

Appendix G

**Velsicol's Response to December 5, 2001 Comments
From TDEC on September 28, 2001 Agency Review Draft Report**

The TDEC and USEPA comments, as received from TDEC, are presented in bold font, followed by Velsicol's response in standard font. Velsicol has included a few typographical changes in the comments where clarification was necessary. These changes are presented within parenthesis in standard font.

TDEC Division of Solid Waste Management Comments

General Comments

1. On page 1 of Step 3 of the Work Plan dated July 31, 2000, Velsicol Chemical Corp. (VCC) proposed to submit a Cypress Creek Investigation and Preliminary Risk Assessment Report (IPRA Report). In the Joint Conditional approval dated July 31, 2000 the preliminary risk assessment was one of the listed conditions. Instead of the IPRA Report, this submission is entitled Cypress Creek Drainage Channel Investigation and Preliminary Human Health Risk Evaluation, a departure from the Work Plan. Is this report a preliminary to the IPRA or is it the IPRA? Please clarify. The submission is also entitled Cypress Creek Drainage Channel Investigation and Preliminary Human Health Risk Assessment on the spine. Please clarify the discrepancy.

Response: The original Work Plan prepared by Velsicol was dated December 29, 1999. The Scope of Work in the December 29, 1999 Work Plan did not include a Preliminary Risk Assessment Report. On August 1, 2000 the Agencies (TDEC and USEPA) provided comment on the December 29, 1999 work plan and requested that Velsicol prepare a Preliminary Risk Assessment for Cypress Creek. On September 5, 2000 Velsicol responded to the Agencies August 1, 2000 comments and described the Scope of Work for the Preliminary Risk Assessment. As noted in Step 4 of the September 5, 2000 response, the Preliminary Risk Assessment Scope of Work entails comparing selected analytical data to site-specific risk-based concentrations calculated using the EPA Region 9 PRG equations and exposure parameters specific to site conditions. On December 14, 2000, the Agencies approved Velsicol's Scope of Work for the Preliminary Human Health Risk Assessment. For ease of reference, copies of pertinent portions all of these documents have been provided in Appendix A of the Final Report.

Velsicol followed the approved Scope of Work as outlined in the September 5, 2000 response to the Agencies comments. In addition, GeoSyntec Consultants' Appendix E report went beyond the approved Scope of Work, in presenting the Preliminary Risk Evaluation.

The report entitled Cypress Creek Drainage Channel Investigation and Preliminary Human Health Risk Evaluation is the report provided by Velsicol in accordance with the approved Work Plan.

The title of the spine of the Report should read the same as the cover: "Cypress Creek Drainage Channel Investigation and Preliminary Human Health Risk Evaluation". The final version of the Report will address this oversight.

2. The Work Plan proposes to do a temporal study, yet the historical data up to 1992 were excluded. This makes the temporal presentation incomplete.

Response: As presented in the first paragraph of Section 3.3.2.4, an attempt was made to evaluate temporal trends using all the data from 1964 onward. This proved to be unsuccessful, as no discernable trends were apparent. No further evaluation is warranted. A statement has been added to the first paragraph of Section 3.3 to clarify that all of the historic and 2001 data in the project database were used in the Nature and Extent Evaluations.

3. The sampling results in Sub-Areas IV and V are being compared to Industrial PRG's instead of Residential PRG's when the residential properties are close to and accessible to the Creek. Comparing the Exposure Point Concentrations (EPC) to Residential PRG's increases the number of the chemicals of potential concerns and the carcinogenic risks and non-carcinogenic hazards. The final report is to include a comparison of data to residential PRG's.

Response: Several screenings were carried out in the risk evaluation. An initial screening was performed by Velsicol (See Section 3.3 of the main report) in which all detects in Sub-Areas IV and V were compared to either residential or industrial PRGs depending on the depth at which the sample was collected. For instance, surface soil (0-1 ft below ground surface) samples in these Sub-Areas were compared to residential PRGs, where available, while sub-surface soil samples were compared to industrial PRGs. The results of these screening steps are provided in Tables 6 and 7 of the main report.

