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International Specialists in the Environment

79076

November 24, 1993

Mr. Kerry Street, HSRL-6J
U.S. Environmental Protection Agency
Remedial Response Branch
77 W. Jackson Blvd.
Chicago, Illinois 60604

Re: Response to Comments on the Conrail RI Report and Additional Sections

Dear Mr. Street:

Please find enclosed our responses to the comments on the Draft Conrail RI Report (Attachment 1), and two new sections to the report; Section 4.1-Lead-Screen Auger Sampling Results (Attachment 2) and Section 4.5-Surface Water and Sediment Sampling Results (Attachment 3). As we agreed, E & E is submitting the responses to the comments on the report for approval prior to the submittal of the final report. In addition, two new sections are enclosed for your comments. Please do not hesitate to contact me if you have any questions or comments on this submittal.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

Bridget A. Lombardi
Site Manager

cc: Stephen Nathan, EPA PO, without attachments
Marshall McReynolds, EPA CO, without attachments
Thomas Yeates, E & E PM, without attachments

**ATTACHMENT 1:
COMMENTS AND RESPONSES**

**RI REPORT COMMENTS PROVIDED TO E & E BY EPA
AND E & E'S RESPONSES TO THE COMMENTS**

Note: Words, letters, etc., were inserted in brackets [] in the comments below by E & E in an effort to clarify the comment.

Comments from Mark Vendl, Geologist, Technical Support Section, June 10, 1993, and E & E's responses.

Comment #1:

Page 3-3. It is stated that for the purpose of this study, the seven wells that were drilled to bedrock are adequate to characterize the surface topography of the shale bedrock, because they are widely spaced. However, the distribution of these wells is approximately linear, and not exactly covering the entire site (see attached map). The entire northeastern part of the site has no bedrock wells. Another statement is made that since the areal distribution of the seven wells are approximately linear, this allows for an apparent dip or slope of the bedrock to be determined. I really don't believe that data along a line is adequate to accurately assess the apparent dip of the bedrock surface. Usually, at least three points in the form of a triangle are needed to estimate slope. The bottom line is that I don't think the bedrock topography at this site has been adequately delineated, especially in the light that DNAPLs are probably present and the overlying sediments are mostly sands. The possibility that DNAPLs have migrated to the top of bedrock needs to be assessed. This would entail trying to locate low areas on top of bedrock which could act as traps.

Response #1: E & E will clarify this portion of the report by stating that the depth to bedrock is adequately defined for the purposes of groundwater modeling and feasibility study calculations. E & E will use the depth to bedrock data as a boundary condition for analytical or numerical modeling and to evaluate remedial alternatives during the FS. E & E investigated the possibility that DNAPL had migrated to the top of bedrock at one location. It is EPA's decision to request additional investigation to address this situation if EPA believes it is warranted.

Comment #2:

Page 4-5. It is stated that determining the extent of the CCl₄ DNAPL source would be exceptionally costly and virtually impossible. I think this statement should be removed, and is not a statement that a contractor should be making in a public document. These comments should be up to the agency to make. This statement could limit our ability to negotiate with the PRPs in the future.

Response #2: E & E is in agreement with this comment and the statement has been removed from the report.

Comment #3:

The big unknown left at this site is the location and extent of the CCl₄ and TCE DNAPLs that are suspected to be present. This could be very important depending on the type of remedy needed for this site. Based on the DNAPL training course put on here in the Region last week, I would think that headquarters would press the Region to further evaluate the DNAPLs at this site. Further evaluation of the subsurface geology may be needed to locate possible locations of the DNAPLs. The use of techniques such as surface geophysics may need to be considered for this site, in order to achieve better resolution of the subsurface geology. I realize that some techniques may not be possible at this site due to the physical constraints of the railyard. However, I think headquarters is going to want to see more justification before agreeing to not locating the DNAPL.

Response #3: The need to press for further evaluation of DNAPLs is a risk management decision to be made by EPA. A reference in the RI Report (EPA 1992a) states it may be impossible to recover DNAPL from the subsurface. It should be noted that an administrative decision to locate the DNAPLs may not result in the successful identification of DNAPL or a definitive conclusion that DNAPL is absent from the site. The likelihood of locating DNAPL will be related the amount of effort expended on additional investigations. If DNAPL is present, complete restoration of the site will require removal of DNAPL.

Comment #4:

If you would like a third party evaluation of this document in regards to the geology, the Indiana District of the U.S. Geological Survey could be requested to conduct a review. The Indiana District has been conducting a number of studies in this area, and are very familiar with the area geology. There is money in the IAG with the USGS to do this review, and would not cost your project anything. Please let me know if you would like to pursue this.

Response #4: A general review by a third party unfamiliar with the site may be of limited value. However, a review by the Indiana District of the Geological Survey could be constructive if the personnel conducting the review are familiar with the geology and hydrogeology within the vicinity of the site. A decision by the RPM to request such a review would be helpful.

Comments from Krista Eskilson, Indiana Department of Environmental Management, June 16, 1993, and E & E's responses.

General Comment:

There was no summation in the document of the residential well sampling results obtained thus far. Although this data may not be useful for risk assessment purposes, a summary should be included to help portray the plumes.

Response to General Comment: A partial summary is provided in Appendix A (Phase I Technical Memoranda). The appendix summarizes all of the residential well sampling results that had been provided to E & E at that time. Presently, E & E does not possess all of the results of the residential well sampling that has been conducted to date. IDEM was responsible for this sampling and is in possession of all of the results.

Comment #1:

Page 1-4, 2nd paragraph. Do the St. Joseph River and Baugo Bay act as sources of recharge for the aquifer?

Response #1: For periods of short duration, it may be possible for the St. Joseph River and Baugo Bay to change from a discharge zone to a recharge zone. Intense rainfall might cause this to occur. However, E & E's potentiometric data has always shown groundwater flow towards the river and bay with vertical gradients consistent with the river and bay acting as discharge zones for the aquifer.

Comment #2:

Page 1-5, Section 1.5. What types of solvents are used for car cleaning? What quantity is stored on-site?

Response #2: It is not known if "car cleaning" is performed by using solvents. Based on conversations with Conrail personnel, it is probable that "car cleaning" only refers to sweeping debris out of box cars. From an historical standpoint, this issue was addressed in the Jacobs study (1987) which found no on site storage of solvents that could be documented. E & E has never identified any solvents stored on-site.

Comments #3:

Page 2-9, 2nd Paragraph. Background sample locations for both the St. Joseph River, Baugo Bay and Baugo Creek were not collected from appropriate locations. The background samples from the St. Joseph River are located within a possible groundwater plume discharge zone to the river from the LaRue Street plume. Background samples from Baugo Creek are also within a possible groundwater plume discharge zone. Please discuss this issue in the text.

Response #3: The background samples from the St. Joseph River are over 3,000 feet downstream from the potential discharge zone of the LaRue Street plume. The background samples from Baugo Creek are over 1,000 feet upstream from the point of discharge of the County Road 1 plume. The sample locations were approved by EPA and IDEM in the Phase III Planning Documents. E & E feels that the locations are appropriate. No site related contaminants were detected in the background samples.

Comment #4:

Section 4.0, General. What about the nature and extent of the contamination in the ponds? No discussion is included in this section regarding the source areas for the chlorinated hydrocarbons and pesticides found in the ponds on the Conrail site.

Response #4. Section 4.5 will be added to the final RI report. The nature and extent of contamination in the surface water and sediment from the ponds is discussed in this section. Section 4.5 is included as Attachment 3 to this submittal.

Comment #5:

Page 4-5, 1st full paragraph, last sentence. This discussion does not include the Trichloroethylene (TCE) or Carbon Tetrachloride (CCl₄) detections in the turnaround track area mentioned on Page 1-7.

Response #5: E & E was not able to duplicate these findings during the Phase I RI, and, although this area was targeted based on these data, E & E's results indicate that it is not a potential source area.

Comment #6:

This section should summarize the results to date and give an indication of the extent of the TCE plume and the CCl₄ plume. Figures should be included summarizing all monitoring well data. A summary figure of the residential well data, including non-detections, would also be helpful to characterize the plumes. Discuss why there appears to have been no sampling done north of the monitoring wells MW51, MW15, MW16, and MW18. Does residential well data support this?

Response #6: The identified extent of the TCE and CCl₄ plumes was defined during the Phase II investigation; therefore, this discussion provides the most complete indication of the extent of the plumes to date. E & E believes that a significant amount of effort is involved in rewriting and re-presenting data contained in the Phase I and II Technical Memoranda and that doing so would add little value to this section. The Phase I and II findings are easily accessible in the appendices of this report. Residential well sampling was beyond the scope of E & E's work. The residential well sampling results completed during investigations conducted by IDEM and EPA/TAT were utilized by E & E in planning the RI and for conceptualizing the

conditions in the study area. No sampling was conducted north of the wells mentioned based on the non-detects found in the residential wells in this area, the Phase I soil gas survey non-detect results from the drum site area, and the groundwater flow paths from identified source areas that can be visualized in Section 3 of the RI Report.

Comment #7:

Page 4-11, 2nd paragraph, last sentence. What about the soil contamination identified in the turnaround track noted on page 17? Is this a possible source area?

Response #7: As stated in Response #5, E & E could not corroborate these findings.

Comment #8:

Page 4-12, last sentence. Is there historical evidence or does the surface drainage network discharge to Baugo Creek? Could surface drainage from the site be the source of the contaminants found in the background samples for Baugo Creek and Baugo Bay?

Response #8: Based on drawings obtained from Conrail and observations made by E & E at the facility, the surface drainage network for the Conrail facility discharges to Crawford Ditch. There is no evidence that the surface drainage network discharges to Baugo Creek. The only site related contaminant detected in the Baugo Creek background samples was toluene. In one of the sediment samples toluene was detected at 4 µg/kg and in the other two sediment samples toluene was not detected. At a concentration of 4 µg/kg, toluene may be present as a laboratory artifact. Therefore there is no correlation between the contamination found in the background samples and the contamination found on the Conrail facility.

Comment #9:

Page 6-2, 1st Paragraph. Discuss the controls currently in place to restrict access to visitors.

Response #9: The following statement has been added to the paragraph listed above. "No trespassing signs posted around the site are the only means of restricting visitor site access."

Comment #10:

Page 6-2, 2nd paragraph. What about excavations done in the residential areas, or local utility work? Do these scenarios pose a risk, or is risk identified only for basement areas, where the soil gas can accumulate?

Response #10: There is no verified soil contamination off the facility in residential areas. Therefore, potential risks in these areas would most likely be due to volatilization of COPCs from contaminated groundwater. There is a potential for excavations to occur in residential areas in the future. The risks posed to workers from these excavations would include inhalation of COPCs, direct contact with COPCs, and incidental ingestion of COPCs during the excavations. The future facility worker scenario evaluated these same pathways and found the potential for excess cancer risks and noncarcinogenic adverse effects to be low (see Tables 6-20 and 6-21). The exposure point concentrations used to evaluate risks for the facility worker are higher than those an off-facility worker would be exposed to. As a result, the potential risks to off-facility workers (i.e., utility workers excavating in residential areas) would be lower than those to facility workers. Therefore, no changes were made to the risk assessment based on this comment.

Comment #11:

Page 6-3, 3rd paragraph. Does the zoning of the site or current deed restrictions support the statement regarding future use of the site?

Response #11: According to the Elkhart County Auditor's Office, the deed for the Conrail facility could not be located and was not recorded with their office. According to Kerry Street (EPA Unit Chief), EPA does not recognize deed restrictions when evaluating possible future scenarios. However, Kerry did agree that the Conrail facility is a viable industry, and was unlikely to be phased out in the future. Therefore, no changes were made to the risk assessment based on this comment.

Comment #12:

Page 6-17, 2nd full paragraph, 1st sentence. Whole facility exposures were stated to be used in this paragraph. This may mask worker exposure to identified hot spot areas on the site. However, in Table 6-13, the chemical concentration modeled is for the upper 95 percent confidence limit (95% UCL) on the arithmetic average or the maximum observed soil concentration. No listing, or table comparing the 95% UCL to the maximum observed soil concentration could be found. Please clarify and provide a table for the 95% UCL concentrations.

Response #12: Workers on the Conrail facility are likely to spend time throughout the facility during the workday. Therefore, they are likely to be exposed to any or all of the COPCs during the day. EPA 1992, "Supplemental Guidance to RAGS: Calculating the Concentration Term" states that the concentration term in the intake equation should be an estimate of the arithmetic average concentration of a contaminant. Due to the uncertainty in estimating the average, it is recommended that the 95% UCL of the arithmetic mean be used for the variable. The potential risks to facility workers were calculated as though a worker is exposed to the 95% UCL or the maximum observed soil concentration of each COPC for the entire duration of each exposure. Therefore, it is likely that contrary to masking hot spots, this method probably overestimates risks to facility workers. A table listing the maximum

observed soil concentrations and the 95% UCL has been inserted in the report and a reference to that table has been included in Section 6.3.3.1 of the report.

Comment #13:

Page 6-52 3rd paragraph, last sentence. A word appears to be missing in the last sentence (i.e. high or low for red blood cell counts).

Response #13: The word "decreased" has been inserted into this sentence.

Comment #14:

Page 6-61 Section 6.8. Sediment chemicals of potential concern (CPECs) are primarily inorganics, and are discussed adequately in the text. However, other than discharge of surface runoff into the westernmost pond via the drainage network, the mechanism to relate inorganics contamination to sources on the site is not established. Also, Crawford Ditch, a major discharge point from the drainage network, is not discussed in the ecological assessment.

Response #14: Identification of specific sources of inorganic contamination on the Conrail facility, other than day-to-day operations of the railyard, was not within E & E's scope of work for the RI. Therefore, it is difficult to determine mechanisms of release. Groundwater flows towards the St. Joseph River, so groundwater is not a major contributor of CPECs to the ponds.

Crawford Ditch is addressed in the EA with respect to sampling in the St. Joseph River both upstream and downstream of where the ditch empties into the river. Statistical analysis of the chemical results of these two groups of samples revealed no differences in their results. Crawford Ditch is an intermittent man-made stream. Its value as an aquatic or semiaquatic habitat is low; it is also not identified as a wetland on the National Wetland Inventory Map for this area. Therefore Crawford Ditch was only evaluated in terms of its discharge to the St. Joseph River, as stated above.

Comment #15:

Page 6-66 Section 6.9.2. Exposure pathways do not address terrestrial wildlife except when associated with aquatic systems. The conclusions indicate that there are no terrestrial ecological risks at the site. How was this conclusion reached?

Response #15: The terrestrial ecosystem in the general vicinity of the site does not appear to be impacted by site activities. There are no species of special concern that would be affected by site-related contamination; the badger was last found north of the St. Joseph River. The Cooper's hawk, which preys on small mammals and birds, if present in the area, would not be impacted by CPECs since its feeding range would extend beyond the facility boundaries and, therefore, only a fraction of its food would come from areas potentially impacted by the facility. The area surrounding the

facility is suburban, agricultural, and industrial and because of these land uses, little high quality wildlife habitat exists on or near the Conrail facility.

