HHRA file 151379

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Received 7/1/96 by V. Janosik, RPM

June 27, 1996

Via Overnight Courier

Mr. Charles L. Tordella
Project Manager
Hazardous Sites Cleanup
Pennsylvania Department of Env. Protection
230 Chestnut Street
Meadville, PA 16335-8311

RE: Westinghouse - Sharon Pre-Risk Assessment Deliverables

Dear Mr. Tordella:

Enclosed are the three pre-risk assessment deliverables you and your colleagues requested at the close of our group meeting on June 11, 1996. They include: (1) a memorandum on the groundwater data point plume groupings, (2) revised conceptual site model handouts, and (3) exposure factor tables for each hypothetical receptor for the baseline human health risk assessment (HHRA).

Feel free to contact myself or David Crawford if you have any questions about these deliverables. We look forward to PADEP and EPA approval of these items so that we can proceed with the HHRA.

Sincerely,

Mark Maritato

Mark C. Maritato
Senior Health Scientist

enc

cc Victor Janosik (U.S. EPA [5 Copies])
Gordon Taylor (Westinghouse)
Pat O'Hara (Cummings/Riter)
David Crawford (ChemRisk)

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MEMORANDUM

To: Chuck Tordella (PADEP)

From: Mark Maritato (ChemRisk) MCM

Date: June 27, 1996

Subject: Groundwater Datapoint Groupings for the Westinghouse - Sharon Human Health Risk Assessment

cc: Victor Janosik (U.S. EPA)
Gordon Taylor (Westinghouse)
Pat O'Hara (Cummings/Riter)
David Crawford (ChemRisk)

As a result of our group meeting on June 11, 1996, on behalf of Westinghouse, ChemRisk, in concert with Cummings/Riter, has re-organized the groundwater data groupings for the Human Health Risk Assessment (HHRA) for Westinghouse's Sharon site. As we discussed in our meeting, differentiating hypothetical groundwater exposures consistent with three apparently distinct source locations - a solvent plume, a PCB/chlorobenzene plume, and the bedrock aquifer, appears to be the most logical reconfiguration of exposure point groupings. Accordingly, the data groupings below support this revision. It should be recognized that certain wells were either included or excluded from their respective data grouping for a variety of factors. At ChemRisk's request, Cummings/Riter prepared the appended memorandum and tables which provides the technical rationale for the final proposed selection of groundwater data points.

Bedrock Well Grouping

All 11 monitoring well locations (refer to Table 1 of Cummings/Riter memo) will be used in

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determining a representative groundwater exposure point concentration for the bedrock aquifer. This is in agreement with the decision made during the June 11 meeting, and summarized in your meeting notes of June 17, 1996.

Solvent (Southern) Plume Grouping

The following 5 sample well locations have been identified for the solvent plume grouping: OS-1A, OS-2A, OS-1B, OS-2B, and S-10. This grouping is in agreement with the tentatively selected data points during the June 11 meeting, and summarized in your meeting notes of June 17, 1996.

PCB/Chlorobenzene (Central)Plume Grouping

The proposed groundwater data points for the central plume differ slightly from those presented in your meeting notes of June 17, 1996. As noted on Table 2 of the attached Cummings/Riter memo, M-4A has been dropped out from the grouping as it did not contain organic chemical concentrations above quantitation limits, or inorganic chemical concentrations above those present in the wells with which it was initially grouped. Two wells, S-12R and N-1 were added to the group because they were reported to contain inorganic constituents at levels exceeding the central plume well grouping concentrations.

Please do not hesitate to contact myself, Gordon Taylor at Westinghouse, or Pat O'Hara at Cummings/Riter if you have any questions or comments about these data groupings. We look forward to receiving your approval to proceed with the risk assessment.

MEMO

TO: Mr. Mark Maritato
ChemRisk

Project No. 93111.20/12

FROM: Mr. Bryan R. Maurer BRM 6/25/96
Cummings/Riter Consultants, Inc.

June 25, 1996

RE: GROUNDWATER DATA GROUPINGS FOR RISK ASSESSMENT
FORMER SHARON TRANSFORMER PLANT

In response to your request, I have reviewed the groundwater data in order to further refine the data groupings discussed at the meeting with the agencies on June 11, 1996 in Meadville, Pennsylvania.