A second screening performed by GeoSyntec Consultants compared the maximum detected concentration of each constituent in each Sub-Area to default residential PRGs (Appendix E, Tables 1 through 6). Constituents that exceeded the residential PRGs in each Sub-Area (including Sub-Areas IV and V) were considered COPCs and were further evaluated in a supplemental screening step by comparing each detected concentration in a Sub-Area to alternate PRGs developed for Sub-Area-specific exposure scenarios (Appendix E, Tables 25 through 33).

Finally, constituents that exceeded the Sub-Area-specific alternate PRGs in any sample were carried forward into the preliminary risk evaluation.

Sub-Areas IV and V are located in the upper and lower surge basins, respectively, and are a part of the creek system floodway. These areas are significantly different than Sub-Area III, in that there are no residential properties immediately adjacent to the Cypress Creek Drainage Channel, and because these Sub-Areas are used as floodwater storage basins, there is no foreseeable use of the land for residential purposes. In addition, these areas are substantially removed from the residential areas as observed in Figures 8, 9 and 10. Receptors and site-specific exposure scenarios relevant to these areas are: (1) an adolescent recreator who may utilize the recreational bike path located along the creek bank, or may traverse over the open field areas in route to the Lucille Price Playground; (2) the groundskeeper who is responsible for the maintenance of the turfgrass in the open field and bike path areas of the upper surge basin; and (3) the channel maintenance worker who performs maintenance activities, such as the removal of material from the channel. These receptors are consistent with the most likely exposure scenarios that are anticipated to occur in these areas, both at present and in the foreseeable future. While the initial conservative screening presented in Appendix E used default residential PRGs, Sub-Areas IV and V are not residential property and should not be quantitatively evaluated as such. Therefore, it is Velsicol's position that preliminary risk estimates based on residential exposure scenarios are not appropriate for these two Sub-Areas.

4. PRE includes the utility worker, groundskeeper, maintenance worker, and recreator, in addition to the residents. In this approach, exposure point concentrations (EPC), 95% upper confidence level (UCL) are used to compare with Industrial and Residential PRE's. In both PRE's, the cumulative risks were not presented. The final report is to present cumulative risks.

Response: The PRE approach in the evaluation utilized PRGs (both default and site-specific) to estimate risks to potential receptors. These PRGs are typically based on the most sensitive toxicological endpoint (cancer or non-cancer) associated with a particular chemical. Many chemicals have toxicity values related to both cancer and non-cancer endpoints. Because the PRG is based on the most sensitive endpoint, it is also considered protective for other toxicological endpoints associated with that chemical. However as in this case, when PRGs are used in the PRE approach as the basis for estimating potential risks, the fact that the PRG relates only to the most sensitive toxicological endpoint associated with the chemical makes the

calculation of cumulative risks problematic. To illustrate this, consider the example of arsenic. The cancer-based PRG for arsenic was used to calculate both cancer and non-cancer preliminary risk estimates. Because the PRG relates only to the potentially carcinogenic effects of arsenic, the non-cancer preliminary risk estimate is not meaningful, and using this value in a summation of the total non-cancer risk posed by arsenic and other COPCs would lead to an inflated cumulative risk estimate.

This issue has been addressed by calculating specific cancer and non-cancer PRGs for those chemicals with USEPA toxicity values related to both endpoints. Once endpoint-appropriate PRGs have been calculated, they may be used in the PRE approach to calculate endpoint-specific risk estimates, which may be summed to provide a more appropriate estimate of cumulative risk. These additional steps have been taken and cumulative risk estimates have been provided in the Final Report. It should be noted that the incorporation of cumulative risk estimates did not affect the conclusions of the Report. Sub-Area III is the only Sub-Area where the cumulative risk estimate exceeded 1×10^{-4} , indicating a need for additional investigation and evaluation.

5. In selecting the Chemicals of Potential Concern (COPC), the detects without PRG's are not included in further preliminary risk evaluation. These should automatically be included as COPC. This exclusion decreases the number of COPC's and the cumulative risks. The final report is to include detects without PRG's as COPC.