Comment #16:

Page 7-1, Section 7.1. Is the clayey layer found at MW 15 acting as a mound dividing the groundwater flow direction? A conclusion regarding the different flow directions should be presented.

Response #16: There is insufficient evidence to determine if the clay at MW15 is causing a groundwater mound. The clay is probably one of the causes for the division in the groundwater flow direction (two other likely causes are the shape of the river and the groundwater mound at MW18). Section 7 is presented to serve as a concise summary. Only conclusions are presented. Evidence used to draw conclusions is presented in earlier sections. No revision to the text will be made.

Comment #17:

Page 7-2, Section 7.2. It would be more clear to name these source areas. No mention of the other possible source areas is made. This data gap should be stated here.

Response #17: The locations of the sources are mentioned in the same sentence that the source is mentioned. The location is effectively the "name" of the source. The existence of other possible source areas is based on information that does not indicate the location of these source areas. Therefore, all that can be said is that other source areas may exist. Data gaps (that may be addressed during a predesign investigation) and recommendations will be presented in the Feasibility Study Report. This section summarizes the findings. No revision to the text will be made.

Comments from Jennifer Wolf, Ecologist, Technical Support Section, June 23, 1993, and E & E's responses.

Comment #1:

Information should be given on the history of the ponds, particularly on whether they were naturally or man made.

Response #1: The ponds were probably man-made; they were not present in aerial photographs taken in 1952, but did appear in photographs dated 1967. The following statement has been inserted in Section 6.7.2.4 of the RI report: "Based on historic aerial photographs, these ponds appear to have been made between the years 1952 and 1967."

Comment #2:

On pages 6-66 and 6-67, it is stated that potentially exposed receptors include:

- 1) aquatic biota in the ponds;*
- 2) semiaquatic wildlife and terrestrial wildlife that depend on the aquatic environment for a fraction of their food or wildlife needs;*
- 3) upland wildlife and birds that use the ponds as a water source; and*
- 4) plants growing along or adjacent to the ponds.*

The only information provided on westernmost pond receptors, however, was that there was stonewort and a school of 3 to 4 inch minnows. Using information collected during the December 1992 site visit as well as information from the literature, from past studies at or near the site, etc., a list should be developed for each of the above four categories. As it stands now, I am not able to tell what are the potentially exposed receptors at the westernmost pond.

Response #2: Upon the suggestion of Pat Van Leeuwen, E & E contacted Eileen Helmer, EPA Ecologist, to discuss these comments. Eileen stated that additional fieldwork would not be necessary to address this comment. She suggested that this comment could be addressed with a qualitative description of the landscape. This qualitative description of the area is provided generally in the RI report and specifically in Section 6.7 of the risk assessment. The following sentence will be added to the end of the second paragraph of Section 6.6

"The determination of whether a more detailed EA is warranted lies with the Risk Manager (i.e., EPA), and will be made based on the results of this screening-level EA."

Comment #3:

As shown of Figure 2-5, one sediment sample, sample SD25, was collected in the westernmost pond. Was this sample collected from the area of the pond expected to have the highest contamination?

Response #3: Yes, the sediment sample referenced above was collected from the point where the drainage system outfall enters the pond.

Comment #4:

On page 6-8[0], it is stated that "the westernmost pond is relatively small (approximately 1 acre in area) and additional substitute habitats are available." I am not sure what the implication of this statement is. Does E & E mean to imply that remedial steps should not be taken at the westernmost pond? Also, does the statement "substitute habitats are available" mean that organisms would be expected to avoid the (contaminated) westernmost pond and instead frequent the other ponds? If the westernmost pond is causing significant ecological risk, remedial steps should probably to [be] taken to stop this risk, regardless of whether or not "substitute habitats are available."

Response #4: E & E agrees with the comment, as stated above. Therefore, paragraph 1 of Section 6.11.3 will be rewritten as follows.

"Potential risks to the benthic organisms from the CPECs present in the ponds are assessed to be moderate to high. CPECs were detected only in the westernmost pond that contained the outfall from the site. Currently, there are no species of special concern residing in the ponds, or in the area, that would be affected by the potential risks posed by CPECs in the ponds. Although there is a potential for some adverse effects from exposure to CPECs to individuals residing in the ponds, it is unclear what effects these affected individuals may have on the overall population structure, habitat diversity, or ecosystem as a whole. It should be kept in mind that these habitats are also affected by the land uses on-site and in the areas surrounding the site (i.e., agricultural, residential, and industrial). Physical disturbances from these land uses may currently have (or have had) in the past more influence on the populations in the ponds than the influence of site-related chemical stressors.

Comment #5:

According to Page 5[6]-56, "the results of this assessment will be used to determine whether a detailed EA is warranted." It is not clear to me what decision was reached, whether it was decided that a detailed EA was or was not warranted.

Response #5: The EA presents the potential risks to flora and fauna residing in affected habitats. The decision whether to perform a more detailed EA based on the information presented in this EA lies with EPA:

Comments from Daniel L. Meyer, Environmental Engineer, Regulation Development Section, Air Toxics and Radiation Branch, June 8, 1993, and E & E's responses.

Comment #1:

1.5 Site History and Previous Investigations. Air monitoring of the treatment system has been proposed. Monitoring at the property line should be conducted to determine residential exposure due to downwind inhalation of on-site contaminants. These concentrations can then be compared to risk-based action levels. Please consult Volume IV of the Air/Superfund National Technical Guidance Study Series, Procedures for Dispersion Modeling and Air Monitoring for Superfund Air Pathway Analysis, when designing an air monitoring network.

Response #1: The design for the air monitoring network for the treatment system will be proposed during the planning stages of the interim remedial action. No changes to the RI report were made based on this comment.

Comment #2:

7.6.1 Assessment of Human Health Risk. Soil excavation causes volatile compounds trapped in the soil and groundwater to volatilize. Due to the health risk to workers during excavation, soil vapor suppression should be employed. Perhaps a foam could be applied over excavated surface soils to inhibit VOC emissions.

Response #2: E & E agrees with this comment and will address this issue in the feasibility study. No change in the RI report is warranted.

Comment #3:

Appendix G. The near-field air dispersion model is a box model. This model is being used to predict downwind concentrations for the risk assessment. The model is a screening model rather than a refined model. Use of a USEPA dispersion model such as SCREEN would be more appropriate. In the event modeling is conducted to assess the downwind impacts of a thermal treatment system, please use SCREEN or ISC rather than this box model. These two models are much more complex than this simple box model.

Response #3: E & E agrees to use a more complex model such as ISC or SCREEN if future modeling is performed. No changes were made to the RI report based on these comments.

Comments from Edward P. Watters, Chief, Safe Drinking Water Branch, June 9, 1993, and E & E's responses.

Comment #1:

We agree with the conclusions drawn from the ground water data. We also agree that interim remedial action is appropriate. Of the options recommended for further evaluation, we do not support the variation to the third option, which is to install a nearby supply well in an uncontaminated area. Pumping from such a well may indeed draw contaminants to the area. We concur that further evaluation is needed to determine the effectiveness of the other options. These will be evaluated as part of the Feasibility Study for the interim remedial Action.

Response #1: This comment pertains to material contained in Appendix A. This variation has been removed from consideration in more recent plans for the interim remedial action.

Comment #2:

In Volume 2, Chapter 5, Conclusions and Data, the consultant for this site has again recommended the need for additional monitoring to identify the source of contamination to local groundwater resources (wetlands) and to identify the threat to ecological receptors. Consideration has not been given to wetland areas north of the site on the St. Joseph River floodplain and along the Crawford Drain. Figure 1, indicates the extent of mapped hydric soil types (Giford and Condit) and includes three man-made ponds located in the northeast corner of Section 14, that were identified by the consultant.

The fate of the three man-made ponds seems to be incidental to the impact groundwater contamination may have on the ecology of the saturated soils areas north of the Conrail site (Figure 1). Although Oshtemo soils are not found on the U.S. Department of Agriculture National List of Hydric soils, they are described as having a slow runoff rate. Wet soil inclusions may also exist in floodplain depressions.

Further planning and remediation at this site should be preceded by a wetlands inventory that includes a wetlands delineation. A remediation proposal that requires modification of wetland hydrology north of the site, in order to accommodate a groundwater extraction strategy, will result in degradation of some acreage mapped as saturated soils areas, through desiccation. In such a contingency, we recommend replacing affected-acreage and wetland values, at par.

Also, in order to facilitate groundwater extraction, if materials must be removed and replaced on a different site, any wetlands which could be impacted by such disposal action, should be identified and delineated as indicated above. Adverse impacts on wetlands at the new site should be avoided to the maximum extent possible. Again, acreage and wetland values so affected should be replaced at par.

A small map is attached.

Response #2: The recommendations presented in Volume 2 are addressed in Volume 1. E & E is in agreement that the potential impact of the proposed remediation should be addressed. E & E believes that this should be addressed during the remedial design process.

The last paragraph of this section states that the wetlands should be identified and delineated. E & E spoke with Eileen Helmer on October 21, 1993, regarding the need for delineating the wetlands. She stated that the locations, size, and water source of each of the wetlands should be identified. She felt that a general survey (i.e., nothing detailed, nothing surveyed) was appropriate. Therefore, E & E reviewed the National Wetlands Inventory Map for Osceola, Indiana, and summarized the wetlands indicated on the map in the following table. The wetlands will be discussed and this table will be included in the RI report in Section 6.7.2.4, which will be retitled "**Ponds and Wetlands**". This following discussion will be added after the last paragraph in this section.

"In addition to the ponds, other wetlands exist both north and south of the Conrail facility, as designated on the Osceola, Indiana, Wetlands Inventory Map (US FWS 1987). Most of these wetlands are relatively small (i.e., less than 2 acres), and may have been disturbed since their inclusion on the wetlands map. These wetlands are summarized in Table TBD (TBD = to be determined during preparation of the final RI report). The wetlands all serve as recharge areas to the shallow aquifer. The ponds, while serving as recharge areas to the aquifer, may also be discharge areas depending on the seasonal levels of the water table."

Wetland Symbol	Wetland Habitat Description	Acres North of Facility*	Acres South of Facility*
PFO1A	Palustrine forested, Broad-leaved Deciduous, Temporarily Flooded	1.5, 5, 1.5	3
POWGx	Palustrine Open Water, Intermittently Exposed, Excavated	1.5, 1	1
PEMFx	Palustrine, Emergent, Semipermanently Flooded, Excavated	1, 1	--
PABFx	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	1	--
PEMC	Palustrine, Emergent, Seasonally Flooded	1	1
P SS1/EM B	Palustrine, Mixed Scrub-Shrub, Broad-Leaved Deciduous and Emergent, Saturated	12	--
PFO1B	Palustrine Forested, Broad-Leaved Deciduous, Saturated	12	--

Wetland Symbol	Wetland Habitat Description	Acres North of Facility*	Acres South of Facility*
POWG	Palustrine Open Water, Intermittently Exposed	--	1, 1.2
PAB4G	Palustrine, Aquatic Bed, Floating Vascular, Intermittently Exposed	--	0.5
P FO/SS 1C	Palustrine, Mixed Forested and Scrub-Shrub, Broad-Leaved Deciduous, Seasonally Flooded	--	10, 1
P FO/SS 1A	Palustrine, Mixed Forested and Scrub-Shrub, Broad-Leaved Deciduous, Temporarily Flooded	--	13, 1.5

* Presented are the approximate acreage of individual wetlands in the noted areas.
 -- Not present.

Comments from Pat Van Leeuwen, EPA Region V Toxicologist, Technical Support Unit, July 28, 1993, and E & E's responses.

General Note: A meeting was held on October 14, 1993, to discuss the issues raised by Pat Van Leeuwen. In attendance at that meeting were Kerry Street and Pat Van Leeuwen of EPA, and Bridget Lombardi and Brenda Jones of E & E. Many of the responses detailed below were agreed upon at that meeting.

General Comments:

Comment #1:

"The site characterization and human health risk assessment are highly focused, addressing primarily a single medium (groundwater) and exposure pathways for this medium. Therefore, the risk assessment report should be considered as Focused Risk Assessment, rather than a Baseline Risk Assessment for the site. This distinction should be emphasized upfront, as the document does not meet the requirements for a Baseline Risk Assessment and can not be said to address all human health hazards at the site resulting from contaminated media."

Response #1: It was agreed upon at the meeting that this document would continue to be called a baseline risk assessment, with further clarification of the focus on mobile chemicals. Therefore, the second paragraph on page 6-1 will be written as follows:

At the direction of EPA, the human health evaluation (HHE) portion of this risk assessment will focus on the volatile organic contamination at the Conrail Site. Volatile organic compounds (VOCs) are mobile compounds with respect to their

tendency to volatilize to the atmosphere or dissolve in water; they generally do not sorb to soil particles readily. Because of this mobility, there is a greater possibility for a larger population (i.e., both nearby residents and facility workers) to be exposed to these contaminants. Non-mobile compounds (i.e., semivolatiles, pesticides, PCBs, and metals) will not be addressed in this HHE; therefore, no conclusions will be made concerning the risks associated with these compounds in this HHE."

Comment #2:

"It also appears that consultation with a toxicologist was not sought during the preparation of the report. This has resulted a number of deviations from Agency guidance which may have significant impact on the final risk values."

Response #2: E & E sought guidance on several occasions from Erin Moran, the EPA Region V Toxicologist who was working with Chuck Wilk, then RPM for the site. However, EPA provided E & E with all necessary guidance after the meeting discussed previously. E & E will incorporate this guidance into the HHE and recalculate the risks to human receptors.

Comment #3:

"I was also surprised to see the inclusion of obsolete (1990) guidance from Region X used in place of newer guidance from Headquarters in the selection of risk parameters. In many areas, the report lacks the detail and documentation required to give the conclusions any credibility."

Response #3: This issue was discussed during the meeting. E & E will make the changes suggested by EPA in the following comments using the guidance supplied by EPA.

Specific Comments:

Comment #1:

Page 6-7, 2nd paragraph. Why was 1/2 the method detection limit (MDL) substituted for the "U" value (non detects)? For CLP sample analyses, the SQL should be available. If the SQL is not available, 1/2 the CRQL should be used in place of the SQL. RAGS, (reference 1989b), section 5.3.4, page 5-11, is quite specific on this point. It should be noted that the quantitation limits is usually 5 times the detection limit for most chemicals by the analytical methods used here; therefore the exposure point concentration may be underestimated by a half order of magnitude. I did not see this under-estimation discussed in the uncertainties section. Also if a contaminant has been shown to be a site-related contaminant of concern (COC), I can not imagine any instance where the non-detect value should be equal to zero. This is especially problematic at this site as the detection limits for some contaminants were set at the 10⁻⁴ to 10⁻⁵ risk levels."