As agreed to at that meeting, the groundwater data will be divided into three groupings to be evaluated in the risk assessment. These groupings are shown on Table 1 and described as follows:

- Bedrock - All eleven bedrock monitoring wells;
- Alluvium Southern (Solvent) Plume - Five wells in the southern portion of the site vicinity which contain trichloroethene and 1,2-dichloroethene; and
- Alluvium Central (PCB/Chlorinated Benzene) Plume - Nine wells identified at the June 11, 1996 meeting, plus two wells with inorganic constituents at concentrations which exceed the maximum concentrations among the wells identified at the meeting. Note that one of the wells identified at the meeting (M-4A) did not contain organic constituents above quantitation limits and was thus removed from this grouping.

Several monitoring wells (Table 2) were not included in any of the groupings listed above for evaluation in the risk assessment for one of the following three reasons:

- The well was located within an area containing LNAPL;

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- The well did not contain organic or inorganic constituents at concentrations exceeding the maximum concentration in the wells included in one of the groupings; or

- The well did not contain organic constituents above quantitation limits, was located in close proximity to the Sawhill Tubular remediation area, and was located at least 500 feet from the Westinghouse property.

BRM/jmc
Attachments

TABLE 1
GROUNDWATER MONITORING WELL DATA GROUPINGS

BEDROCK MONITORING WELLS		
S-1B	M-11B	N-6B
S-2B	M-9	N-7B
S-8B	N-2B	R-1
M-4B	N-3B	

ALLUVIUM SOUTHERN PLUME MONITORING WELLS		
S-10	OS-1B	OS-2B
OS-1A	OS-2A	

ALLUVIUM CENTRAL PLUME MONITORING WELLS		
S-12R	*M-14	*MW-15A
*M-1	*M-15	*MW-16A
*M-5	*M-17	*MW-16B
*M-13	N-1	

* - Wells identified at the June 11, 1996 meeting.

TABLE 2
GROUNDWATER MONITORING WELLS
NOT INCLUDED IN THE DATA GROUPINGS

WELLS LOCATED WITHIN LNAPL AREA		
S-4	M-10	GM-3B
M-2	M-11A	MW-14A
M-7	M-12	MW-14B

WELLS WITH NO ORGANIC OR INORGANIC CONCENTRATIONS ABOVE INCLUDED WELLS				
M-4A	M-16	N-3A	S-1A	S-7
M-6	M-18	N-5	S-2A	S-8A
M-8	MW-3A	N-7AR	S-3	S-9
MW-15B	MW-3B	OS-3A	S-5	S-11
MW-17AR	N-2A	OS-3B	S-6	S-13

? above what?

WELLS NEAR SAWHILL REMEDIATION AREA WITH NO ORGANIC DETECTIONS ABOVE QUANTITATION LIMITS		
OS-4A	OS-5A	PW-1
OS-4B	OS-5B	MW-7

EXPOSURE FACTOR TABLES

Exposure Parameters for the Child Wader

Parameter	Value	Source
Sediment Ingestion Rate (mg/d)	200	EPA, 1996
Fraction Attributable to Site	0.5	Assumed
Dermal Adherence Factor (mg/cm^2)	0.2	EPA, 1992
Total Body Surface Area (cm^2)	11,000	EPA, 1989a
Fraction of Surface Area Exposed	0.33	EPA, 1989a (Feet, hands, forearms, and lower legs)
Exposure Frequency (d/yr)	82	5 d/wk, 3 mo/yr; 1 d/wk, 4 mo/yr
Exposure Duration (yr)	6	EPA, 1989b
Body Weight (kg)	33	EPA, 1989a
Averaging Time, Carcinogen (d)	25,550	EPA, 1989b
Averaging Time, Noncarcinogen (d)	2,190	EPA, 1989b

Exposure Parameters for the Hypothetical Trespasser

Parameter	Value for Age Range 7 to 12 yrs	Value for Age Range 13 to 18 yrs	Source
Soil Ingestion Rate (mg/d)	200	100	EPA, 1996
Fraction Attributable to Site	0.5	0.5	Assumed
Dermal Adherence Factor (mg/cm^2)	0.2	0.2	EPA, 1992
Total Body Surface Area (cm^2)	11,000	16,200	EPA, 1989a
Fraction of Skin Surface Area Exposed (soil)	0.26	0.29	EPA, 1989a (Hands, forearms, and lower legs)
Exposure Frequency (d/yr)			
Moat	4	4	Assumed
Railroad ROW	78	78	Assumed (2 times per week, 9 months)
Exposure Duration (yr)	6	6	EPA, 1989b
Body Weight (kg)	33	56	EPA, 1989a
Averaging Time, Carcinogen (d)	25,550	25,550	EPA, 1989b
Averaging Time, Noncarcinogen (d)	2,190	2,190	EPA, 1989b
Surface Water Dermal Permeability Coefficient (cm/hr)	chemical specific		EPA, 1992
Surface Water Exposure Frequency (d/yr)	4	4	Assumed
Fraction of Skin Surface Area Exposed (surface water)	0.33	0.37	EPA, 1989a