Response: This statement is not correct. Constituents without PRGs were retained as COPCs in the screening tables (Appendix E, Tables 1 through 6). However, the PRE approach used in this evaluation utilizes PRGs (both default and site-specific) to estimate risks to potential receptors. When PRGs were not available for specific chemicals, reasonable surrogates were used for screening and risk estimation purposes. In the case of chlordene, the PRG for chlordane was used as a surrogate, and in the case of endrin aldehyde and endrin ketone, the PRG for endrin was used as a surrogate. The use of appropriate surrogate risk-based screening values and toxicity values is a commonly accepted practice in risk assessment. There were a few obscure compounds such as hexachloronorbomadiene, heptachloroborene, HexVCL, and octachlorocyclopentene for which neither PRGs nor USEPA-derived toxicity values are available. In fact, these were the only constituents for which potential risks were not quantitatively estimated. Even in a more comprehensive Superfund-style risk evaluation, the potential risks from these constituents would have been dealt with qualitatively, most likely in an uncertainty section. Excluding these three constituents from the PRE tables has no impact on the

cumulative risk estimates because there are no available toxicity data with which to calculate risks.

6. In item 10 of the Joint Conditional Approval dated July 31, 2000 (same as letter dated August 1, 2000 in Appendix A), Velsicol was directed to list anticipated, historical or documented half-lives for the contaminants of concern. This information will be useful in recognizing time trends in probable natural degradation of the contaminants along Cypress Creek. Spatial and temporal trend analyses were proposed in the Work Plan so the inclusion of the half-lives of the contaminants is important. Although some of the half-lives of the pesticides were provided, they were not documented. Anticipated or historical half-lives are not provided. The final report is to include this information.

Response: This evaluation was conducted in accordance with the Agency approved September 5, 2000 Work Plan response, which stated: "an attempt will be made to provide and use the requested information as appropriate to perform the evaluations and to prepare the IPRA Report". The results of this attempt related to contaminant half-lives are documented in Section 3.3.2.4 of the Report. As discussed in that Section, and as noted in the response to Comment 2, no time trends were discernable in the data.

The literature sources related to chemical properties and half-life data have been documented in the Final Report. In addition, some of the degradation information presented in Section 3.3.2.4 was revised in the Final Report.

7. In addition, inclusion of the historical data from 1964 to 2001 is necessary for the analysis of the temporal trends. In this submission, only data from 1992 to 2001 are included, this makes the temporal analysis incomplete. The final report is to include all available data.

Response: See response to Comment 2.

Specific Comments

8. Executive Summary

This executive summary gives recommendations (page v) based on Comparisons to Human Health Risk Based Goals and Preliminary Risk Evaluation in Appendix E. On pages vii, and 1 of Appendix E, it is noted that the preliminary risk evaluation does not represent a comprehensive human health risk assessment, nor does it provide a definitive estimate of the potential risks to particular groups or individuals. Therefore it is not appropriate to propose risk management decisions in this executive summary based on the “qualified” results of the preliminary evaluation in Appendix E. There is also an “executive summary” in Appendix E that represents the actual evaluation of the data. The “executive summary” from Appendix E can replace this executive summary.

Response: The recommendations presented at the end of the Executive Summary have been modified as discussed at the October 29, 2001 review meeting with TDEC and EPA in Nashville. That is, to revise the first recommendation to provide the investigation findings to “appropriate parties”, not just to the City of Memphis as was proposed on page v of the draft report. In addition, the second recommendation, to use the findings as the basis of dialogue with TDEC and others to establish a course of action, has been slightly modified. Implementation of this second recommendation is ongoing and is anticipated to lead to risk management decisions that are being formulated by TDEC, Velsicol and others outside of the report. All of the project findings, including all of the clarifications and qualifiers provided throughout the body of the report, should be used in formulating risk management decisions.

The Executive Summary of the main report is a summary of the entire report. Therefore, to replace the main report Executive Summary with the Executive Summary of a single Appendix (Appendix E), as suggested in the comment, would not yield a complete Executive Summary.

Note that the Executive Summary of Appendix E has been revised to reflect the clarifications and changes that were made in the body of Appendix E.

9. Page 8, Second Paragraph

This paragraph indicates that the soil contaminant data from 1997 were not included in the evaluation. The cause for the soil contamination was due to leakage of the pipeline. The underground pipeline was slip lined in 1982 and recent video inspections show it is in very good condition. It is not clear if the condition of the underground pipeline in 1997 was known. In the Work Plan VCC proposes to study the temporal and spatial trend of contamination. It is therefore important not to disregard any historical data including this set of data. The final report is to include and evaluate this data.