Response #1: The section that is referred to above was written incorrectly. In fact, after double-checking the calculations, it was confirmed that one-half of the SQL was substituted for the "U" value, not one-half of the method detection limit. As a result, the exposure point concentrations were not underestimated by a half order of magnitude, and this was not discussed in the uncertainties section. Therefore, this sentence will be rewritten to reflect the use of one-half the SQL and not one-half the MDL.

In regard to the issue of any instance where a non-detect value should be equal to zero, in a situation such as Conrail, where there is an obvious groundwater plume moving away from the source area, there will be instances when a given contaminant may no longer be detected in a well, if that well is located in an area that the plume has moved through and is now gone. However, after reviewing the specific calculations for determining exposure point concentrations, no instances were found where the U-value was actually regarded as zero. In other words, although it was stated in the text that "if there was no reason to believe the contaminant was present in a sample, the U-value was regarded as zero," this did not occur. Every calculation of exposure point concentrations included one-half the SQL and not 0 in the calculation. Therefore, this sentence will be struck from the text.

Comment #2:

Page 6-8, 1st paragraph. See above

Response #2: See above.

Comment #3:

"Page 6-8, section 6.2.2.7, and elsewhere. The contractors seemed to have invented a new term here: chemicals of potential concern (COPC). In Superfund, we speak of "potential chemicals of concern", which are all chemicals found at the site which might be considered in the risk assessment. From this list, we chose, based on toxicity, comparison with background levels, etc., a set of chemicals about which we have some concern at the site. The later are the 'Chemicals of concern" for the site. Incidentally, carcinogens (e.g. benzene) are never eliminated as COCs at a Superfund site, no matter how low the contaminant concentration."

Response #3: In several places, RAGS refers to chemicals of potential concern. Therefore, within-the text of this risk assessment, E & E followed the examples set in RAGS. Based on discussions during the meeting, EPA agreed that no changes to the document were necessary.

Regarding the issue of carcinogens (e.g., benzene) being eliminated from consideration, E & E will include all carcinogens in the risk assessment and will make all appropriate changes to the document resulting from this action.

Comment #4:

"Page 6-8, section 6.2.2.7, 1st paragraph. The text states that chemicals were eliminated from the risk assessment if they were detected at "low frequency" or "low concentrations" or were regarded as "being of minimal toxicity". None of these criteria were defined in the report. What is "low frequency"? I did not see any tables of background concentrations or calculations of concentrations associated with risk ranges which would define the latter criteria. Carcinogens were eliminated using these criteria."

Response #4: Low frequency will be used in the text to mean detected in less than 5% of the samples. Low concentration was evaluated qualitatively with respect to the relative toxicity of the compound. Unfortunately, as stated in the previous response, some carcinogens were deleted from the list of COPCs using these criteria; however, as stated above, these carcinogens will be included in the risk analysis. The remaining compounds (i.e., those compounds that were not carcinogens, were detected at low frequency, and are of low toxicity) will not be added to the list of COPCs. This paragraph will be rewritten as follows:

"For the HHE, COPCs were selected based primarily on their site-wide frequency of detection and the levels at which they were detected. Tables 6-3 through 6-5 present the frequency of detection and the range of concentrations detected for each volatile chemical detected in subsurface soils (0.5 to 12 feet BGS), groundwater, and surface water and sediments, respectively. As explained above, only CLP data were used in the COPC selection process. Chemicals detected at low frequencies (i.e., detected in less than 5% of the samples) or at low concentrations (based on a qualitative comparison to toxicity values) were excluded from further consideration in the risk assessment because they are not representative of site conditions and are unlikely to contribute significantly to overall risks at the site. However, no chemicals were eliminated that are considered carcinogens, primary contaminants, or degradation products of these contaminants (see Figure 5-1), or that constituted a hot spot of contamination."

Comment #5:

Page 6-9, 3rd paragraph, Table 6-4. The frequency of detection (fod) reported in Table 6-4 is said to be based on the total number of samples where a chemical was detected compared to the total number of samples tested. The latter is described as 152, which includes 3 samples from Phase I wells, 2 from Phase II wells and one from Phase III wells. When a chemical is reported to be detected in 10/152 samples, does this mean 10/26 wells, 2/> 30 wells, what??? How was this reported fod used to eliminate COCs in the risk assessment?

Response #5: As stated in the response to comment 4 above, if a compound was detected in less than 5% of the total number of wells (i.e., 64 downgradient wells and 13 background wells), and it was not a primary contaminant or degradation product, it was not considered a COPC. E & E will redo this table to present the number of

wells each compound was detected in over the total number of wells. Downgradient and background wells will be presented separately.

Comment #6:

Page 6-9, last paragraph; page 6-15, 1st paragraph. What is meant by "minimal human exposure"? Is this exposure in addition to other exposures to the same receptor population? How much would this exposure add to the risk to this receptor population (sample worst case calculation)? Is there any indication of subsistence fishing in the area? These issues warrant an explanation.

Response #6: In three phases of fieldwork (totaling twelve months time), there were no observations of what may have been construed to be subsistence fishing in the area of the river potentially affected by the Conrail facility. There is limited public access to the river in this area due to homes along the shoreline. Due to the residential development along the river, it is likely that the only persons fishing or swimming in the river in the area potentially impacted by the site, are local residents. We felt that the risks associated with recreational swimming, fishing, and eating fish from the river would be additive to the other risks associated with the site, and that the additives risks would be minimal when compared to site-related risks. We will evaluate the magnitude of the risks from these recreational pathways in a quick calculation to ensure that the statement below is accurate. We expect the risks to be low, so the referenced paragraph on page 6-9 will be rewritten as follows:

"Generally, the chemicals detected in surface waters and sediments are subsets of the chemicals detected in site soils and groundwater. The risks from exposure to these chemicals are minimal (e.g., less than 5% of the total risk) due to the low concentrations detected and the toxicity values of the compounds detected. Therefore, they were not evaluated in the HHE."

The referenced paragraph on page 6-15 will be rewritten as follows:

"However, swimmers and fishermen utilizing the river and/or the bay in areas that may be affected by COPCs are most likely local residents. These residents are also exposed to COPCs via the pathways discussed above. The risks from fishing and swimming in the river and bay are less than 5% of the total risk posed to these residents via all pathways. Therefore, the recreational pathways of swimming and fishing in the river and bay will not be evaluated further in this HHE."

Comment #7:

Table 6-6. Some primary contaminants (not degradation products) are considered as COCs in groundwater but not in soil. What is the source of these chemicals? Are sampling methods adequate to detect the chemicals in soil? VOCs cannot be accurately measured in soil, and the concentration is usually under-estimated. RAGS says to consider the chemicals as COCs if there is a potential for migration between

media. The difficulty in measuring VOCs in soil is not discussed in the uncertainty section.

Response #7: Table 6-6 lists four chemicals that are COPCs in groundwater and not in soils. As shown in Figure 5-1, none of these four chemicals are primary contaminants, i.e., they are all degradation products. Additionally, none of these four compounds has been detected in soils (0.5 to 12 feet BGS) during three rounds of sampling.

Regarding the issues raised concerning the adequacy of the sampling techniques employed to collect these samples, many other VOCs that are equally or more volatile than the chemicals that were not detected, were detected in the soil samples at low concentrations. This implies that the sampling technique was sensitive enough to allow detection of volatile chemicals. Therefore, no discussion was included in the text on the difficulty of measuring VOCs in soil. E & E will, as agreed upon in the meeting, clarify the text to emphasize that none of the four groundwater COPCs that are not soil COPCs were detected in any round of soil samples (0.5 to 12 feet BGS). The following sentence will be added to the end of the fourth paragraph of Section 6.2.3, page 6-9:

"Of the four groundwater COPCs that are not soil COPCs (i.e., chloromethane, 1,1-dichloroethane, 1,1-dichloroethene, and 1,1,1-trichloroethane), none was detected in any subsurface soil sample (0.5 to 12 feet BGS)."

Comment #8:

Page 6-10, 1st bullet. Trespassers are listed here, but I did not see any inclusion of this population in the risk assessment. Is the area fenced (no notation)? Do adjacent residents have access to the site - e.g., could they walk a dog on-site? Such a daily exposure would be in addition to other exposures and might be part of the characterization of the RME exposure. The latter is not now fully defined.

Response #8: The site is not fenced. As stated in a previous response to an IDEM comment (comment # 1 from Krista Eskilson), a sentence will be added to indicate that the site is not fenced. The risks posed to trespassers were felt to be minimal compared to the risks posed by other routes of exposure, and were considered additive to the other residential risks. Therefore, similar to the recreation routes (i.e., swimming and fishing), they were not addressed quantitatively in the risk assessment.

As agreed upon in the meeting, E & E will explain why trespassers were not addressed further in the HHE. The following paragraph will be added after the last bullet in this section.

"The site is not fenced, and it is possible that trespassers (e.g., people walking dogs, etc.) could enter the site. The population most likely to trespass on the site are local residents. The major route of exposure to COPCs for these trespassers would be inhalation of vapors. Ingestion and dermal absorption of COPCs from surface soils are incomplete pathways due to the 0.5 to 3 feet of ballast that covers the site.

Risks posed to trespassers are low (i.e., less than 5% of the risk) when compared to those risks to residents via groundwater usage and household exposures. Therefore, risks to trespassers are not evaluated further in this HHE."

Comment #9:

Page 6-11, section 6.3.2.1. This section discusses spills and leaks at the site. However, the discussion seems to be restricted to spills and leaks which have resulted in contamination of groundwater. Metallic contaminants, PAHs, and other contaminants which bind to the soil would not be detected in groundwater, but might accumulate in significant quantities in surface soil (0-6").

Response #9: As discussed in the meeting, other chemicals are present at the site due to the nature of the site operations, but this HHE addresses VOCs only. In response to Pat's first General Comment, the text was rewritten to emphasize that the HHE focuses on mobile compounds (i.e., VOCs) and not on non-mobile compounds. Consequently, no conclusions would be reached or inferences drawn on risks due to exposures to non-mobile compounds. No additional changes will be made to the text in response to this comment.

Comment #10:

Page 6-15, paragraph 2. Why is the railyard excavation scenario limited to subsurface soil? The presence of metals and PAHs in subsurface soil may be an indication of much higher levels in surface soil. Wouldn't this receptor population be exposed to surface soil contaminants as well? VOCs in soil present a minimal risk from dermal absorption due to their high volatility. Surface soil contaminants, such as PAHs and lead, often present unacceptable risks to exposed populations through the oral and dermal pathways.

Response #10: See response to Comment #9 above.

Comment #11:

Page 6-12, paragraph 3, Figure 6-2. The text indicates that Figure 6-2 illustrates that the distributions of the two soil COCs shown are not normally distributed. It is obviously from the plot shown for TCE that the sampling may indicate two soil sources of TCE, which have different contaminant levels. This issue requires further evaluation/ explanation.

Response #11: E & E assumes that EPA is referring to page 6-16, paragraph 3, Section 6.3.3.1. E & E agrees with EPA that there is more than one source area on site. As agreed upon in the meeting, E & E will provide further explanation of the graphs in Figure 6-2. The referenced paragraph will be rewritten as follows.

"The 95 percent upper confidence limit (95 UCL) on the arithmetic mean, or the maximum observed value (if the 95 UCL exceeded the maximum value or if fewer than 10 samples were available for the calculation), was used to estimate the subsurface soil concentrations used for both the reasonable maximum exposure (RME) case and for the central tendency (CT) case (EPA 1992b). Prior to determining the 95 UCL, it was necessary to determine whether the data were normally distributed. Figure 6-2 shows the distribution of two of the soil COPCs. All subsurface soil samples (0.5 to 12 feet BGS) were used to calculate the 95 UCL regardless of location on the facility. As evidenced by the graphs in Figure 6-2, the soil COPC concentrations are not normally distributed, which may be due to, among other things, the presence of more than one source area on the site. Therefore, prior to calculation of the 95 UCL, all the soil data were log-transformed per the *Supplemental Guidance to RAGS: Calculating the Concentration Term* (EPA 1992b)."

Comment #12:

Page 6-16, paragraph 2, Table 6-7. The text and table indicate that subsurface soil and groundwater from two different areas were used to perform the risk characterization in this report. However, it is not clear from the report how this was done. Some sections indicate that groundwater exposures were calculated [sic] based on the maximum contaminant concentrations in each plume. Other sections, which describe the modeling of emissions [sic] from groundwater, etc., indicated that the 95 UCL of the mean concentrations were used to calculate the exposure point concentrations. Why were different concentration values used in the different exposure pathway calculations? How was the 95 UCL of the mean concentration determined for groundwater? The methodologies used here lack sufficient description.

Response #12: Page 6-16 and Table 6-7 state that UCLs were only calculated for subsurface soils and not for groundwater. Therefore, there was no discussion of how the 95 UCL of the mean concentration was determined for groundwater. However, the following two paragraphs may have been misleading with respect to calculation of the groundwater exposures, and will be rewritten as indicated.

Section 6.3.3.2, second paragraph, page 6-17:

"Each of the models described below was applied to estimate exposure concentrations for both the RME and CT exposure scenarios. The basic input to the models was the 95 UCL on the mean or the maximum observed concentrations of subsurface soil samples (whichever was lower), or the maximum observed groundwater concentrations. These models are described in detail in Appendix G."

Section 6.3.3.3, third paragraph, page 6-19:

"For each of the exposure scenarios, parameter values were selected to correspond to the CT exposure and the RME that an individual in the receptor group might experience. The exposure point concentration used for both the CT and for the RME case was 95 UCL on the mean or the maximum observed concentrations of subsurface soil samples (whichever was lower), or the maximum observed groundwater concentrations."

Comment #13:

Tables 6-8 through 6-15. The contractors appear to have coined another term in this report. To what does the term "Typical" refer? Is the "typical" calculation a substitute for the Superfund required Central Tendency (CT) calculation? The parameter values used here do not match either the values used in Region V for the CT calculation or the values proposed by the CT workgroup.

Response #13: Yes, the typical case was meant to address the central tendency issue. When this document was under preparation, the document(s) discussed above were not available to the general public. Since the meeting, EPA has provided E & E with copies of the documents referred to above. As a result, E & E will change the text wherever appropriate to use the phrase central tendency (CT) and not typical case.

Comment #14A:

Pages 6-20 to 6-22/Tables 6-8 through 6-12 Current Land Use. Many parameter values used in these calculations deviate from the suggested default values. There is no explanation/justification given for these changes.

Parameter values from an outdated (1990) Region X guidance are often used instead of the Supplemental guidance to RAGS issued by OSWER (referenced as 1991a). Who approved these changes? What is the basis for the Region X values? Do they apply in Region V?