Exposure Parameters for the Hypothetical MaintenanceWorker

Parameter	Value	Source
Soil Ingestion Rate (mg/d)	100	EPA, 1996
Fraction Attributable to Source	1.0	Assumed
Dermal Adherence Factor (mg/cm^2)	0.2	EPA, 1992
Total Body Surface Area (cm^2)	18,000	EPA, 1989a
Fraction of Surface Area Exposed	0.15	EPA, 1989a (Hands, forearms, face)
Inhalation Rate (m^3/d)	20	EPA, 1989a (for moderate activity, males only, 8 hr/d)
Particulate Emission Factor (m^3/kg)	4.6E+9	Based on RAM model default results, EPA, 1991
Exposure Frequency (d/yr)	5	Assumes 1 working wk/yr
Exposure Duration (yr)	25	EPA, 1991
Body Weight (kg)	70	EPA, 1989b
Averaging Time, Carcinogen (d)	25,550	EPA, 1989b
Averaging Time, Noncarcinogen (d)	9,125	EPA, 1989b

Exposure Parameters for the Hypothetical Indoor Worker

Parameter	Value	Source
Inhalation Rate (m^3/d)	13.6	EPA, 1989a (Light-moderate activity, males only, 8 hr/d)
Exposure Frequency (d/yr)	250	EPA, 1991
Exposure Duration (yr)	25	EPA, 1991
Body Weight (kg)	70	EPA, 1989b
Averaging Time, Carcinogen (d)	25,550	EPA, 1989b
Averaging Time, Noncarcinogen (d)	9,125	EPA, 1989b

Exposure Parameters for the Hypothetical Construction Worker

Parameter	Value	Source
Soil Ingestion Rate (mg/d)	100	EPA, 1996
Fraction Attributable to Source	1.0	Assumed
Dermal Adherence Factor (mg/cm^2)	0.2	EPA, 1992
Total Body Surface Area (cm^2)	18,000	EPA, 1989a
Fraction of Surface Area Exposed	0.15	EPA, 1989a (Hands, forearms, lower legs)
Inhalation Rate (m^3/d)	20	EPA, 1989b
Particulate Emission Factor (kg/m^3)	Site-Specific	Based on equations contained in EPA, 1993
Exposure Frequency (d/yr)		
Outdoor	195	5 d/wk, 9 mo/yr
Indoor	65	5 d/wk, 3 mo/yr
Exposure Duration (yr)		
Outdoor	1	Assumed
Indoor	2	Assumed
Body Weight (kg)	70	EPA, 1989b
Averaging Time, Carcinogen (d)	25,550	EPA, 1989b
Averaging Time, Noncarcinogen (d)	365	EPA, 1989b

Adult Exposure Parameters for Hypothetical Residential Groundwater Use

Exposure Parameters	Variable	Value	Units	Reference
Averaging Time, Carcinogenic	ATc	25550	days	EPA, 1989b
Averaging Time, Noncarcogenic	ATnc	ED*365	days	EPA, 1989b
Body Weight, adult	BW	70	kg	EPA, 1989b
Groundwater Concentration	C_w	Chemical specific	µg/l	
Exposure Duration	ED	30	years	EPA, 1989b
Exposure Frequency, showering	EF_{shower}	350	days/year	5 days/week, 2 weeks vacation/yr
Exposure Frequency, ingestion	EF_{ing}	350	days/year	5 days/week, 2 weeks vacation/yr
Exposure Time, showering	t_{shower}	8	min/day	EPA, 1989a
Fraction of Surface Area Exposed, showering	SAf	1	unitless	
Inhalation Rate, light activity	$InhR_{shower}$	0.6	m^3/hr	EPA, 1989a
Ingestion Rate, groundwater	IR	2	l/day	EPA, 1989a
Permeablity Coefficient	PC	Chemical specific	cm/hr	EPA, 1992
Surface Area, total	SA	18000	cm2	EPA, 1989a