Response: The data from the #003 Outfall underground pipeline area under the Jackson Street viaduct (i.e., the subject of the comment) was not included in the investigation for the reasons stated in Section 1.5, on page 8, of the report. In addition, this data is not relevant to the creek sediment issues, except to indicate the type of contaminants that may be of concern along the Creek. This position is also in accordance with the approved Work Plan. See Step 4 of the September 5, 2000 response, which lists the locations that were to be included in the investigation. The referenced video inspection, which was performed in 1997 concurrent with the viaduct construction project activities, shows that the #003 Outfall pipeline is currently in very good condition.

10. Page 19, Section 3.1.1 Historical Data

Data prior to 1992 were excluded from this evaluation because of the questions on the quality of the sample collection or that the analyses predated SW-846. The data from 1964 up to 1981 were important and valid because they were collected and analyzed by the EPA approved methods of the time. Some of the samples were collected and analyzed by EPA. A preliminary evaluation is deficient if not all relevant data are included, particularly one that proposes to study temporal trend. Technological advances naturally improve the analytical precisions but the value of older data should not be dismissed offhand. In Appendix C (D), page 2 paragraph 6 indicates that in the March 5 through 9, 2001 sampling event, most of the MS/MSA data provided for metals analyses were unacceptable. All the metal results should be qualified as estimates. In addition, greater than 50% of the filed duplicates of the March 2001 sampling event have relative percent difference (RPD) outside of the RPD control limit (page 4) for all compounds. So recent data are not perfect

either. Historical data can therefore be regarded as usable as recent data. The final report is to compare this historical data with the recent data.

Response: Data collected during 1964, 1980 and 1981 were included in the project database and were included in evaluations as appropriate. All of the 1964 through 2001 data contained in the project database were included in the evaluations performed by Velsicol and presented in the main report, including the temporal trends analyses.

See the response to Comment 18 regarding GeoSyntec's use of a more limited data set in the Preliminary Risk Evaluation.

Velsicol does not agree that historical data can be regarded as being as usable as recent data. As compared to the recent data, the quality of the different historical data sets suffers for several different reasons. These include lack of detailed information on sample collection location and handling methods, on analytical methods, on field and laboratory QA/QC measures, and on data validation procedures.

11. Page 25, Section 3.3.1 Initial PRG's Screening

This section reports screenings of sample concentrations against Residential PRG's in Sub-Area III and against Industrial PRG's in Sub-Areas I, II, IV and V. Upon closer inspection, Tables 3 through 7 actually compare averages of detects against PRG's instead of EPC's against PRE's as performed in Appendix E.

Response: As indicated in the referenced section, and in accordance with the approved work plan, an initial screening was performed using the analytical data (see Sections 3.1.4 and 3.2) compared to standard published generic USEPA Region IV PRGs. The results of this screening are contained in the remainder of Section 3.3 and in the noted tables of the main report (Tables 3-7). The data contained in these tables is described in the text starting on page 27. EPCs were developed by GeoSyntec as part of the Preliminary Risk Evaluation, as described in Appendix E, and were not part of the initial screening performed in this referenced section of the main report.

Velsicol would like to clarify that Sub-Area III was also screened against Industrial PRGs and that Sub-Area IV was also screened against Residential PRGs. Additionally, the comment regarding comparing against averages is incorrect. Individual data points were compared to the

PRGs. The average and range of detects were presented in Tables 3 through 7 only to generally describe the findings.

12. Page 26, Section 3.3.1 Initial PRG's Screening, Second and Third Bullets

The sampling results in Sub-Area IV and V are compared with Industrial PRG's. In Sub-Area IV, the Upper Surge Basin, the industrial, commercial, and residential properties co-exist. Residential properties are above the flood plain but close to the flooded area. The unlined area of the Cypress Creek is also accessible to the residents. So the more conservative and appropriate approach would be to compare the sampling results to the Residential PRG's. The final report is to utilize this more conservative approach.

Response: See response to Comment 3.