Response #14A: As stated above, the document(s) for central tendency were not available when the risk assessment was being performed. Whenever the OSWER document (listed above) had default factors, they were used. However, whenever it did not have a default factor, we had to use judgment regarding what are appropriate factors, hence the use of the Region X guidance. Regarding whether the Region X guidance applies in Region V, it was our belief that Region X residents are basically the same as Region V's and that climate, work habits, and residential behaviors would be the same in both areas. Therefore, we felt it was appropriate guidance. Since EPA has given the necessary guidance to E & E, we will recalculate the risks using the appropriate default factors.

Comment #14B:

The CT value for a worker is 7 years, not 10 years. Give the reason for using 10 years.

Response #14B: See answer above.

Comment #14C:

The CT values for ingestion of drinking water are 1.4 l/day for adults and 0.5 l/day for children.

Response #14C: See answer above.

Comment #14D:

The CR exposure duration is generally considered to be 9 years, 2 years as a child and 7 years as an adult. The RME exposure duration is generally considered to be 30 years, 6 years as a child and 24 years as an adult. These combinations should provide the most conservative estimates of exposure. Other combinations may be considered, but they should be described/justified. The inclusion of a subchronic 6 year child exposure scenario is only useful when evaluating the soil ingestion exposure pathway. This is the only exposure pathway in which there is a significant difference between the intake/body weight ratio of the two populations.

Response #14D: Based on this comment and on the discussion in the meeting, changing the CT and RME exposure durations to those values listed above will not alter the risk calculations significantly since the intake/body weight ratios of the two populations remain the same except in the soil ingestion scenario. Therefore, all references to the child exposure pathways will be removed from the document. (Note that there is not a residential soil ingestion pathway in this HHE).

Comment #14E:

The body surface values listed for the Typical/RME dermal exposures from showering are CT values. Adult RME values are also give in the cited reference and should be used for the RME calculation.

Response #14E: E & E will recalculate the dermal exposures from showering using the following values: CT = 20,000 cm² and RME = 23,000 cm². These values were taken from EPA 1992c, as referenced in the RI report.

Comment #14F:

The shower volatilization model presented in G.3 is not the model prepared for USEPA by Andelman. The methodology used here is not consistent with methods presented in RAGS, Part B, and will give different PRGs.

Response #14F: As discussed in the meeting, PRGs were not calculated during the scoping stages of the Conrail RI/FS. As a result, there is no issue regarding potential conflict or disagreement between the numbers resulting from the use of the Foster and Chrostowski model and the non-existent PRGs. Therefore, as agreed upon in the meeting, no change will be made to the HHE. However, E & E is aware of the

potential conflicts that could arise and will use the Andelman model in all future HHEs.

Comment #15A:

Pages 6-22 to 6-23/Tables 6-13 through 6-15 Future Land Use. Some parameter values used for the facility worker scenario are inappropriate.

The CT soil ingestion for workers is 50 mg/day. The RME soil ingestion rate for construction workers is 480 mg/day. The reference cited is incorrect.

Response #15A: The risks will be recalculated with the values listed above and all appropriate changes will be made to the text. The reference will be corrected to EPA 1991a.

Comment #15B:

The reference for the ED value in Table 6-13 is incorrect.

Response #15B: This will be corrected to EPA 1991a.

Comment #15C:

The surface area value used in the dermal exposure pathway is not consistent with the 1991 OSWER Supplemental Guidance to RAGS. Why was the 1990 Region X value used here?

Response #15C: The risks will be recalculated using the following values taken from EPA 1992c as referenced in the RI report: CT = 5,000 cm² and RME = 5,800 cm².

Comment #16:

Table 6-19 Toxicity Values. When RfCs are available to assess inhalation exposures, they should not be converted to RfDs unless the values are approved by USEPA. See HEAST, Appendix A, section III, "Dose Conversions on HEAST".

Response #16: E & E notes that in the future we should use RfC values and not RfD values. As agreed upon in the meeting, no changes to the risk assessment will be made based on this comment.

Comment #17:

Section 6.3.4 Uncertainty Section. I did not see any explanation of factors which cause an underestimation of risk e.g. limiting the number of contaminants considered, lack of toxicity values, use of the MDL over the SQL, etc.

Response #17: As previously stated, the SQL and not the MDL was used, and the text will be changed to reflect this. E & E will improve upon the uncertainty section by reiterating that the focus is on VOCs only and that conclusions can not and will not be drawn concerning the risks from non-VOC compounds. A discussion on the compounds lacking toxicity values and the potential to underestimate the risk because of this will also be included.

Comment #18:

Page 6-42 Equation. It is not clear from the equation shown and the accompanying explanation of the process that the dermal exposure has been calculated correctly. The absorbed dose should be used in combination with a dermal RfD or Slope factor. The latter are calculated using the oral ingestion values, following RAGS, Part A, Appendix A methodology. I did not see a table of oral absorption values or adjusted toxicity values in the report.

Response #18: The equation will be changed to reflect the fact that the SF_d was used. Since the COPCs are all organic compounds for this site, it was assumed that the oral absorption of each chemical is 100%. Therefore, an adjustment to the SF_o was not necessary; the SF_d were assumed to be the same as the SF_o . This will be explained in Section 6.4.3.4, Route-to-Route Extrapolation of Reference Doses and Slope Factors.

Comment #19:

Page 6-50. Were the modeled indoor VOC concentrations evaluated for explosion potential. I did not see any discussion of this issue or any reported LELs for TCE or carbon tetrachloride. This should be done as a reality check.

Response #19: A review of the modeled exposure point air concentrations for both the plume 1 and the plume 2 residential indoor air scenarios showed that the modeled concentrations were all well below their NIOSH LELs. Generally, chlorinated solvents have high LELs. No changes were made to the risk assessment.

Comment #20:

Pages 6-22/23, 6-52. It should be realized that the facility worker soil contact scenario is completely bogus. The significant exposure from dermal contact with soil would be more likely to come from contaminants present in the subsurface soil - metals, PAHs, etc. The VOCs present in the subsurface soil have very low dermal

absorption values due to their volatility. This scenario implies that the facility worker performing an on-site excavation is not at risk, but this has not been demonstrated in this risk assessment report.

Response #20: This scenario was suggested to E & E by Erin Moran, EPA Toxicologist, and was conducted at her direction. As agreed upon in the meeting, E & E will reiterate that the scenario will evaluate only VOCs, and that risks due to other chemicals will not be evaluated. The pages listed above will be modified as follows.

Page 6-22, Scenario 3, the first paragraph will be rewritten as follows:

"A future facility worker scenario was envisioned in which exposures to soils up to 12 feet BGS could occur as a result of excavations that might occur during various construction or maintenance activities. Risks from exposures to COPCs (VOCs) will be evaluated in these pathways. These exposures were evaluated for the facility as a whole and are presented below."

Page 6-52, the first full paragraph will be rewritten as follows:

"Future scenarios evaluated in this risk assessment are limited to worker exposures, since future residential exposures are expected to remain the same as the current scenarios. The pathways evaluated were soil contact and inhalation of airborne contaminants (i.e., vapor-phase VOCs). Based on the estimated cancer risks and the estimated hazard indices for noncarcinogenic effects, neither pathway poses a risk to workers in the future who may be exposed to COPCs via these pathways."

Comments from Steve Mason, Office of Regional Counsel, and E & E's responses.

Comment #1:

[Executive Summary,] page 1. revise: change "potentially contributing sources" to identify contributing source areas.

Response #1: E & E will make this revision to the RI Report.

Comment #2:

[Executive Summary,] page 1. Delete sentence " In October 1978 ...["

Response #2: E & E will delete this sentence from the RI Report.

Comment #3:

[Executive Summary,] page 2. Change: was either added or proposed to or for the NPL not "prepared"

Response #3: E & E will change "prepared" to "proposed".

Comment #4:

[Executive Summary,] page 2. Delete first two sentences of paragraph 2.

Response #4: E & E will make this revision.

Comment #5:

[Executive Summary,] page 3. last sentence of paragraph 2 indicates a second CCl₄ source, where is it? Are dimensions given lateral or vertical?

Response #5: The last sentence states that contamination was detected at 16 µg/kg in the soil at the 128 to 130 foot depth interval and does not state that this concentration is indicative of an existing source area. This sentence was included because there may be a relationship between this contamination and the shallower source. E & E will clarify the second sentence in this paragraph so that it states: "The dimensions of this source area are approximately 75 feet by 30 feet, with a vertical thickness of 7.5 feet."

Comment #6:

[Executive Summary,] page 3, first [fifth] paragraph. Is the County Road 1 plume the "area between these points?["] If the plume coming from Conrail is continuous through to Vistula and Charles Street that should be stated.

Response #6: The County Road 1 plume and the "area between" the Conrail facility and the St. Joseph River refer to the same area of identified groundwater contamination. CC1₄ and TCE have been tracked continuously from the railyard to the river. Thus, the sentence will be revised to read: ". . . the groundwater plume follows this path from the Conrail facility and is continuous through to Vistula Avenue and Charles Avenue to the St. Joseph River."

Comment #7:

[Executive Summary,] page 3, paragraph 4, last sentence, revise. This contamination is a source of the identified, downgradient groundwater contamination in the LaRue Street area.

Response #7: E & E will revise this sentence to read: "This contamination is a source of the identified, downgradient groundwater contamination in the LaRue Street area."

Comment #8:

[Executive Summary,] Page 4, paragraph 1. Why does this only "suggest" a DNAPL source? Are we more certain than that?

Response #8: The reference cited in the revision draws its conclusions from empirical evidence from different sites. The various sites are diverse in nature and the reference does not provide a rigorous theoretical basis for the guidelines. The results and findings in the Conrail RI, coupled with the referenced document, suggest the presence of DNAPL.

Comment #9:

[Section 1,] Page 1-7. Delete third paragraph.

Response #9: E & E will make this revision.

Comment #10:

[Section 4,] Page 4-5, first paragraph. Even though this TCE source is in the unsaturated zone, is there any possibility that this source area at one time could have been the source for groundwater contamination?

Response #10: E & E believes that it is clearly stated that this TCE source in the unsaturated zone is a source of groundwater contamination. Additional information that is discussed is intended to show that there must be (have been) additional TCE source areas other than the one identified.

Comment #11:

[Section 4,] Paragraph 4.3.1. Should state that the contamination in Charles Ave, and Vistula Ave., are part of the single, indivisible County Road 1 plume.

Response #11: E & E will add a sentence that states: "The contamination in Charles Avenue and Vistula Avenue is part of the single, indivisible County Road 1 plume."

Comment #12:

[Section 4,] Page 4-8, 2nd paragraph. Is there a possibility that the spread of contamination laterally could result from mounding or spreading through the drainage system?

Response #12: The identified groundwater mounding in or near the Conrail facility is either small in magnitude or present in a location that would cause minimal lateral spreading of groundwater contaminants as compared with other transport factors. As stated in Section 4.4, the drainage system could have played an historic role in the lateral spread of contamination, but there is no evidence that this is currently taking place.

Comment #13:

[Section 4,] Page 4-9, first paragraph. Why do we care whether a consistent relationship exists? Does the example relationship have any site specific meaning, eg. longer than usual degradation time?

Response #13: If a consistent relationship were found, it might indicate that a simple process was causing the variations observed in the extent of transformation. Although a pattern is not observed, it is important that we state that we evaluated the data for systematic trends. The last half of the paragraph will be revised to read as follows: "The ratio of CCl₄ to CHL, calculated from detected concentrations in groundwater samples, does not form a consistent pattern that correlates with CCl₄ concentration, distance from the Conrail facility, or depth zone of the aquifer."

Comment #14:

[Section 4,] Page 4-9, third paragraph, first sentence. Are both DNAPL compounds at the Site? or are compounds susceptible to DNAPL in general?

Response #14: Both compounds are present at the site and both may be present as DNAPLs. Section 5.1.2 and Section 5 in general describe the differences between the transport of a DNAPL and the transport of a dissolved compound.

Comment #15:

[Section 4,] Page 4-10, first incomplete paragraph. Can we say with stronger language, that this contamination is a continuation of and is indivisible from the county road 1 plume? The fact that MW10D, MW11, MW04 are ND should support conclusion that it must be the same plume, right? If so let's spell that out. The "additional explanation" suggests a reason why the plume may show up in MW43 but not necessarily why no CCl₄ was found.

Response #15: E & E will add a sentence that states: "This contamination is indivisible from the County Road 1 plume." E & E will remove the "additional explanation" text; however, it should be noted that its inclusion may have been important for the feasibility study and/or remedial design because the intent was to indicate the potential for other TCE sources to be on-site than have currently been identified.

Comment #16:

[Section 4,] Page 4-11, first paragraph, last sentence. If mounding transports groundwater contamination away from the mound how does that explain the presence of CCl₄ at MW 48, upgradient of the suspected source?

Response #16: The mounding would have the effect of reversing the groundwater flow direction over short distances and localized areas. The small potentiometric mound located at MW45 would cause contaminated groundwater to flow away from this location in all directions until the regional flow could compensate for the difference caused by the mounding. This could result in contamination detected at MW48 to be derived from the area near MW45.

Comment #17:

[Section 6,] Page 6-2, 2nd paragraph, fourth sentence. Delete "potentially" revise to read "affected or threatened".

Response #17: The word "potentially" will be deleted so that the sentence now states: "Residential areas affected by contaminated ..."

Comment #18:

[Section 6,] Page 6-52 through ... ecological assessment, the page numbering is wrong and text is not ordered properly.

Response #18: E & E can find no errors in ordering and will take measures to see that all copies of the revision are in order.

Comment #19:

[Section 7,] Page 7-2, fourth paragraph, last sentence, revise: "Groundwater samples from all three zones collected..."

Response #19: This paragraph will be revised so that the last two sentences will read as follows: "Groundwater samples collected from monitoring wells located hydraulically upgradient of the plume and the site in the shallow and intermediate zones did

not detect any VOC contamination. LSA samples collected hydraulically upgradient in the deep zone did not detect any VOC contamination."

Comment #20:

[Section 7,] Page 7-3, 2nd paragraph, last sentence. What about monitoring well MW 48 with CCl₄ of 13 ppb?

Response #20: MW48 is on the Conrail facility. MW21S is upgradient from the facility and shows non-detect.

Responses to the memo from Wayde M. Hartwick, Remedial Project Manager, dated August 27, 1993.

Comment #1:

[Executive Summary,] Page 2, First full paragraph, last sentence. The facility was "proposed" for the NPL on June 24, 1988.

Response #1: E & E will make this revision.

Comment #2:

[Executive Summary,] Page 2, 2nd full paragraph, first sentence [sic]. Add date of SNL and date of Conrail's response. Did Penn Central get SNL?

Response #2: In response to a comment made by Steve Mason, ORC, this has been deleted.

Comment #3:

[Executive Summary,] Page 3, paragraphs 2 and 3. Is the last dimension used to describe the source areas the depth from the surface?

