4732ppm
556 (downstream of Site 4 and HR tributary 2)	Zinc	143ppm

- upstream/adjacent of HW units)		
	Chromium	27.9ppm
	Cadmium	<2.0ppm (ND)
	Aluminum	27,674ppm
	Calcium	5435ppm
	Cyanide	0.015ppm*
	PCB	<2.5ppm (ND)
	Iron	39,022ppm
	Manganese	2170ppm
555 (adjacent to HW units)	Zinc	72.5ppm
	Chromium	101ppm
	Cadmium	<0.9ppm (ND)
	Aluminum	11,920ppm
	Calcium	248ppm
	Cyanide	0.092ppm*
	PCB	<2.5ppm (ND)
	Iron	390,852ppm
	Manganese	353ppm
553 (adjacent to HW units)	Zinc	76.4ppm
	Chromium	102ppm
	Cadmium	<0.7ppm (ND)
	Aluminum	12,738ppm
	Calcium	3057ppm
	Cyanide	0.01ppm*
	PCB	<2.5ppm (ND)
	Iron	147,897ppm
	Manganese	1309ppm
552 (adjacent to HW units)	Zinc	148ppm
	Chromium	324ppm
	Cadmium	<1.7ppm (ND)
	Aluminum	28,416ppm
	Calcium	2842ppm
	Cyanide	0.094ppm*
	PCB	<2.5ppm (ND)
	Iron	495,631ppm
	Manganese	4246ppm
551 (downstream of HW units)	Zinc	32.1ppm
	Chromium	39.5ppm
	Cadmium	<0.9ppm (ND)
	Aluminum	9134ppm
	Calcium	19,292ppm
	Cyanide	0.009ppm*
	PCB	2.5ppm (ND)
	Iron	28,511ppm
	Manganese	398ppm
HR Tributary 1 (upstream of site; downstream of HR Reservoir)	Zinc	159ppm
	Chromium	34.9ppm
	Cadmium	<0.9ppm (ND)
	Aluminum	17,340ppm
	Calcium	8125ppm
	Cyanide	0.007ppm*
	PCB	<2.5ppm (ND)

	Iron	82,705ppm
	Manganese	1552ppm
HR Tributary 2 (downstream of Site 4, upstream of HW units)	Zinc	157ppm
	Chromium	33.7ppm
	Cadmium	<1.1ppm (ND)
	Aluminum	12,944ppm
	Calcium	2304ppm
	Cyanide	0.012ppm*
	PCB	<2.5ppm (ND)
	Iron	63,952ppm
	Manganese	1788ppm

* Average of two cyanide data points per sample location

Parameters included in the above table chosen for comparison to groundwater, seep and stream data, potential toxicity to fish, and, in the case of aluminum and calcium, historical visual observation of what appeared to be aluminum and calcium precipitate on the substrate of sections of Hinckston Run. Samples were obtained at the same location as stream/seep samples.

Aluminum and calcium are present at relatively high concentrations in several seeps and sediment sample locations, which confirmed visual observations of Hinckston Run substrate conditions. However, these parameters are not statistically elevated in the wells downgradient of the Site 4 landfill and hazardous waste units – rather the upgradient wells for these disposal units exhibit elevated aluminum and calcium, further suggesting that it is the slag at the Riders, not the individual waste disposal units, that is contributing to the deposition of these chemicals in Hinckston Run sediment. The same may be true for zinc, although zinc is not elevated in any of the Riders wells. PCBs were not detected (note that the holding time limit for all sediment PCB samples was exceeded). Iron concentrations exceeded 25 Pa. Code Ch. 250 non-residential direct contact standards for surface soils (>190,000ppm) at two locations adjacent to the HW units (555 and 552). Chromium also appears to be slightly elevated at locations adjacent to the waste disposal units. There is some correlation between this data and the fact of elevated iron and chromium in some downgradient wells, suggesting an impact on Hinckston Run sediment from the disposal units in addition to other sources (slag, coal refuse, AMD, conditions in the two tributaries that enter Hinckston Run upstream and adjacent to the waste disposal units).