13. The Sub-Area V, Lower Surge Basin floods even more frequently than the Upper Surge Basin. From the residential properties and Lucille Price Playground, there is unlimited access to the Cypress Creek. A conservative approach would be to compare the sampling results with the Residential PRG's. The final report is to utilize this more conservative approach.

Response: See response to Comment 3.

14. Page 26, Section 3.3.1 Initial PRG's Screening, Last Paragraph

In the last sentence, it is stated that if a constituent does not have a related PRG value, it was not considered as an exceedance of the screening criteria. This is not valid. A constituent should be retained for further evaluation in the absence of a PRG. The final report is to retain such constituents.

Response: The initial screening, as presented in Section 3.3.1, was performed for the purpose of determining if each Sub-Area should be carried forward to the preliminary human health risk evaluation. This section was not intended to select individual constituents for further evaluation. The end result of this screening was that all five Sub-Areas were carried forward.

The issue of how GeoSyntec Consultants handled constituents without PRGs, in identifying COPCs, is discussed in the response to Comment 5.

Note also, that in Section 3.3.1, page 26, if an isomer compound did not have a PRG, the PRG for its parent compound was used in the initial screening.

15. Page 26, Section 3.3.2.1, Upstream to Downstream Along Channel

This paragraph claims that no trends were identified along the channel. This claim is not valid because not all the historical data were included in the analysis. The final report is to utilize historical data in identifying trends.

Response: The referenced claim is indeed valid. All of the data in the project database (see Sections 3.1.4 and 3.2) was utilized in the analyses. This has been clarified in the first paragraph of Section 3.3. In addition, the last sentence in Section 3.3.2.1 has been expanded to note that trends may not be apparent due to the effects of sediment mobilization and re-deposition over time.

16. Page (29, Section) 3.3.2.2 Distance from Channel in Sub-Area IV

There are 10 instead of 2 exceedance of PRGs in this area.

Response: The first paragraph notes that the evaluation was conducted on constituents detected in at least 2 of the sample locations located along a particular transect (i.e T-6) (see figure 8). The number of PRG exceedances in this area is not addressed in this section.

Please note that the second paragraph of Section 3.3.2.2 should reference Figure 11 instead of Figure 10. The final report will include this correction.

17. Page (31, Section) 3.3.2.4 Chlorinated Pesticide Half-Lives and Degradation Products

In this section, the properties and half-lives of aldrin, dieldrin, isodrin, endrin, chlordane, heptachlor, DDD, DDE, and DDT are discussed without attributed sources. It should be made clear if these properties and half-lives are site-specific or from other documents. Historical and anticipated half-lives should also be presented as outlined in the Work Plan.

Response: The literature sources related to chemical properties and half-life data will be documented in the final report. The information presented in the report is not based on site-specific information because, as indicated in the report and in the response to Comment 6. No discernable temporal trends were apparent from the evaluations.

18. Page 35, Section 4.0 Preliminary Human Health Risk Evaluation, Second Paragraph

The last sentence states that in general, only the most recently obtained data was used where both new and historic data existed. This is a departure from the Work Plan and makes the evaluation incomplete.

Response: The subject sentence relates only to the Preliminary Risk Evaluation conducted by GeoSyntec Consultants in Appendix E. All of the 1964 through 2001 data in the project database were used in the evaluations presented in Section 3 of the main report. Additionally, as stated in the noted section and in Appendix E; “the goal was to identify current surface soil and sediment constituents that would be relevant for evaluating potential exposures. The most representative data available for each of the five sub-areas and related exposure scenarios were used in certain Appendix E evaluations. In general, only the most recently obtained data was used where both new and historic data existed”. As noted in Appendix E, Section 3-2 historic data was used where more recent data did not exist (i.e. Sub-Area V). This approach is consistent with USEPA RAGS guidance, which states that the risk assessor may “use only the most recent data in a quantitative risk assessment and evaluate older data in a qualitative analysis of changes in concentration over time.”

19. Appendix A January 16, 2001 Letter from MEC to TDEC, Response to USEPA and TDEC Comments on the Work Plan for Off-Site Investigation of Soil and Sediment Contamination Along Cypress Creek

This Appendix is used to help establish the scope for the risk assessment. The purpose is better served if the Joint Conditional Approvals are also included in this Appendix.