Response #3: For the CCl₄ source area, the last dimension refers to the vertical thickness. This will be clarified in the revision. For the TCE source area, the last dimension refers to the depth from the surface and E & E will clarify this as well.

Comment #4:

[Executive Summary, Page 3,] Last paragraph. Reference USEPA criteria and guidance for suggesting DNAPL presence.

Response #4: E & E will add the reference which is referred to in other portions of the report as EPA 1992a.

Comment #5:

[Executive Summary,] Page 6, paragraphs 1 and 4 reference chemical selected as contaminants of concern. Are these different groups or is one group part of the other?

Response #5: They are part of the same group. E & E will clarify this section in conjunction with the comments from the EPA toxicologist.

Comment #6:

[Executive Summary, Page 6,] Paragraph 2. 4.29×10^{-4} is not with [within] USEPA's risk range. There are other references throughout this document (especially in Section 7) that incorrectly state a cancer risk as within the risk range.

Response #6: E & E agrees with this comment. After the revised calculations are performed pursuant to EPA's toxicologist's comments, E & E will ensure that statements that refer to the risk range are accurate.

Comment #7:

[Executive Summary,] Page 8, paragraph 2. Give common name for mammal.

Response #7: E & E will add the common name (badger).

Comment #8:

[Executive Summary, Page 8,] Paragraph 3. Define acronym CPEC.

Response #8: E & E will add the definition of the acronym CPEC (Chemicals of Potential Ecological Concern).

Comment #9:

[Section 1,] Page 1-3, first sentence. Expound on the phrase, "no series is recognizable.["

Response #9: E & E will add the phrase, "due to the presence of railroad ballast."

Comment #10:

[Section 1, Page 1-3,] Paragraph 2. Have, any "small commercial establishments" been identified as potential contributors? Did any receive 104(e)s?

Response #10: During the Phase I and II field investigations, the potential contributions from the Martin Drum site and Elkhart Office Machines were investigated, the latter location to a lesser extent because of access restrictions. The results are presented in Appendices A and B of the RI Report. The scope of the Phase III investigation did not include fieldwork at any additional potential contributors. E & E does not know the 104(e) status of any nearby facilities. E & E did not utilize any 104(e)s to guide the investigation or focus on a potential off-site source.

Comment #11:

[Section 1, Page 1-3,] Last sentence. Add that residents are potentially impacted because they are on private wells.

Response #11: E & E will add the sentence: "The residents in these four areas utilize private wells."

Comment #12:

Page 1-4, first paragraph. Get rid of "really" in first sentence. What about aquifer classification? What's the name of the bedrock shale (i.e. formation, member)?

Response #12: E & E will change the word "really" to "regionally." E & E will state that the aquifer is a nationally designated sole source aquifer and that it is classified as class IIA (Guidelines for groundwater classification under the EPA groundwater protection strategy, U.S. EPA 1986). Specific information concerning the bedrock is included in the geology section (Section 3.1).

Comment #13:

[Section 1, Page 1-4,] 2nd paragraph. How does Suburban Utilities use the ground water?

Response #13: E & E will add a sentence stating that the water is supplied to residences in an area within the study area.

Comment #14:

[Section 1, Page 1-4,] 3rd paragraph. Define EA acronym.

Response #14: This acronym was defined previously, on page 1-2.

Comment #15:

[Section 1,] Page 1-7, first paragraph. Identify "private development company."

Response #15: E & E does not know the name of the development company; however, the present owner is Knolls Partnership. Therefore, no revision to the text will be made.

Comment #16:

[Section 1,] Page 1-9, first paragraph. Rewrite to, "Conrail has retained GTI to design..."

Response #16: E & E will make this revision.

Comment #17:

[Section 2,] Page 2-1, second paragraph. Explain why list of parameters were chosen.

Response #17: A sentence will be added to explain the rationale for choosing these parameters for analysis during LSA sampling. E & E will add the sentence: "These compounds were chosen based on the results from the Phase I and II investigations."

Comment #18:

[Section 2,] Page 2-3, second full paragraph. Justify why soil samples were not taken until Phase III.

Response #18: Soil samples were collected during all three phases. A summary of the Phase III soil sampling results is presented in Section 4.2. Summaries of the Phase I and II soil sampling results are presented in the Appendices. The comprehensive analysis is based on the results of all three phases.

Comment #19:

[Section 2,] Page 2-9, first paragraph. Define HHE acronym.

Response #19: This acronym was defined previously, on page 1-2.

Comment #20:

[Section 4,] Page 4-3, last paragraph. Why wasn't an angled boring used to determine if tanker contents had contaminated subsurface soils?

Response #20: The number of borings allocated for the investigation of the buried tank car were located to determine whether the tank car or surrounding soil was acting as a source of groundwater contamination. An angled boring was not planned because the positive existence, size, and orientation of the tank car was determined as part of the field investigation.

Comment #21:

[Section 7,] Page 7-2, fourth paragraph. Again, reference rationale based on % solubility for DNAPL source conclusions.

Response #21: E & E will add the reference (EPA 1992a).

Comment #22:

[Section 7,] Page 7-3, third paragraph. Define TCE's MCL.

Response #22: E & E will revise this sentence so that it reads: "TCE was detected below the MCL (5 µg/L) throughout ... "

Comments from Judy Kleiman, RCRA/CERCLA Liaison, June 7, 1993, and E & E's responses.

Comment #1:

The draft Remedial Investigation for the Conrail Railyard site in Elkhart, Indiana has been reviewed by RCRA for ARARs. The major contaminants at this site are carbon tetrachloride (CCl₄) and trichloroethylene (TCE). The origin of the TCE contamination is not known, but the CCl₄ in the soil is believed to have spilled from a tanker car near track 69. It is assumed that if the CCl₄ was carried in a tanker car, it was a commercial product with a commercial value. As a spilled commercial product, the CCl₄ would meet the definition under 40 CFR section 261.33 (f) for listed waste U211. Once a substance is determined to be a commercial product listed in 40 CFR 261.33(f), the source and intended use of the material will not affect the listing. In the case of a spilled commercial product, the resulting contaminated media is also listed waste of the same waste code.

Since there is no information about the source of the TCE, it must be assumed that the TCE is not a listed waste. However, since TCE is a characteristic parameter, the TCE in the contaminated soil or ground water could result in a characteristic waste and could trigger RCRA ARARs.

Response #1: The ARARs are evaluated as part of the FS. E & E acknowledges the information provided in this comment.

ATTACHMENT 2:
SECTION 4.1 LEAD-SCREEN AUGER SAMPLING RESULTS

4.1 LEAD-SCREEN AUGER SAMPLING RESULTS

This section summarizes and discusses the LSA sampling results from the Phase III field investigation. Eleven LSA borings were located in the County Road 1 plume and five LSA borings were located in the LaRue Street plume. All groundwater samples collected using the LSA technique were analyzed for CCl_4 , TCE, CHL, and TCA at the field laboratory. The method detection limits (MDLs) for these compounds were 8 $\mu\text{g/L}$, 9 $\mu\text{g/L}$, 7 $\mu\text{g/L}$, and 7 $\mu\text{g/L}$, respectively. Appendix C contains the LSA sampling results and Figure 2-1 shows the LSA boring locations. The vertical distribution of contamination is presented and discussed in a manner that is consistent with the interpretation of the groundwater flow patterns presented in Section 3.2 of this report. To facilitate the discussion of the groundwater monitoring approach and interpretation of analytical results, the aquifer has been divided into three depth intervals. These three zones are used as a means to evaluate site conditions and do not correspond to identifiable stratigraphic horizons. The shallow zone extends from the water table (approximately 15 feet BGS) to approximately 35 feet BGS. The intermediate zone spans the interval 35 feet BGS to 85 feet BGS. The deep zone extends from 85 feet BGS to the top of bedrock.

4.1.1 County Road 1 Plume

LSA boring LSA32 was placed in the track 69 CCl_4 source area, which was identified in the Phase II investigation, to define the vertical extent of groundwater contamination. This LSA boring was drilled and sampled to bedrock to determine the presence or absence of residual or pooled dense nonaqueous phase liquid (DNAPL) in localized horizons, including the top of bedrock. In the groundwater sample collected from the 18 to 23-foot BGS sample interval, CCl_4 was detected at 31,000 $\mu\text{g/L}$. This was the highest detected concentration of any contaminant in a groundwater sample collected using the LSA technique in the study area. CCl_4 concentrations in the two other samples collected between 23 feet and 35 feet BGS were 6,400 $\mu\text{g/L}$ and 1,800 $\mu\text{g/L}$. Within the intermediate monitoring zone, CCl_4 concentrations ranged from non-detect to 200 $\mu\text{g/L}$. CCl_4 was detected in groundwater samples collected from the deep zone at concentrations less than or equal to 84 $\mu\text{g/L}$. The groundwater sample collected from the interval on top of bedrock (143 to 148 feet BGS) shows detectable levels of CCl_4 ; however, this detection may be attributable to cross-contamination from the sampling pump.

LSA borings LSA34 and LSA36 were positioned at the approximate center of the main classification yard, which is hydraulically downgradient of LSA32, in order to locate the

path of the CCl_4 groundwater plume originating from the track 69 source area. LSA34 and LSA36 were drilled to 93 feet and 63 feet, respectively. The highest concentration of CCl_4 detected in LSA34 was $2.2 \mu\text{g/L}$ in the 23 to 28-foot sample interval, and the highest concentration of CCl_4 in LSA36 was $5.5 \mu\text{g/L}$ in the 13 to 18-foot sample interval. This indicates that the CCl_4 contamination associated with the track 69 source area has limited impact on the groundwater quality at these locations.

TCE was detected in groundwater samples collected from LSA32, LSA34, and LSA36. TCE was detected only once in LSA32 above the MDL in the groundwater sample collected from the 28 to 33-foot sample interval at a concentration of $15 \mu\text{g/L}$. TCE was detected above $1 \mu\text{g/L}$ in LSA34 at concentrations of $5.7 \mu\text{g/L}$ and $47 \mu\text{g/L}$ in the groundwater samples collected from the 18 to 23-foot and 23 to 28-foot sample interval, respectively. At LSA36 located 250 feet east of LSA34, TCE was detected at a maximum concentration of $1,300 \mu\text{g/L}$ in the groundwater sample collected from the 38 to 43-foot sample interval. TCE concentrations gradually decrease from this high concentration with depth in the intermediate zone, such that TCE was detected at $25 \mu\text{g/L}$ at the bottom of the boring at 63 feet BGS. Based on field analytical data from LSA34, which showed a maximum TCE concentration of $47 \mu\text{g/L}$, and field analytical data from LSA36 and LSA25 (from Phase II, see Appendix B), located east and west of LSA34, respectively, each of which revealed TCE at concentrations greater than $1000 \mu\text{g/L}$, it appears as if one TCE groundwater contamination plume has been bisected in the vicinity of LSA34, or multiple TCE plumes are commingled and are represented by analytical results from LSA36 and LSA25. The source(s) of the TCE detected in these borings is unknown.

TCA was detected in LSA32 at a concentration of $9.6 \mu\text{g/L}$ in the groundwater sample collected from the 48 to 53-foot sample interval. TCA was either not detected or detected at concentrations $< 1 \mu\text{g/L}$ in all other samples from LSA32, LSA34, and LSA36. In these same borings, CHL is present in groundwater samples where CCl_4 is observed, at relatively lower concentrations. This is consistent with the degradation process of CCl_4 parent material undergoing reductive dechlorination to CHL daughter product (see Section 5.2.2).

LSA boring LSA38 was completed in the track 65 and 66 TCE source area, identified in the Phase II investigation, to define the vertical extent of the groundwater contamination in this area. The total depth of LSA38 is 148 feet BGS. LSA borings LSA42 and LSA44 are positioned downgradient of LSA38 in order to characterize the path of the plume originating from this source area. The total depths of LSA42 and LSA44 are 138 feet and 83 feet BGS,

respectively. TCE was detected above the MDL concentration in groundwater samples collected from all three of these LSA borings, while CCl_4 , CHL, and TCA concentrations were detected below their respective MDLs in samples collected from the three locations. TCE concentrations from LSA38 ranged from 28 $\mu\text{g/L}$ in the 18 to 23-foot sample interval to 1,400 $\mu\text{g/L}$ in the 78 to 83-foot sample interval. TCE also was detected at a concentration of 720 $\mu\text{g/L}$ in the sample collected on top of bedrock (143 to 148 feet BGS) in LSA38. Concentrations of TCE greater than 500 $\mu\text{g/L}$ were present in the groundwater samples collected from the shallow monitoring zone of LSA42 with the highest concentration (2,800 $\mu\text{g/L}$) detected in the 33 to 38-foot sample interval, a sampling interval which overlaps the shallow and intermediate zones. TCE was not detected above the MDL in the deep monitoring zone in LSA42. In LSA44, TCE was detected at concentrations greater than or equal to 100 $\mu\text{g/L}$ between 18 feet BGS and 58 feet BGS, with a zone of TCE detected at concentrations greater than 500 $\mu\text{g/L}$ between 28 and 43 feet BGS. The results from LSA44 indicate that TCE contamination extends into the intermediate monitoring zone at this location. The shallow and intermediate contamination in this area can be attributed to the track 65 and 66 TCE source area. The presence of DNAPL or an additional source may be the cause of contamination in the deep zone, however the source of the deep zone contamination is unknown.

Three LSA borings, LSA43, LSA45, and LSA46, were positioned east to west, respectively, along U.S. 33 to identify the path of the plume(s) at the border of the railyard and to further define the groundwater contamination previously identified to the west of these locations in the intermediate monitoring zone. The total depths of these borings were 68 feet, 93 feet, and 108 feet, respectively. CCl_4 and TCA were not detected in samples collected from these three borings at concentrations above the respective MDL for each compound. CHL was detected only once above the MDL in groundwater samples collected from these three borings at a concentration of 38 $\mu\text{g/L}$ in the 103 to 108-foot sample interval in LSA46. TCE was detected above the MDL in groundwater samples collected from LSA43 at concentrations of 12 $\mu\text{g/L}$ and 13 $\mu\text{g/L}$ in the 23 to 28-foot and 63 to 68-foot sample intervals, respectively. In LSA45, TCE was detected above the MDL in the 58 to 63-foot and 78 to 83-foot sample intervals at respective concentrations of 350 $\mu\text{g/L}$ and 13 $\mu\text{g/L}$. In LSA46, TCE was not detected above the MDL in groundwater samples collected in the shallow and intermediate zones. In the groundwater samples collected within the deep zone, the TCE concentrations ranged from 1,400 $\mu\text{g/L}$ to 6,300 $\mu\text{g/L}$. Based on these data and Phase II LSA results, this TCE at the border of the Conrail facility represents a continuous

plume that can be traced upgradient into the railyard and downgradient into the County Road 1 area.