Air Concentration Calculation Factors	Variable	Value	Units	Reference
Water to Air Transfer Coefficient, shower	TC	0.6	unitless	Mckone & Bogen, 1991
Shower Flow Rate	Q_{shower}	12	l/min	Mckone & Bogen, 1991
Volume of Shower Stall	V_{shower}	2	m^3	Mckone & Bogen, 1991
Air Exchange Rate in Shower Stall	AXR_{shower}	12	m^3/hr	Mckone & Bogen, 1991

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Adult Exposure Parameters for Hypothetical Industrial Groundwater Use

Exposure Parameters	Variable	Value	Units	Reference
Averaging Time, Carcinogenic	ATc	25550	days	EPA, 1989b
Averaging Time, Noncarcogenic	ATnc	ED*365	days	EPA, 1989b
Body Weight, adult	BW	70	kg	EPA, 1989b
Groundwater Concentration	C_w	Chemical specific	µg/l	
Exposure Duration	ED	25	years	
Exposure Frequency, showering	EF_{shower}	250	days/year	EPA, 1991
Exposure Frequency, ingestion	EF_{ing}	250	days/year	EPA, 1991
Exposure Time, showering	t_{shower}	8	min/day	EPA, 1989a
Fraction of Surface Area Exposed, showering	SAf	1	unitless	
Inhalation Rate, light activity	$InhR_{shower}$	0.6	m^3/hr	EPA, 1989a
Ingestion Rate, groundwater	IR	1	l/day	EPA, 1991
Permeablity Coefficient	PC	Chemical specific	cm/hr	EPA, 1992
Surface Area, total	SA	18000	cm2	EPA, 1989a

Air Concentration Calculation Factors	Variable	Value	Units	Reference
Water to Air Transfer Coefficient, shower	TC	0.6	unitless	Mckone & Bogen, 1991
Shower Flow Rate	Q_{shower}	12	l/min	Mckone & Bogen, 1991
Volume of Shower Stall	V_{shower}	2	m^3	Mckone & Bogen, 1991
Air Exchange Rate in Shower Stall	AXR_{shower}	12	m^3/hr	Mckone & Bogen, 1991

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Exposure Factor Table References

EPA. 1989a. *Exposure Factors Handbook.* U.S. Environmental Protection Agency, Office of Health and Environmental Assessment, Washington, D.C. EPA/600/8-89/043. July.

EPA. 1989b. *Risk Assessment Guidance for Superfund; Volume I: Human Health Evaluation Manual (Part A) - Interim Final.* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89-002. July.

EPA. 1991. *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

EPA. 1992. *Dermal Exposure Assessment: Principles and Applications; Interim Report.* U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. EPA/600/8-91/011B. January.

EPA. 1993. *Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emissions from Superfund Remedial Actions.* U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC.

EPA. 1996. *Risk-Based Concentration Table, January-June 1996.* U.S. Environmental Protection Agency, Region III, Philadelphia, PA. June.

McKone, T.E. and K.T. Bogen. 1991. Predicting the uncertainties in risk assessment. *Environ. Sci. Technol.* 25(10):1674-1681.

Westinghouse - Sharon, Pennsylvania

Revised Human Health and Ecological Risk Receptor Characterization

June 27, 1996

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IR.302697

Westinghouse - Sharon Hypothetical Receptors and Exposure Pathways

Sector		Hypothetical Receptor	Quantitative Exposure Pathway
Middle Buildings	Interior	Post Development Employee	☐ Inhalation of Vapors (via LNAPL & Soil Gas)
		Construction/Utility Worker	☐ Ingestion of Subsurface Soil ☐ Dermal Contact with Subsurface Soil ☐ Inhalation of Dust (from Subsurface Soil) ☐ Inhalation of Vapors
	Exterior	Construction/Utility Worker	☐ Ingestion of Subsurface Soil ☐ Dermal Contact with Subsurface Soil ☐ Inhalation of Dust (from Subsurface Soil) ☐ Inhalation of Vapors

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Westinghouse - Sharon Hypothetical Receptors and Exposure Pathways