Rationale and Reference(s):		Hinckston Run Stream Samples		
Location	Parameter	BSC Result (1stQ 2002)	DEP Result (November 2000)	25 Pa. Code Chapter 16 Water Quality Max Criteria
550/HR03 (downstream of site)	Zinc	0.04ppm (total/dissolved)	0.042ppm (total)	0.021ppm* dissolved (CaCO ₃ = 13ppm)
	Chromium	<1ppb (ND-total/dissolved)	57.5ppb (total)	16ppb (Cr ⁺⁶ dissolved)
	Chloride	19ppm	15ppm	NA
	Nitrate	1.21ppm	0.47ppm	NA
	Sulfate	140ppm	305ppm	NA
	Iron (total)	3100ppb	5050ppb	NA
	Manganese (total)	1960ppb	3280ppb	NA
	Aluminum (total)	3.04ppm	NS	NA
561/HR02 (upstream of site; downstream of Hinckston Run Reservoir)	Calcium	67.2ppm	107.0ppm	NA
	Zinc	0.04ppm (total) 0.03ppm (dissolved)	<0.01ppm (ND-total)	0.0023ppm* dissolved (CaCO ₃ = 1ppm)
	Chloride	25ppm	11ppm	NA
	Nitrate	0.67ppm	0.45ppm	NA
	Sulfate	24ppm	69ppm	NA
	Iron (total)	90ppb	<20ppb (ND)	NA

	Manganese (total)	60ppb	28ppb	NA
	Aluminum (total)	0.27ppm	NS	NA
	Calcium (total)	27.5ppm	35.2ppm	NA
HR01 (upstream of HR Reservoir)	Chloride	NS	18ppm	NA
	Nitrate	NS	0.55ppm	NA
	Sulfate	NS	56ppm	NA
	Iron (total)	NS	76ppb	NA
	Manganese (total)	NS	11ppb	NA
	Aluminum (total)	NS	NS	NA
	Calcium (total)	NS	24.5ppm	NA
556(downstream of Site 4 and HR tributary 2 – adjacent/upstream of HW units)	Zinc	0.05ppm (total) 0.04ppm (total)	0.043ppm (total)	0.025ppm* dissolved (CaCO3 = 16ppm)
	Chloride	16ppm	13ppm	NA
	Nitrate	1.21ppm	0.55ppm	NA
	Sulfate	100ppm	467ppm	NA
	Iron (total)	1760ppb	3300ppb	NA
	Manganese (total)	1350ppb	2580ppb	NA
	Aluminum (total)	1.94ppm	NS	NA
	Calcium (total)	51.5ppm	99.6ppm	NA
557 (downstream of Site 4; upstream of HR Trib 2; adjacent/upstream of HW units)	Zinc	0.05ppm (total/dissolved)	NS	0.0023ppm* dissolved (CaCO3 = 1ppm)
	Chloride	20ppm	NS	NA
	Nitrate	1ppm	NS	NA
	Sulfate	200ppm	NS	NA
	Iron (total)	3050ppb	NS	NA
	Manganese (total)	2370ppb	NS	NA
	Aluminum (total)	3.65ppm	NS	NA
	Calcium (total)	80.6ppm	NS	NA
558 (adjacent to FeMn Landfill in stream at seep 558 location)	Zinc	NS	0.023ppm	0.048ppm dissolved (assume CaCO3 = 35ppm, based on BSC 1 st Q 2002 seep water hardness)
	Chloride	NS	14ppm	NA
	Nitrate	NS	0.62ppm	NA
	Sulfate	NS	281ppm	NA
	Iron (total)	NS	2920ppb	NA
	Manganese (total)	NS	1800ppb	NA
	Calcium (total)	NS	91.8ppm	NA
HR Tributary 1 (upstream of site; downstream of HR reservoir)	Chloride	NS	8ppm	NA
	Nitrate	NS	0.43ppm	NA
	Sulfate	NS	68ppm	NA
	Iron (total)	NS	<20ppb (ND)	NA
	Manganese	NS	<10ppb (ND)	NA
	Aluminum (total)	NS	NS	NA
	Calcium (total)	NS	17.2ppm	NA

HR Tributary 2 (downstream of Site 4, upstream of HW units)	Chloride	NS	7ppm	NA
	Nitrate	NS	0.74ppm	NA
	Sulfate	NS	37ppm	NA
	Iron (total)	NS	53ppb	NA
	Manganese (total)	NS	<10ppb (ND)	NA
	Aluminum (total)	NS	NS	NA
	Calcium (total)	NS	21.8ppm	NA

*Determined using 25 Pa. Code Ch. 16 Table 1 calculations for water hardness (expressed as CaCO₃), per BSC 1st quarter 2002 sampling results.