LSA40 and LSA41 were located and sampled to investigate the relationship between the County Road 1 plume and the Charles Avenue contamination (see Figure 2-1). In LSA 40, CCl_4 and TCE were not detected at concentrations above the respective MDL for each compound in groundwater samples collected to a depth of 93 feet. CCl_4 , however, was detected in the deep zone at a concentration of 84 $\mu\text{g}/\text{L}$ in the groundwater sample collected from the 98 to 103-foot depth interval. CCl_4 concentrations increased to approximately 200 $\mu\text{g}/\text{L}$ at a depth of 108 feet and remained at this approximate concentration to a depth of 133 feet, before decreasing to concentrations below the MDL in the groundwater sample collected from the 143 to 148-foot sample interval at the top of bedrock. In addition, TCE was detected in groundwater samples collected from LSA40 in the five sample intervals between 108 and 133 feet BGS at concentrations ranging from 55 $\mu\text{g}/\text{L}$ to 98 $\mu\text{g}/\text{L}$. TCE was not detected above the MDL in groundwater samples collected between 133 feet and 148 feet BGS.

In LSA41, CCl_4 was not detected above the MDL in groundwater samples collected to a depth of 146 feet (top of bedrock). TCE, however, was initially detected above the MDL in LSA41 in the groundwater sample collected from 108 feet BGS, at a concentration of 17 $\mu\text{g}/\text{L}$. TCE was detected at a concentration of 530 $\mu\text{g}/\text{L}$ in the groundwater sample collected from the 128 to 133-foot sample interval. TCE concentrations remained above 100 $\mu\text{g}/\text{L}$ to the top of bedrock at a depth of 146 feet. These results indicate that the Charles Avenue contamination is part of the County Road 1 plume. Within the Charles Avenue area, the areal extent of TCE groundwater contamination appears to be greater than the CCl_4 groundwater contamination.

4.1.2 LaRue Street Plume

LSA borings LSA31, LSA33, LSA35, LSA37, and LSA39 were drilled in the east end of the Conrail Site study area, on the Conrail facility adjacent to the receiving yard, in order to delineate the source of the LaRue Street contamination plume within the railyard (see Figure 2-1). Based on data from previous investigations in the study area, the levels of contamination are lower in the LaRue Street area than those observed in the main classification yard. Levels of contamination in this area are near or less than the respective MDLs. Figure 4-1 shows the locations of cross sections C-C' and D-D' created from the LSA borings in the

LaRue Street area. Figures 4-2 and 4-3 are cross sections C-C' and D-D', respectively, and show the concentration contours of CCl_4 and TCA within the aquifer.

Cross-section C-C' (see Figure 4-2) is oriented south to north and includes LSA borings LSA31, LSA35, and LSA33, respectively. The Conrail receiving yard is approximately midway between LSA31 and LSA35. The groundwater flow direction is approximately to the north. LSA31 is upgradient of the receiving yard based on groundwater flow direction and has a total depth of 93 feet BGS. The highest concentration of any of the four volatile compounds in groundwater samples collected from this boring analyzed for in the field laboratory was 3.5 $\mu\text{g}/\text{L}$ TCA in sample interval 53 to 58 feet BGS. This indicates that, with the exception of TCA, there are no sources of these compounds immediately upgradient of the receiving yard contributing to the groundwater contamination identified downgradient of this location. The location of the source of this TCA is not known. TCA can be traced within the intermediate zone with increasing concentrations downgradient of the receiving yard from LSA35 to LSA33. TCA was not detected in groundwater samples collected from the deep zone. The source of this TCA also is not known.

Cross section C-C' (Figure 4-2) shows the absence of CCl_4 in LSA31 near the water table and the presence of CCl_4 at 13 $\mu\text{g}/\text{L}$ in the water table groundwater sample collected from the 18 to 23-foot interval of LSA35, which is located downgradient of the receiving yard on the Conrail facility. Further downgradient in the general direction of groundwater flow, CCl_4 was detected in LSA33 at a concentration of 34 $\mu\text{g}/\text{L}$ in the groundwater sample collected from the 18 to 23-foot sample interval and at a concentration of 24 $\mu\text{g}/\text{L}$ in the groundwater sample collected from the 23 to 28-foot sample interval. The results shown in the C-C' cross section are consistent with the Phase II LSA results. Specifically, LSA10, which was completed at the present location of MW40, was sampled during the Phase II RI and revealed CCl_4 concentrations similar to those at LSA33 at a similar depth. CCl_4 was not detected above the MDL in groundwater samples collected from the intermediate or deep groundwater zones.

The line of section for cross section D-D' (Figure 4-3) is oriented east to west and includes LSA borings LSA39, LSA35, and LSA37, respectively. The LSA borings used to create this cross section are all located downgradient of the receiving yard. LSA37 was located 30 feet west of LSA35, and LSA39 was located 50 feet east of LSA35. The shallowest sample interval, 18 to 23 feet BGS, from each of these three LSA borings exhibits the highest concentration of CCl_4 for the respective boring. For this sample interval, CCl_4 was detected at concentration of 5.6 $\mu\text{g}/\text{L}$ in LSA37, at a concentration of 13 $\mu\text{g}/\text{L}$ in LSA35,

and at a concentration of 70 $\mu\text{g/L}$ in LSA39. Concentrations rapidly decrease with depth from these high concentrations. The western edge of this CCl_4 plume seems fairly well defined by the groundwater results from LSA35 and LSA37, yet the eastern edge of the plume as identified through groundwater results from LSA39 indicates that CCl_4 groundwater contamination extends further east and remains uncharacterized.

TCA groundwater contamination is limited to the intermediate zone in LSA37 and LSA35. The shallow and intermediate zones, however, of LSA39 reveal TCA groundwater contamination. The deep zones for these borings were not investigated. The pattern of TCA contamination shown in Figure 4-3 is distinctly different from the pattern of CCl_4 contamination, suggesting separate contributing sources for these two compounds.

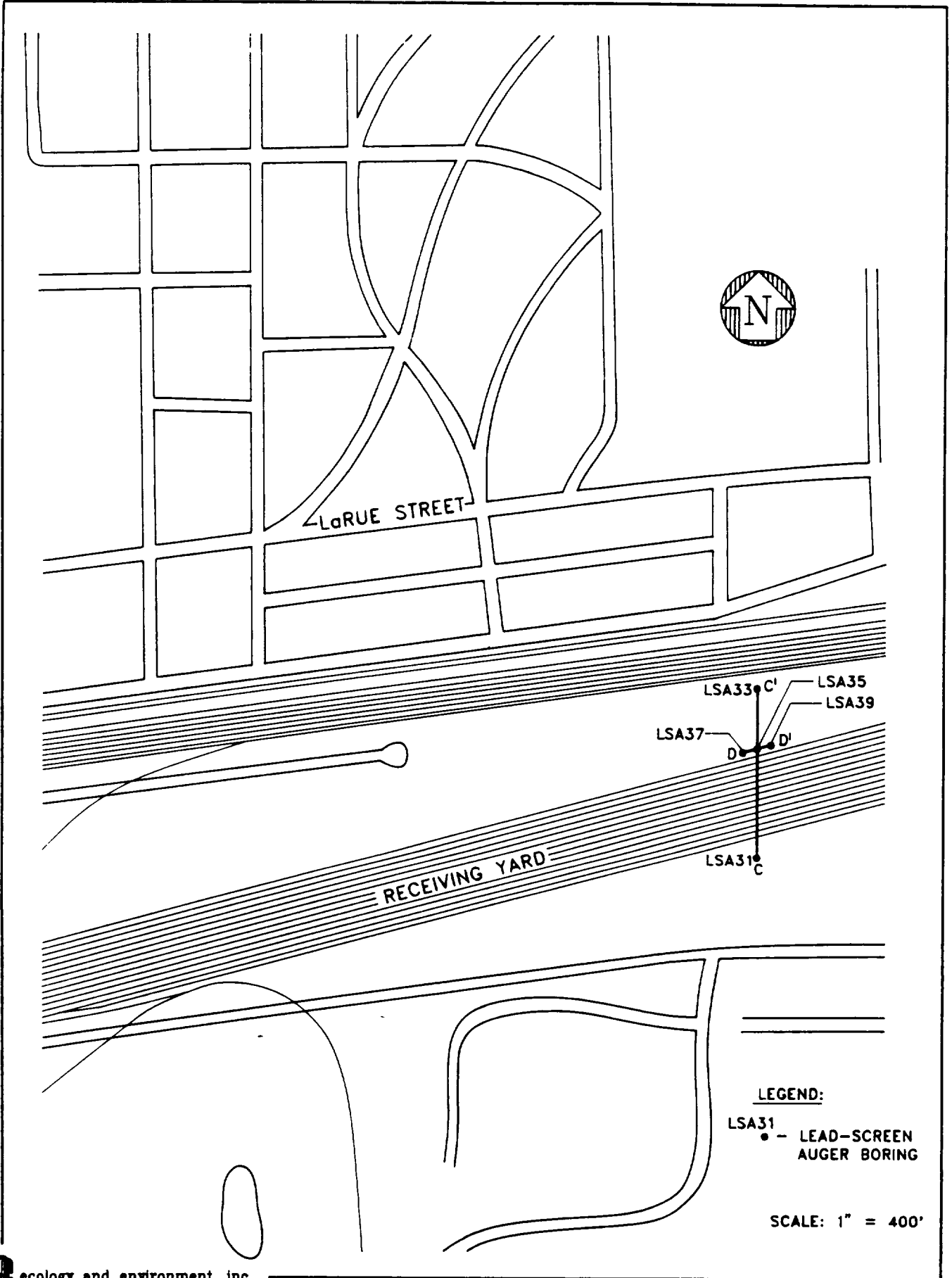


FIGURE 4-1
CROSS-SECTION LOCATIONS - C-C' AND D-D'