Response: Comment noted. Copies of pertinent portions of the relevant work plan-related documents have been included in Appendix A of the Final Report.

20. Page 2, Appendix D Data Validation Report, Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

This section indicates that the MS/MSD data provided for metals analysis were unacceptable in most cases. Because every metal analyte failed at least one of the three spike recoveries; all detected results should be qualified as estimates. There is a great deal of discussion on the quality of the historical data. This discussion shows that the most recent data need to be viewed with reservation as well.

Response: Comments noted. Appropriate data qualifiers are presented along with all of the recent data in the project database.

21. Page 3, Appendix D Data Validation Report, Field Duplicate Analysis

Thirty-eight of the 72 field duplicates are out of the limits for the relative percent difference (RPD). EPD is used to monitor the precision of the field sample collection procedures and the laboratory analytical methods. So more than fifty percent of the chemicals analyzed in the most recent sampling events are estimates. Uncertainties exist among the recent data as well.

Response: Comments noted.

22. Page 8, Paragraph 3, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The distance of the residents are not farther away from the Creek than that of residents in Sub-Area III. SO it is not appropriate to dismiss the residential scenario.

Response: Velsicol's analysis of the factual information and maps of the area differs from that stated in this comment. The figures clearly show the distance of the residents from the Creek in the various Sub-Areas (see especially Figures 2, 8, 9 and 10). Whereas in Sub-Area III the residential property backs up to the Creek, in Sub-Area-IV the nearest residential lot is approximately two hundred feet away from the Creek. Also see response to Comment 3.

23. Page 11, Section 3-2 DATA SELECTED FOR RISK CHARACTERIZATION, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The 1964 sampling results were excluded on the basis of age, lack of specific location/depth information, and the uncertainty about where the Creek was lined or unlined in various areas at the time. There are no temporal limits on the usefulness of data in a historical data analysis. This submission proposes to study temporal trend. Uncertainty of the exact location exists but not the area in question. Whether the Creek was lined or not does not matter because this is a trend analysis, uncertainties can be noted.

Response: The temporal evaluation was conducted in Section 3.3.2.4 of the main report. Also see response to Comments 2 and 18.

24. Page 12, Last Paragraph, Section 3-2 DATA SELECTED FOR RISK CHARACTERIZATION, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The exclusion of the samples from 1964, 1980 and 1981 from Sub-Area V in a spatial and temporal trend analyses is a departure from the Work Plan, which proposes to perform temporal analysis. The final report is to include this data.

Response: See responses to Comments 2 and 18. The 1964, 1980 and 1981 data were included in the temporal and spatial evaluations presented in Section 3.3.2 of the main report.

25. Page 14-19, Section 3-4-1 to 3-4-5 Risk-Based Screening of Sub-Areas, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The constituents without screening values were deleted from the consideration as COPC's no matter how high their concentration. These constituents should be automatically retained. The final report is to retain these constituents.

Response: See response to Comment 5.

26. Page 37, (Section) 4-3-4 Sub-Area IV Comparisons to Groundskeeper, Recreator and Channel Maintenance Worker PRG's, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The residential scenario should be added to the comparison of Residential PRG's because of the proximity of residential properties and the availability of the access to the Creek. The final report is to address this.

Response: See response to Comments 3 and 22.

27. Page 39, (Section) 4-3-5 Sub-Area V Comparisons to Groundskeeper, Recreator and Channel Maintenance Worker PRG's, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The residential scenario should be added to the comparison of Residential PRG's due to the closeness and access from the Little Chicago neighborhood to the Creek. The final report is to address this.

Response: See response to Comments 3 and 22.

28. Page 43, Section 5 PRELIMINARY RISK EVALUATION, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The PRE methodology specified by USEPA (1997c) was cited but not included in the Reference section.

Response: Comment noted. The appropriate reference for, and a discussion of the regulatory relevance of PRE methodology will be provided in the Final Report.

29. Page 42, (Section) 4-4 Conclusions of Supplemental PRG Comparisons, Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

In the third paragraph, the fourteen pesticides and PAH's exceed Residential PRG in Sub-Area III should be named instead of stating "a number" of these chemicals exceed Residential PRG. The same goes for Sub-Areas IV and V in paragraphs four and five. In addition, the chemicals that exceed Residential PRG's in sub-Areas IV and V should be named as well.