The data shown above represents detectable levels of metals that have a corresponding aquatic toxicity in 25 Pa. Code Chapter 16 or are general water quality indicator parameters. Most metals of interest at this site (cadmium, chromium, and lead – based on the types of waste disposed) have not been detected in surface water, with some exceptions. Cyanide is also not being detected (which was detected in 1991 and 1973 samples at downstream location 550/HRO3: 5.21ppm in 1973 and 0.028ppm in 1991). Organics are not being detected. Although zinc has been detected in several stream samples above water quality toxics criteria, zinc is not present at significant concentrations in groundwater, casting doubt on a direct connection to specific waste disposal units. Chromium is elevated in a HW unit downgradient well and downstream at location 550, but it is not clear there is a connection since chrome is not being detected at elevated levels in any other stream point adjacent to the HW units (the chrome concentrations for location 550 have shown a decreasing trend over the past 10 years). It appears that based on general water quality indicator parameter (such as iron, manganese, calcium and sulfate) concentrations, there are impacts from the Riders site as it is clear that based on water chemistry alone that Hinckston Run upstream of the site and two tributaries that feed Hinckston Run have better water quality. BSC's time trend data charts do not indicate any particular trend in such indicator parameter concentrations in the past 10 years. However, iron, manganese and sulfate concentrations have decreased at downstream location 550/HRO3 compared to 1991 and 1973 levels, when the disposal units were active (iron: 33,000ppb in 1973 and 14,200ppb in 1991; manganese: 14,600 in 1973 and 10,000ppb in 1991; sulfate 850ppm in 1973 and 793 in 1991). While these values are "snapshot" in nature, they are supported by time-trend analyses and demonstrate that while it appears that the Riders site has an impact on Hinckston Run, conditions are improving, impacts are more of a general water quality nature and not indicative of significant water quality toxics. Considering this data with the elevated iron, manganese and sulfate in the other site environmental media of concern (as summarized above), it appears that the waste disposal units may be contributing to impaired conditions in Hinckston Run.

Rationale and Reference(s)		Hinckston Run Fish Samples	
Location	Parameter/Species	DEP September 2000 Sample Results (in ppm)	Government Limit
HRO1 (upstream of HR Reservoir)	PCB/Rainbow Trout	0.022 Arochlor 1260 (estimate)	PAFBC consumption alert = 0.1ppm/ USFDA consumption action level = 2ppm
	PCB/White Sucker	0.021 Arochlor 1260 (estimate)	Same
	PCB/Bluntnose Minnow	0.028 Arochlor 1260 (estimate)	Same
	Mercury/Bluntnose Minnow	0.01	EPA consumption limit is 0.1ppm
	Lead/BM	0.159	NA
	Chrome/BM	0.514	NA
	Cadmium/BM	0.028	NA
	Mercury/Rainbow Trout	0.011	0.1 (EPA)
	Lead/RT	0.207	NA
	Chrome/RT	1.38	NA

	Cadmium/RT	0.046	NA
	Mercury/White Sucker	0.016	0.1(EPA)
	Lead/WS	0.172	NA
	Chrome/WS	0.789	NA
	Cadmium/WS	0.026	NA
HRO2/561 (downstream of HR Reservoir, upstream of site)	PCB/Rainbow Trout	<0.023 (ND)	0.1ppm PAFBC 2.0ppm USFDA
	PCB/White Sucker	0.013 Arochlor 1260 (estimate)	Same
	PCB/Blacknose Dace	0.025 Arochlor 1260 (estimate)	Same
	Mercury/Rainbow Trout	0.025	0.1 (EPA)
	Lead/RT	0.056	NA
	Chrome/RT	1.64	NA
	Cadmium/RT	0.026	NA
	Mercury/White Sucker	0.013	0.1(EPA)
	Lead/WS	0.137	NA
	Chrome/WS	0.376	NA
	Cadmium/WS	0.029	NA
	Mercury/Blacknose Dace	0.026	0.1 (EPA)
	Lead/BD	0.118	NA
	Chrome/BD	0.998	NA
	Cadmium/BD	0.043	NA
HRO3/550 (downstream of site)	PCB/Blacknose Dace	0.037 Arochlor 1260 (detection limit 0.033ppm)	0.1ppm PAFBC 2.0ppm USFDA
	PCB/Creek Chub	0.017 Arochlor 1260	Same
	Mercury/Blacknose Dace	0.012	0.1 (EPA)
	Lead/BD	0.122	NA
	Chrome/BD	1.21	NA
	Cadmium/BD	0.026	NA
	Mercury/Creek Chub	0.018	0.1 (EPA)
	Lead/CC	0.026	NA
	Chrome/CC	0.368	NA
	Cadmium/CC	0.10	NA

DEP conducted fish sampling of Hinckston Run and three tributaries with the USF&WS and PAFBC in September 2000 (and accompanied by a representative of the Kiski-Conemaugh Watershed Group. As stated above, USF&WS and PAFBC were interested in overall stream quality assessment.