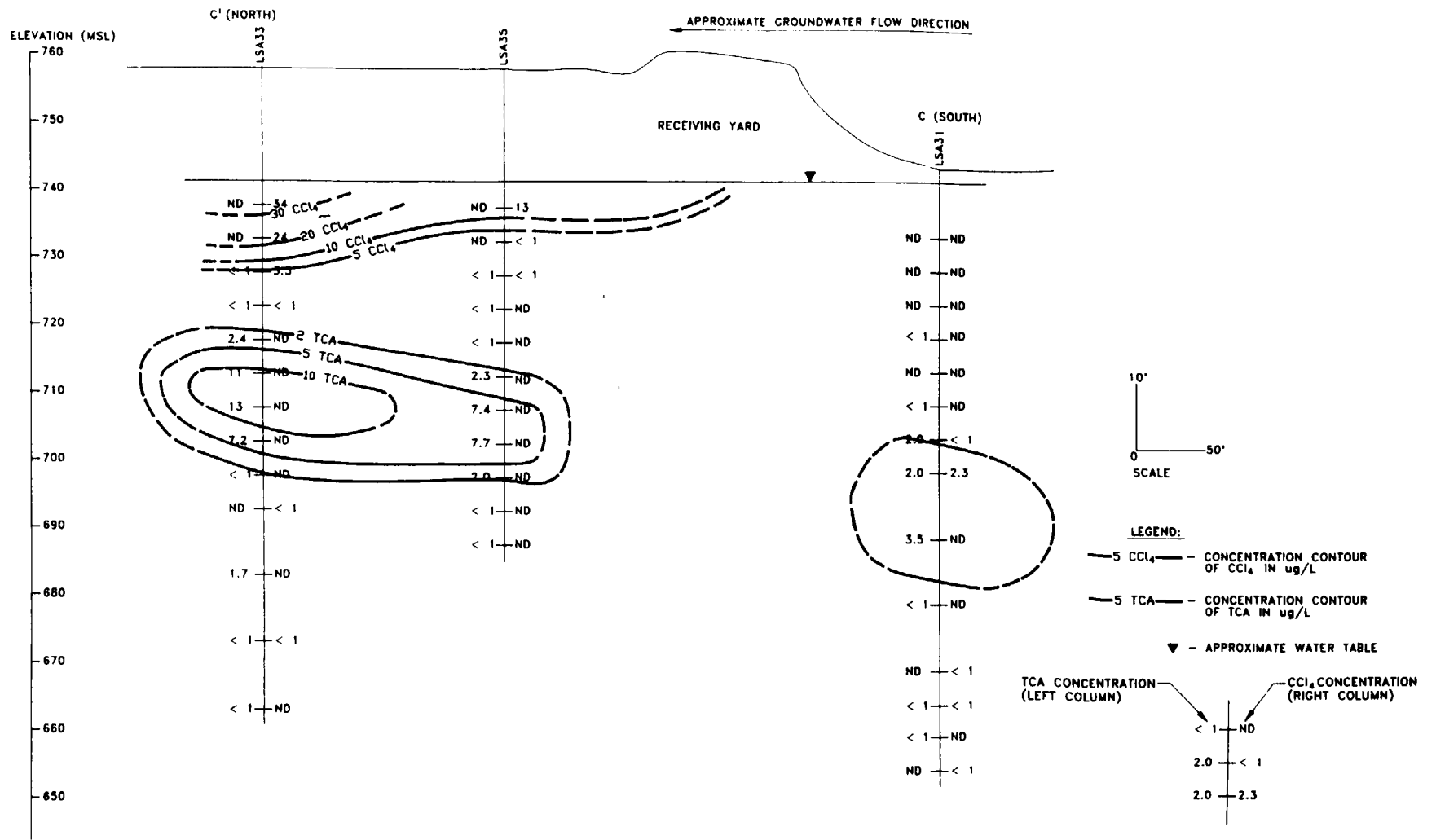


FIGURE 4-2 CROSS SECTION C-C' CCl₄ AND TCA CONCENTRATIONS IN ug/L

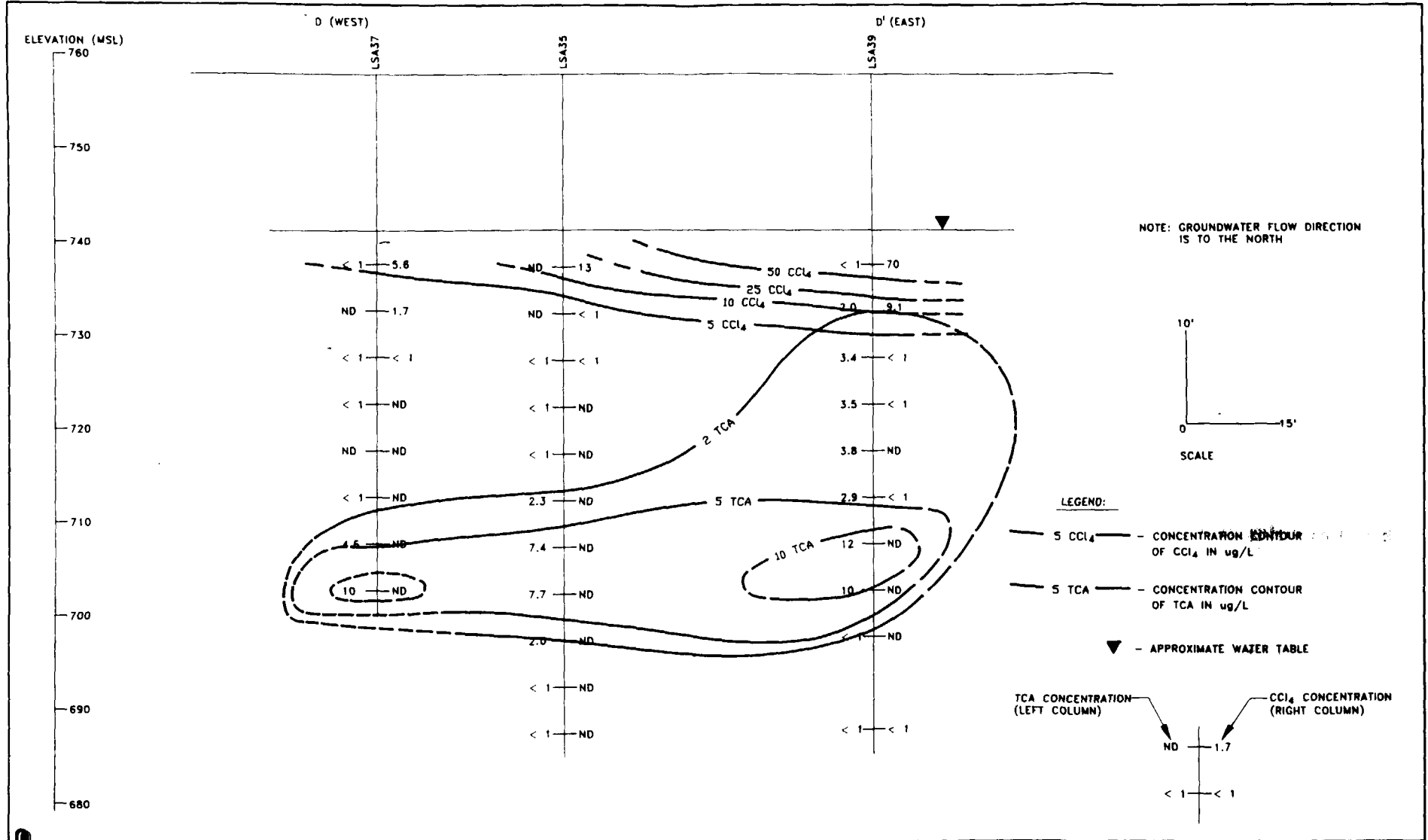


FIGURE 4-3 CROSS SECTION D-D' CCl₄ AND TCA CONCENTRATIONS IN ug/L

ATTACHMENT 3:
SECTION 4.5 SURFACE WATER AND SEDIMENT SAMPLING RESULTS

4.5 SURFACE WATER AND SEDIMENT SAMPLING RESULTS

This section summarizes the analytical results of the sediment and surface water samples collected during the Phase III investigation in support of the risk assessment. An analysis of the results is presented in Section 6. The analytical results are presented in Appendix E, Tables E-5 and E-6. Tables 4-1 and 4-2 summarize the organic and inorganic analytical results, respectively, for each area in which a group of sediment samples was collected. Using the same format as the sediment data, the surface water sample organic and inorganic analytical results, respectively, are summarized in Tables 4-3 and 4-4. All surface water and sediment samples were analyzed for VOCs, semivolatile compounds, pesticides/PCBs, and inorganic analytes, except for SW16, which was not analyzed for pesticides/PCBs.

Three background sediment samples and three background surface water samples, SD/SW01 through SD/SW03, were collected from Baugo Creek, upstream of its discharge to Baugo Bay. As shown in Table 4-1, the VOC and semivolatile compounds detected in these background sediment samples were toluene and two phthalates. All three compounds are common laboratory artifacts. No pesticides or PCBs were detected. As shown in Table 4-2, sixteen inorganic analytes were detected in these sediment samples; the maximum concentration of each analyte detected in this group of samples is also listed in the table. No VOCs were detected in this group of surface water samples (see Table 4-3). Two phthalates and one pesticide were the compounds detected in these surface water samples. The phthalate compounds are common laboratory artifacts. The twelve inorganic analytes that were detected in the surface water samples, along with the maximum concentration of each analyte detected within this group, are shown in Table 4-4.

Five sample pairs were collected from Baugo Bay (SD/SW04 through SD/SW08), in the approximate area where the County Road 1 plume discharges into the bay. The VOCs detected in the sediment samples were toluene, acetone, and methylene chloride. One phthalate and seven polycyclic aromatic hydrocarbon (PAH) compounds were detected in this group of sediment samples. Three pesticide compounds and Aroclor-1254 were also detected in sediment samples from this group. Eighteen inorganic analytes were detected. The highest concentrations of semivolatile compounds detected in the sediment samples collected from Baugo Bay were found in SD08. Most of these compounds were not detected in the background samples. Sediment sample SD08 also exhibited higher levels of most inorganic analytes than were present in the background samples. Although only the VOCs and the phthalate are common laboratory artifacts, it is not clear whether any of these compounds or

analytes are site-related. No VOCs were detected in this group of surface water samples. One semivolatile compound, a phthalate, was detected and it is classified as a common laboratory artifact. No pesticide or PCB compounds were detected in this group of surface water samples. Twelve inorganic analytes were detected. Surface water sample SW05 exhibited higher concentrations of most inorganic analytes than were observed in the background samples. Given the nature of the compounds and analytes detected in the surface water and sediment samples from Baugo Creek and Baugo Bay, their relationship to the site is uncertain.

Six sediment/surface water sample pairs were collected as background samples from the St. Joseph River. These samples (SD/SW17 through SD/SW22) were collected upstream of the location where Crawford Ditch discharges to the St. Joseph River. The VOCs detected in this group of sediment samples were acetone, 2-butanone, and methylene chloride, which are classified as common laboratory artifacts. Eighteen semivolatile compounds (consisting of phenols, aromatics, phthalates, and PAHs), two pesticides, and Aroclor-1254 were detected. Seventeen inorganic analytes were detected. No VOCs were detected in the surface water samples. Four phthalate compounds, each classified as a common laboratory artifact, were detected. One pesticide was detected. Eleven inorganic analytes were detected.

Eight sediment samples and eight surface water samples (SD/SW09 through SD/SW16) were collected from the St. Joseph River in an area that is part of the discharge zone of the County Road 1 plume. Acetone, methylene chloride, toluene, 2-butanone, 1,2-dichloroethene(total), TCE, and CCl_4 were the VOCs detected in this group of sediment samples. The latter three compounds are attributable to the site and are not considered to be common laboratory artifacts. Some of these site-related compounds were detected in two of the eight sediment samples in this group. TCE and CCl_4 were detected in sediment sample SD10 at concentrations of 100 $\mu\text{g}/\text{kg}$ and 67 $\mu\text{g}/\text{kg}$, respectively. TCE and 1,2-dichloroethene(total) were detected in sediment sample SD15 at concentrations of 12 $\mu\text{g}/\text{kg}$ and 32 $\mu\text{g}/\text{kg}$, respectively. One phthalate, nine PAHs, three pesticides, and Aroclor-1254 were the other compounds detected in this group of sediment samples. Eighteen inorganic analytes were also detected in this group of sediment samples. The types of compounds and analytes as well as their concentrations were similar to the background sample results from the St. Joseph River. TCE was the only VOC detected in this group of surface water samples. TCE was detected at a concentration of 35 $\mu\text{g}/\text{L}$ in surface water sample SW15. The TCE in this sample may be attributable to the site. No VOCs were detected in SW10, the sample corresponding to SD10. Four phthalate compounds were the only semivolatile

compounds detected in this group of surface water samples and each is regarded as a common laboratory artifact. No pesticides or PCBs were detected. Twelve inorganic analytes were detected. The sample locations for this group of samples correspond to the discharge zone of the plume. The relationship between the compounds and analytes detected in this group of samples and the site is uncertain because similar results were obtained for the background samples. Given the nature of these compounds and analytes, only TCE, CCl₄, and 1,2-dichloroethene(total) can be attributed to the site through the findings of this investigation.

Three sediment samples and three surface water samples (SD/SW23 through SD/SW25) were collected from the three ponds located south of the main classification yard on the Conrail facility. Acetone and toluene, each categorized as a common laboratory artifact, were the only VOCs detected in the sediment samples. Eighteen semivolatile compounds were detected in this group of sediment samples, with most of the detections present in SD25, the sample collected from the westernmost pond where an outfall pipe is located. Eleven pesticides were detected in SD25 and none were detected in the other two sediment samples. Aroclor-1254 was detected in SD25 at a concentration of 2,000 µg/kg. Twenty inorganic analytes were detected. VOCs, semivolatile compounds, pesticides, and PCBs were not detected in these three surface water samples. Eleven inorganic analytes were detected. Many of the compounds and analytes detected in sediment sample SD25 appear to be related to the sample location, which is near the outfall pipe. The apparent impact of the outfall is uncertain because the way in which the outfall pipe is connected to the Conrail facility is unknown.

Table 4-1 SUMMARY OF ORGANIC DATA FOR SEDIMENT SAMPLES												
Organic Parameter	Baugo Bay Background Sample Numbers SD01-SD03				Baugo Bay Sample Numbers SD04-SD08				Ponds Sample Numbers SD23-SD25			
	Results Range (µg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (µg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (µg/kg)		Number of Detections	Location of Maximum Concentration
Volatile Organic Compounds												
methylene chloride	ND	ND	0/3	N/A	ND	46	3/5	SD08	ND	ND	0/3	N/A
acetone	ND	ND	0/3	N/A	ND	100	3/5	SD08	ND	840	2/3	SD25
1,2-dichloroethene (total)	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
2-butanone (MEK)	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
carbon tetrachloride	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
trichloroethene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
toluene	ND	4	1/3	SD02	ND	15	1/5	SD05	ND	12	1/3	SD25
Semivolatile Organic Compounds												
4-methylphenol	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	310	1/3	SD25
naphthalene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	110	1/3	SD25
2-methylnaphthalene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	120	1/3	SD25
acenaphthene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	110	1/3	SD25
dibenzofuran	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	52	1/3	SD25
fluorene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	80	1/3	SD25
phenanthrene	ND	ND	0/3	N/A	ND	350	1/5	SD08	ND	390	1/3	SD25
anthracene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	82	1/3	SD25

Table 4-1 SUMMARY OF ORGANIC DATA FOR SEDIMENT SAMPLES												
Organic Parameter	Baugo Bay Background Sample Numbers SD01-SD03				Baugo Bay Sample Numbers SD04-SD08				Ponds Sample Numbers SD23-SD25			
	Results Range (µg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (µg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (µg/kg)		Number of Detections	Location of Maximum Concentration
Semivolatile Organic Compounds (Cont.)												
carbazole	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	60	1/3	SD25
fluoranthene	ND	ND	0/3	N/A	ND	650	3/5	SD08	ND	430	1/3	SD25
pyrene	ND	ND	0/3	N/A	ND	910	3/5	SD08	ND	2,300	1/3	SD25
butylbenzylphthalate	ND	89	1/3	SD01	ND	ND	0/5	N/A	ND	ND	0/3	N/A
benzo(a)anthracene	ND	ND	0/3	N/A	ND	450	2/5	SD08	ND	770	2/3	SD25
chrysene	ND	ND	0/3	N/A	ND	550	2/5	SD08	ND	960	2/3	SD25
bis(2-ethylhexyl)phthalate	ND	73	2/3	SD01	ND	1,200	3/5	SD08	ND	710	2/3	SD24
di-n-octylphthalate	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
benzo(b)fluoranthene	ND	ND	0/3	N/A	ND	770	1/5	SD08	ND	1,100	1/3	SD25
benzo(k)fluoranthene	ND	ND	0/3	N/A	ND	390	1/5	SD08	ND	540	1/3	SD25
benzo(a)pyrene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	810	1/3	SD25
indeno(1,2,3-cd)pyrene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	750	1/3	SD25
benzo(g,h,i)perylene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
Pesticides/PCBs												
Aldrin	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	8.4	1/3	SD25
Endosulfan I	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	6.2	1/3	SD25

Table 4-1 SUMMARY OF ORGANIC DATA FOR SEDIMENT SAMPLES												
Organic Parameter	Baugo Bay Background Sample Numbers SD01-SD03			Baugo Bay Sample Numbers SD04-SD08			Ponds Sample Numbers SD23-SD25					
	Results Range (µg/kg)	Number of Detections	Location of Maximum Concentration	Results Range (µg/kg)	Number of Detections	Location of Maximum Concentration	Results Range (µg/kg)	Number of Detections	Location of Maximum Concentration			
Pesticides/PCBs (Cont.)												
Dieldrin	ND	ND	0/3	N/A	ND	4.1	2/5	SD05	ND	ND	0/3	N/A
4,4'-DDE	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	17.0	1/3	SD25
Endrin	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	17.0	1/3	SD25
Endosulfan II	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	1.2	1/3	SD25
4,4'-DDD	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	1.2	1/3	SD25
4,4'-DDT	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	220.0	1/3	SD25
Methoxychlor	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	11.0	1/3	SD25
Endrin Aldehyde	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	5.6	1/3	SD25
alpha chlordane	ND	ND	0/3	N/A	ND	1.6	1/5	SD04	ND	9.2	1/3	SD25
gamma chlordane	ND	ND	0/3	N/A	ND	3.0	1/5	SD08	ND	15.0	1/3	SD25
Aroclor-1254	ND	ND	0/3	N/A	ND	130.0	1/5	SD08	ND	2,000.0	1/3	SD25

Table 4-1								
SUMMARY OF ORGANIC DATA FOR SEDIMENT SAMPLES								
Organic Parameter	St. Joseph River Background Sample Numbers SD17-SD22				St. Joseph River Sample Numbers SD09-SD16			
	Results Range (µg/kg)	Number of Detections*	Location of Maximum Concentration	Results Range (µg/kg)	Number of Detections*	Location of Maximum Concentration		
Volatile Organic Compounds								
methylene chloride	ND	10	2/6	SD17/21	ND	39	5/8	SD14
acetone	ND	230	2/6	SD17	ND	33	2/8	SD09/11
1,2-dichloroethene (total)	ND	ND	0/6	N/A	ND	32	1/8	SD15
2-butanone (MEK)	ND	15	2/6	SD19/22	ND	44	1/8	SD14
carbon tetrachloride	ND	ND	0/6	N/A	ND	67	1/8	SD10
trichloroethene	ND	ND	0/6	N/A	ND	100	2/8	SD10
toluene	ND	ND	0/6	N/A	ND	15	2/8	SD12
Semivolatile Organic Compounds								
4-methylphenol	120	120	1/1	SD19	ND	ND	0/7	N/A
naphthalene	N/A	N/A	0/0	N/A	ND	ND	0/7	N/A
2-methylnaphthalene	N/A	N/A	0/0	N/A	ND	ND	0/7	N/A
acenaphthene	160	160	1/1	SD19	ND	ND	0/7	N/A
dibenzofuran	96	96	1/1	SD19	ND	ND	0/7	N/A
fluorene	160	160	1/1	SD19	ND	ND	0/7	N/A
phenanthrene	60	1300	5/5	SD19	ND	460	4/8	SD12
anthracene	120	220	2/2	SD19	ND	ND	0/7	N/A