Response: Comment noted. Section 4-4 of the Final Report contains a complete list of the chemicals that exceed the residential PRGs in Sub-Area III. However, for each of the other sub-areas, Section 4-4 of the Final Report only lists the chemicals that exceed the sub-area-specific PRGs. Section 3 of Appendix E contains comparisons with default residential PRGs for each sub-area, as well as lists of the chemicals that exceed residential PRGs in each sub-area. Also see response to Comment 3.

30. Table 13 INGESTION AND DERMAL VALUES USED FOR DAILY INTAKE CALCULATIONS – UTILITY WORKER SCENARIO Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

According to the exposure duration, the utility workers have one project every other year on the Creek. This parameter needs to be justified.

Response: This parameter is based on Velsicol and GeoSyntec Consultants observations and discussions with current City of Memphis staff. In addition, Mr. John Leonard of TDEC (formerly with the City of Memphis Storm Water Drainage Division) indicated at the meeting with TDEC on October 29, 2001 that the assumed exposure duration is conservative.

31. Table 18 INHALATION VALUES USED FOR DAILY INTAKE CALCULATIONS – RECREATION SCENARIO Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The Lucille Price Playground is built for children much younger than age 8. This table needs to be modified to accommodate that fact.

Response: The Lucille Price Playground is located adjacent to, but not in Sub-Area V, the flood plain area. Because young children are not likely to frequent the flood plain area, an adolescent recreator between the ages of 8 and 15 is likely to be more representative of the typical exposures in this area. Sampling data from areas close to Lucille Price Playground was included in the analyses.

32. Tables 25-33 Appendix E Comparison to Human Health Risk-Based Goals and Preliminary Risk Evaluation, Cypress Creek Drainage Channel by GeoSyntec Consultants

The EPA's (EPCs) and PRG's should be side by side to justify the choice of COPC's. The cumulative risks for each Sub-Area should also be presented.

Response: Comment noted. We believe that this is a request for the EPCs and Risk estimates to be presented side by side in the PRE tables. Therefore, this information will be provided in the revised report. In addition, as described in the response to Comment 4, cumulative risk estimates will be provided in the Final Report.

USEPA Comments

EPA COMMENTS:

I find the report of GeoSyntec Consultants (Appendix E) generally well prepared following relevant Agency risk assessment guidance for performing (performing) screening assessments. However, the preliminary risk evaluation (PRE) used cites an agency source for the procedure but does not include the citation in the reference section of the report. I am familiar with the PRE procedure developed as a guidance for a federal site in Region 4 by a OTS risk assessor. It has not been issued as a regional or national guidance of the Agency. The conclusions of this report are consistent with the assumptions and analyses performed. Comparison of the maximum value for each contaminant with preliminary remediation goals (PRGs) for residential and alternate receptors yielded a number of chemicals of potential concern (COPCs) for each sub-area. However, the PRE identified only four chemicals of concern (COCs) in a single sub-area, i.e. chemicals having levels that exceed the Agency's risk-based remedial action levels. Since risk assessments for hazardous waste sites are to evaluate risk from current and future exposure prior to any further action, there are critical questions that relate to the report's conclusions: (1) does the environmental sampling data used adequately characterize the site, (2) are the appropriate receptors evaluated and (3) are appropriate exposure parameters used for the receptors evaluated. Each of these issues is discussed below in the order presented.

A subset of the complete historical database for the Cypress Creek was used in the PRG screening assessment and the preliminary risk evaluation (PRE). The reports states that recently available surface soil data were used. However, it is not completely clear what criteria were used to make the subset selection and if the criteria was uniformly applied across the five sub-areas of the creek. Data from a range of 4 to 24 surface soil samples were used in each sub-area for the assessment. The limited number of samples is likely to provide inadequate characterization of all sub-area stretches of the creek considering the heterogeneity of the contaminants' occurrence in the soil and sediment. Secondly, a residential-use assumption is typically used to determine a protective level for unrestricted use of an area. Here, only sub-area III was evaluated using residential-use exposure assumptions in the PRE. If an area is to be assessed for restricted use, i.e. non-residential receptors, then considerable confidence in the accuracy of the assumptions for current and future use much be achieved. The determination of land use assumptions and therefore the