The data indicates that PCB and mercury in the fish tissues are below State and Federal consumption advisories. The only PCB detected (and in most cases only estimated) was Arochlor 1260, but still below the consumption advisories. Further, the data does not indicate any significant differences from upstream of the Riders site to downstream. However, there was a larger and more diverse fish population upstream of the Hinckston Run Reservoir and the Riders site, then downstream of the site. This appears to be due in part to habitat, since downstream of the site the stream exhibits a less suitable fish habitat. However, indicator parameters such as dissolved oxygen, pH and alkalinity progressively decrease upstream to downstream. Also as indicated above, iron, calcium and aluminum concentrations markedly increase adjacent to the site and so should be considered to be partly responsible for the lower fish diversity and population. DEP considers the presence of fish in the Riders stretch of Hinckston Run to be evidence of environment improvement from conditions in the 1970s and 1980s.

DEP also conducted benthic macroinvertebrate sampling of Hinckston Run with the USF&WS and PAFBC in September 2000 and separately in fall 2002 (the latter as part of an impaired stream assessment). For the 2000 sampling, macroinvertebrate quantification and classification has not been completed (to be done by PAFBC). However, bugs were collected at stations upstream (HRO1 and HRO2/561), adjacent (558 and 556) and downstream (HRO3/550). The three Hinckston Run tributaries were also checked in September 2000. Bugs were collected in all three, fish in the upper

(upstream and adjacent to the site) two. The dissolved oxygen and pH of the tributaries do not indicate any remarkable conditions that may be adversely affecting Hinckston Run. During DEP's fall 2002 stream assessment, no bugs were recovered from sampling stations located adjacent to the site and immediately downstream of the site, whereas some benthic life was recovered at the mouth of Hinckston Run before it enters the Little Conemaugh River and abundant benthic life (in terms of population and diversity) were recovered upstream of the reservoir. These results indicate an adverse impact from the Riders site, which can be linked to the chemical results from stream, seep and sediment data tabulated above and in attached reports.

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

3. Are there complete pathways between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential Human Receptors (Under Current Conditions)

<u>"Contaminated Media"</u>	<u>Residents</u>	<u>Workers</u>	<u>Day-Care</u>	<u>Construction</u>	<u>Trespassers</u>	<u>Recreation</u>	<u>Food</u> ³
Groundwater	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
Air (indoors)	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
Soil (surface, e.g., <2 ft)	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
Surface Water	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>	<u>NO</u>
Sediment	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>	<u>NO</u>
Soil (subsurface e.g., >2 ft)	<u>NO</u>	<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>	<u>NO</u>	<u>NO</u>
Air (outdoors)	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors -- spaces for Media which are not "contaminated" as identified in #2 above.
2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media – Human Receptor combination (Pathway).

If no (pathways are not complete for any contaminated media –receptor combination) – skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet) to analyze major pathways.

 X
If yes (pathways are complete for any "Contaminated" Media – Human Receptor combination) – continue after providing supporting explanation..

If unknown (for any "Contaminated" Media – Human Receptor combination) – skip to #6 and enter "IN" status code.

Rationale and Reference(s):

There are no groundwater users downgradient of the Riders site that are hydrogeologically connected to impacted water at Riders. Hinckston Run is not used for drinking water and is not routinely used for fishing; access is extremely limited, environmental and habitat conditions have not and continue not to be supportive of sport fishing activities. Trespassers may come in contact with contaminated seeps, surface water and sediment in Hinckston Run, based on the summaries identified above, and reports attached to this evaluation. However, access is limited and generally not possible from the Riders side of the stream (due to topography and site access restrictions). Therefore, the "trespass pathway" is considered to be remote and in any event would not involve any acutely hazardous constituents. Based on plans to mine a part of the Riders site (a mining permit was issued in October 2006), including the SPL area, mining workers may be exposed to contaminants in the subsurface soil/slag. However, TRI and the mining company (Rollock, Inc) have developed contingency plans to manage any hazardous materials/waste that may be encountered during mining, so this potential exposure pathway is considered to be properly controlled. Attached to this evaluation is a RCRA Exposure Information Report prepared by BSC for a proposed (and subsequently withdrawn) new hazardous waste landfill at Riders.

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

4. Can the exposures from any of the complete pathways identified in #3 be reasonably expected to be "significant" (i.e., potentially⁴ "unacceptable" levels) because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

NO If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) – skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) – continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

If unknown (for any complete pathway) – skip to #6 and enter "IN" status code.

Rationale and Reference(s):

As stated above, DEP considers the only potential exposure pathways to be via trespassers, workers and construction workers. However, such exposures would either be short in duration, or controlled in accordance with hazardous materials contingency plans and in any case would not involve acutely hazardous constituents.

⁴ If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a Human Health Risk Assessment specialist with appropriate education, training and experience.

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

5. Can the "significant" exposures (identified in #4) be shown to be within acceptable limits? NA

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) – continue and enter a "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable") – continue and enter a "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) – continue and enter "IN" status code.

Rationale and Reference(s): _____