Sector	Hypothetical Receptor	Quantitative Exposure Pathway
Moat	Facility Maintenance Worker	☐ Inhalation of Dust (from Surface Soil) ☐ Ingestion of Surface Soil ☐ Dermal Contact with Surface Soil
	Construction/Utility Worker	☐ Inhalation of Dust (from Subsurface Soil) ☐ Ingestion of Subsurface Soil ☐ Dermal Contact with Subsurface Soil
	Trespasser 7-18 years old	☐ Inhalation of Dust (from Surface Soil) ☐ Ingestion of Surface Soil ☐ Dermal Contact with Surface Soil

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Westinghouse - Sharon Hypothetical Receptors and Exposure Pathways

Sector	Hypothetical Receptor	Quantitative Exposure Pathway
Railroad Right-of-Way	Trespasser 7-18 years old	☐ Inhalation of Dust (from Surface Soil) ☐ Ingestion of Surface Soil ☐ Dermal Contact with Surface Soil ☐ Dermal Contact with Pooled Surface Water Runoff (Using Upgradient (in-pipe) Clark Street, Wishart Court Inteceptor, and Franklin Street Water Sampling Data)
	Railroad Maintenance Worker	☐ Inhalation of Dust (from Surface Soil) ☐ Ingestion of Surface Soil ☐ Dermal Contact with Surface Soil

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Westinghouse - Sharon Hypothetical Receptors and Exposure Pathways

Sector	Hypothetical Receptor	Quantitative Exposure Pathway
North and South	Employee	☐ If Middle Building Indoor Vapor Risks Exceed Acceptable Risk Criteria, Risk Calculations for Hypothetical Exposure to Vapors in North and South Sector Buildings will be Performed
	Construction/Utility Worker	☐ A Qualitative Discussion of Potential Risks via Exposure to Subsurface Soil in the North and South Sector will be Presented, Based on the Risk Results for the Middle Sector/AB Slab Subsurface Soils

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Westinghouse - Sharon Hypothetical Receptors and Exposure Pathways

Sector	Hypothetical Receptor	Quantitative Exposure Pathway
River	Child Wader (7-12 years old)	❑ Ingestion of Sediments ❑ Dermal Contact with Sediments ❑ Surface Water - will Re-Screen with PADEP Data
Other Site Considerations	Employee/Resident Using Groundwater From 3 Separate Sources: (1) Solvent (Southern) Plume (2) PCB/Chlorobenzene (Central) Plume (3) Bedrock Aquifer	❑ Inhalation of Vapors while Showering ❑ Ingestion of Groundwater ❑ Dermal Contact with Groundwater

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Screening-Level/Preliminary Ecological Assessment

- As defined by EPA Region III (EPA, 1994) screening level ecological assessments provide a preliminary characterization of potential exposures and effects to ecological receptors

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Screening-Level/Preliminary Ecological Assessment cont'd

- Key Tasks Include:
  - Ecosystem Characterization
    - Identification of available habitats
    - Identification of potential ecological receptors
  - Stressor Characterization
    - Evaluation and summary of available chemical data
    - Selection of chemicals of potential ecological concern (COPEC)
  - Screening Analysis/Risk Evaluation
    - Identify complete exposure scenarios
    - Ecological effects quotient (EEQ) approach to evaluate the potential for risks to ecological receptors

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Potential Sources of Information for Preliminary Ecological Assessment

- Ecosystem Characterization
  - RMC/Normandeau Associates (1994) on-site ecological evaluation
    - Limited terrestrial habitat available
    - Ecological receptors primarily limited to aquatic pathways (i.e., aquatic species or piscivorous birds)
  - Local, State, and Regional Agencies
    - Presence of endangered and threatened species at the Site unlikely based on available habitats

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Potential Sources of Information for Preliminary Ecological Assessment cont'd

- Stressor Characterization
  - Cummings/Riter (1995)
  - Normandeau Associates (1994)
  - Pennsylvania Fish and Boat Commission Report (1995)

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Proposed Approach for Evaluating Ecological Risks

- Ecological Assessment Should Focus on Exposures to Sediment and Surface Water
  - Aquatic receptors (i.e., benthic invertebrates, fish)
  - Piscivorous species (i.e., fish-eating birds)
  - Insectivores (i.e., swallows)

- Ecological Effects Quotient
  - Ratio of the exposure point concentration for each COPEC to relevant benchmarks
    - AWQC
    - Sediment Quality Guidelines
    - Toxicological Benchmarks

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