Table 4-1								
SUMMARY OF ORGANIC DATA FOR SEDIMENT SAMPLES								
Organic Parameter	St. Joseph River Background Sample Numbers SD17-SD22				St. Joseph River Sample Numbers SD09-SD16			
	Results Range (µg/kg)	Number of Detections*	Location of Maximum Concentration	Results Range (µg/kg)	Number of Detections*	Location of Maximum Concentration		
Semivolatile Organic Compounds (Cont.)								
carbazole	190	190	1/1	SD19	ND	ND	0/8	N/A
fluoranthene	130	1,400	5/5	SD19	ND	980	5/8	SD12
pyrene	130	1,200	5/5	SD19	ND	1,400	5/8	SD12
butylbenzylphthalate	N/A	R	0/0	N/A	ND	ND	0/8	N/A
benzo(a)anthracene	64	690	5/5	SD20	ND	650	5/8	SD12
chrysene	69	630	5/5	SD20	ND	710	5/9	SD12
bis(2-ethylhexyl)phthalate	430	430	1/1	SD20	ND	1,400	5/8	SD12
di-n-octylphthalate	150	150	1/1	SD22	ND	ND	0/8	N/A
benzo(b)fluoranthene	71	730	5/5	SD20	ND	1,100	5/8	SD12
benzo(k)fluoranthene	46	460	4/4	SD20	ND	370	3/8	SD14
benzo(a)pyrene	160	720	4/4	SD20	ND	430	2/8	SD14
indeno(1,2,3-cd)pyrene	61	300	3/3	SD20	ND	130	1/8	SD10
benzo(g,h,i)perylene	420	420	1/1	SD20	ND	ND	0/8	N/A
Pesticides/PCBs								
Aldrin	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Endosulfan I	ND	ND	0/6	N/A	ND	ND	0/8	N/A

Table 4-1								
SUMMARY OF ORGANIC DATA FOR SEDIMENT SAMPLES								
Organic Parameter	St. Joseph River Background Sample Numbers SD17-SD22				St. Joseph River Sample Numbers SD09-SD16			
	Results Range (µg/kg)		Number of Detections*	Location of Maximum Concentration	Results Range (µg/kg)		Number of Detections*	Location of Maximum Concentration
Pesticides/PCBs (Cont.)								
Dieldrin	ND	ND	0/6	N/A	ND	ND	0/8	N/A
4,4'-DDE	ND	ND	0/6	N/A	ND	6.5	1/8	SD14
Endrin	ND	ND	0/6	N/A	ND	6.5	1/8	SD14
Endosulfan II	ND	ND	0/6	N/A	ND	ND	0/8	N/A
4,4'-DDD	ND	ND	0/6	N/A	ND	ND	0/8	N/A
4,4'-DDT	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Methoxychlor	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Endrin aldehyde	ND	ND	0/6	N/A	ND	ND	0/8	N/A
alpha chlordane	ND	0.75	1/6	SD20	ND	0.65	1/8	SD09
gamma chlordane	ND	1.2	2/6	SD22	ND	2.4	2/8	SD16
Aroclor-1254	ND	62	3/6	SD20	ND	190	4/8	SD14

Key:

ND: Compound was analyzed for but not detected.

N/A: Not applicable; maximum concentration corresponds to a non-detect concentration.

- * Some results were rejected due to major violation of technical or QC protocols.

Source: Ecology and Environment, Inc. 1993.

Table 4-2 SUMMARY OF INORGANIC DATA FOR SEDIMENT SAMPLES												
Analyte	Baugo Bay Background Sample Numbers SD01-SD03			Baugo Bay Sample Numbers SD04-SD08			Ponds Sample Numbers SD23-SD25					
	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration
Aluminum	1,360	3,000	3/3	SD02	1,530	13,400	5/5	SD04	1,740	10,600	3/3	SD25
Antimony	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	26.9	1/3	SD25
Arsenic	0.46	1.6	3/3	SD02	0.37	14.9	5/5	SD08	1.1	11.1	3/3	SD25
Barium	5.8	13.8	3/3	SD02	6.1	182	5/5	SD08	10.5	2,420	3/3	SD25
Beryllium	ND	ND	0/3	N/A	ND	0.8	2/5	SD05	ND	0.66	1/3	SD25
Cadmium	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	18.6	1/3	SD25
Calcium	16,100	24,500	3/3	SD01	1,080	85,300	5/5	SD08	35,000	85,300	3/3	SD24
Chromium	4.6	6.6	3/3	SD02	2.8	34.9	5/5	SD08	4.3	108	3/3	SD25
Cobalt	1.4	3.2	3/3	SD02	2.4	14.7	5/5	SD08	2.7	6.9	3/3	SD25
Copper	2.4	3.7	3/3	SD02	3.5	51.4	5/5	SD08	5.7	994	3/3	SD25
Iron	3,730	5,930	3/3	SD02	2,760	32,600	5/5	SD08	4,060	19,700	3/3	SD25
Lead	1.5	14	3/3	SD02	1.7	35.7	5/5	SD08	3.6	650	3/3	SD25
Magnesium	5,450	6,910	3/3	SD03	557	15,200	5/5	SD05	8,550	12,900	3/3	SD25
Manganese	102	114	3/3	SD02	71.2	1,860	5/5	SD08	148	822	3/3	SD25
Mercury	ND	ND	0/3	N/A	ND	0.3	1/8	SD04	ND	0.49	1/3	SD25
Nickel	4.2	7.9	3/3	SD02	4.3	30.2	5/5	SD08	6.2	216	3/3	SD25
Potassium	ND	337	1/3	SD02	ND	1,810	3/5	SD05	ND	ND	0/3	N/A

**Table 4-2
SUMMARY OF INORGANIC DATA FOR SEDIMENT SAMPLES**

Analyte	Baugo Bay Background Sample Numbers SD01-SD03				Baugo Bay Sample Numbers SD04-SD08				Ponds Sample Numbers SD23-SD25			
	Results Range (mg/kg)	Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)	Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)	Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)	Number of Detections	Location of Maximum Concentration
Silver	ND	0/3	N/A	ND	0/5	N/A	ND	1/3	SD25	1.5	1/3	SD25
Sodium	48.8	3/3	SD02	65.1	5/5	SD08	247	5/5	SD08	84.8	3/3	SD25
Vanadium	5.7	3/3	SD02	4.9	5/5	SD08	30.5	5/5	SD08	8.7	3/3	SD25
Zinc	10.4	3/3	SD02	10.1	5/5	SD08	194	5/5	SD08	21.6	3/3	SD25

Table 4-2								
SUMMARY OF INORGANIC DATA FOR SEDIMENT SAMPLES								
Analyte	St. Joseph River Background Sample Numbers SD17-SD22				St. Joseph River Sample Numbers SD09-SD16			
	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration
Aluminum	1,610	10,500	6/6	SD17	2,090	11,900	8/8	SD12
Antimony	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Arsenic	2.8	10.5	6/6	SD17	2	20.5	8/8	SD12
Barium	11.6	142	6/6	SD17	10	182	8/8	SD12
Beryllium	ND	ND	0/6	N/A	ND	1.3	3/8	SD10
Cadmium	ND	ND	0/6	N/A	ND	4.5	1/8	SD12
Calcium	4,270	77,100	6/6	SD18	1,910	67,800	8/8	SD10
Chromium	6.1	33.5	6/6	SD17	7.7	38.9	8/8	SD10
Cobalt	1.9	7	6/6	SD17	2	13.7	8/8	SD12
Copper	3.3	44.3	6/6	SD17	2.7	60.7	8/8	SD10
Iron	5,080	31,200	6/6	SD20	4,720	33,000	8/8	SD12
Lead	5.4	57.9	6/6	SD17	1.7	84	8/8	SD14
Magnesium	1,190	21,500	6/6	SD18	1,080	11,200	8/8	SD12
Manganese	81	1,470	6/6	SD17	86.6	2,330	8/8	SD12
Mercury	ND	2.8	1/6	SD17	ND	0.27	1/8	SD13
Nickel	5.5	22.7	6/6	SD17	4.5	26.5	8/8	SD12
Potassium	ND	9050	1/6	SD17	ND	ND	0/8	N/A

Table 4-2 SUMMARY OF INORGANIC DATA FOR SEDIMENT SAMPLES								
Analyte	St. Joseph River Background Sample Numbers SD17-SD22				St. Joseph River Sample Numbers SD09-SD16			
	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration	Results Range (mg/kg)		Number of Detections	Location of Maximum Concentration
Silver	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Sodium	57.5	189	6/6	SD17	64.1	348	8/8	SD14
Vanadium	6.3	230	6/6	SD17	7.2	28.3	8/8	SD14
Zinc	14.3	154	6/6	SD17	11.3	198	8/8	SD12

Key:

ND: Analyte was analyzed for but not detected.

N/A: Not applicable; maximum concentration corresponds to a non-detect result.

Source: Ecology and Environment, Inc. 1993.

Table 4-3 SUMMARY OF ORGANIC DATA FOR SURFACE WATER SAMPLES												
Organic Parameter	Baugo Bay Background Sample Numbers SW01-SW03			Baugo Bay Sample Numbers SW04-SW08			Ponds Sample Numbers SW23-SW25					
	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration
Volatile Compounds												
trichloroethene	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
Semivolatile Compounds												
diethylphthalate	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
di-n-butylphthalate	ND	0.7	2/3	SW02	ND	ND	0/5	N/A	ND	ND	0/3	N/A
bis(2-ethylhexyl)phthalate	ND	0.7	2/3	SW01/03	ND	1.0	3/5	SW08	ND	ND	0/3	N/A
di-n-octylphthalate	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	ND	0/3	N/A
Pesticides/PCBs												
Endrin aldehyde	ND	0.014	1/3	SW03	ND	ND	0/5	N/A	ND	ND	0/3	N/A

Table 4-3

SUMMARY OF ORGANIC DATA FOR SURFACE WATER SAMPLES

Organic Parameter	St. Joseph River Background Sample Numbers SW17-SW22			St. Joseph River Background Sample Numbers SW09-SW16		
	Result Range (µg/L)	Number of Detections	Location of Maximum Concentration	Result Range (µg/L)	Number of Detections	Location of Maximum Concentration
Volatile Compounds						
trichloroethene	ND	0/6	N/A	ND	1/8	SW15
Semivolatile Compounds						
diethylphthalate	ND	1/6	SW19	ND	1/8	SW13
di-n-butylphthalate	0.6	2/6	SW20	ND	0/8	N/A
bis(2-ethylhexyl)phthalate	1.0	4/6	SW19	ND	2/8	SW09
di-n-octylphthalate	6.0	6/6	SW19	ND	3/8	SW16
Pesticides/PCBs						
Endrin aldehyde	ND	3/6	SW22	ND	0/7	N/A

Key:

ND: Analyte was analyzed for but not detected.

N/A: Not applicable; maximum concentration corresponds to a non-detect result.

Source: Ecology and Environment, Inc. 1993.

Table 4-4 SUMMARY OF INORGANIC DATA FOR SURFACE WATER SAMPLES												
Analyte	Baugo Bay Background Sample Numbers SW01-SW03				Baugo Bay Sample Numbers SW04-SW08				Ponds Sample Numbers SW23-SW25			
	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration
Aluminum	226	333	3/3	SW01	97.8	4,170	5/5	SW05	ND	304	2/3	SW25
Antimony	ND	ND	0/3	N/A	ND	93.6	2/5	SW05	ND	ND	0/3	N/A
Arsenic	ND	1.3	1/3	SW01	ND	2	3/5	SW05	ND	ND	0/3	N/A
Barium	53.1	53.1	3/3	SW01/02/03	52.8	76.3	5/5	SW05	13.3	106	3/3	SW25
Calcium	83,200	84,000	3/3	SW02	78,400	92,500	5/5	SW05	48,500	59,200	3/3	SW24
Copper	ND	ND	0/3	N/A	ND	ND	0/5	N/A	ND	19.9	1/3	SW25
Iron	329	368	3/3	SW01	300	4,220	5/5	SW05	18.8	651	3/3	SW25
Lead	ND	1.1	1/3	SW01	ND	2.8	1/5	SW05	ND	41.1	1/3	SW25
Magnesium	25,900	26,300	3/3	SW02	20,900	28,600	5/5	SW05	14,800	16,100	3/3	SW23
Manganese	29.9	31.4	3/3	SW03	28	139	5/5	SW05	18.2	286	3/3	SW24
Potassium	3,580	3,920	3/3	SW01	1,880	5,300	5/5	SW05	1,360	2,210	3/3	SW23
Selenium	ND	1.5	1/3	SW01	ND	ND	0/5	N/A	ND	ND	0/3	N/A
Sodium	14,500	14,800	3/3	SW02	9,900	15,600	5/5	SW05	4,940	6,190	3/3	SW23
Zinc	ND	13.8	1/3	SW01	12.9	50.8	5/5	SW04	ND	155	2/3	SW25

Analyte	St. Joseph River Background Sample Numbers SW17-SW22				St. Joseph River Sample Numbers SW09-SW16			
	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration	Results Range (µg/L)		Number of Detections	Location of Maximum Concentration
Aluminum	398	572	6/6	SW22	152	2,500	8/8	SW16
Antimony	ND	70.9	1/6	SW22	ND	72.1	5/8	SW16
Arsenic	1.1	1.2	3/6	SW20/21	ND	2.6	5/8	SW16
Barium	51.8	55.3	6/6	SW17	50.2	79.3	8/8	SW16
Calcium	73,100	75,400	6/6	SW21	76,900	85,200	8/8	SW16
Copper	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Iron	515	671	6/6	SW17	352	3,680	8/8	SW16
Lead	ND	1.19	1/6	SW22	ND	5.2	2/8	SW16
Magnesium	19,400	20,100	6/6	SW21	20,600	21,800	8/8	SW12/16
Manganese	36.4	41,470	6/6	SW18	28	300	8/8	SW16
Potassium	2,340	2,910	6/6	SW19	1,820	2,910	8/8	SW16
Selenium	ND	ND	0/6	N/A	ND	ND	0/8	N/A
Sodium	8,810	10,100	6/6	SW21	9,370	10,200	8/8	SW09
Zinc	ND	ND	0/6	N/A	ND	20.7	2/8	SW09

Key:

ND: Analyte was analyzed for but not detected.

N/A: Not applicable; maximum concentration corresponds to a non-detect result.

Source: Ecology and Environment, Inc. 1993.