receptors to be included in the risk assessment is a risk management issue. Lastly, the type of restricted-use receptor(s) and the exposure assumptions for that receptor(s) must be appropriate for current and future exposure. Since the risk assessment process is to be applied to chronic risks, exposure frequency assumptions that significantly deviate from daily exposure tax the underlying toxicological principles. Exposure frequencies used in developing alternate PRGs and in the PRE of 14 and 20 days per year for the grounds keeper and the utility worker scenarios respectively are examples of significant deviations. The finding of no unacceptable risk in these preliminary risk evaluations must be viewed with considerable caution.

The quantification in the PRE of risk levels to individual chemicals should be summed to obtain the total cancer and non-cancer risk for each receptor. However, it appears that sub-area III yielded the only calculated risk outside EPA's protective range with or without (with or without) the summation of total chemical risks. Dieldrin alone produced unacceptable cancer risk and endrin ketone, endrin and isodrin produced unacceptable non-cancer risk for a residential receptor.

Further evaluation of the site relative to adequate chemical characterization, receptors and exposure assumptions needs to be made to fully evaluate human health risks. In addition, risk to ecological receptors should be evaluated following EPA's ecological risk assessment process. The upper and lower surge basins and perhaps other areas of the creek and the flood plain appear to provide extensive wildlife habitats. Exposure of lower trophic aquatic species may allow biomagnification of contaminants through the food chain potentially affecting humans and animal top feeders. These potential risks need to be assessed.

My comments on the human health aspects of the report are consistent with the comments of Dr. Ruth Chen.

Response: Because the USEPA's comments are generally consistent with the comments of Dr. Ruth Chen, we believe that the previous responses to those comments will help to clarify some of the issues with which USEPA has expressed concerns. There are, however, several issues identified specifically by the USEPA that warrant supplemental responses.

USEPA's review noted that the PRE process used in this evaluation has not been issued as a regional or national guidance of the Agency. While this is true, the PRE process has been adopted and used successfully at a RCRA facility (the Kennedy Space Center) in Florida as a

tool for preliminary risk characterization with the goal of focusing the investigation and remedial efforts on the most significant problems. The PRE process represents a useful tool and, as such, was included by Velsicol, going beyond the scope of assessment outlined the approved work plan. The Final Report will include an expanded discussion on the development and regulatory relevance of the PRE process, including the correct citation. The Final Report will specifically note that the memorandum outlining this process does not represent regional or national agency guidance.

USEPA's comments suggested viewing the preliminary risk assessment with caution due to several of the restricted-use receptors and exposure assumptions. VCC believes the receptors and exposure assumptions are appropriate for the site and the uncertainty associated with the development of risk-based target levels for exposure scenarios of short duration is a common problem and not one unique to this site. Due to the underlying risk assessment approach and the manner in which doses are evaluated, it is true that uncertainty increases as scenarios are assumed to be shorter (this is particularly true for chemicals that are not regulated as carcinogens since toxicological effects, which could be manifested during a short period of exposure may be disguised by averaging the dose over a longer exposure period). VCC believes that even with the uncertainties in PRGs developed for the site-specific scenarios, the risk estimates are still appropriate for Preliminary Risk Evaluation purposes since the primary risk driving chemicals are regulated as carcinogens by USEPA, and the Lifetime Average Daily Dose (used to evaluate potential carcinogens and assuming a linear, no-threshold model of risk) is expected to be more robust than the Average Daily Dose (used to evaluate non-carcinogens) when used with shorter exposure durations. In addition, the assumption of a linear, no-threshold model of carcinogenicity, the use of upper confidence limits in estimating the cancer slope factor, and the use of the most conservative point in USEPA's target risk range ensure that there is a significant level of conservative incorporated into the calculated PRGs. With regard to non-carcinogens, there are also a number of safety factors incorporated into the reference doses specifically to account for potential uncertainties.

USEPA's review noted a lack of clarity regarding the criteria used to select data used in the PRE. Section 3.1 of the main report presents detailed information on the entire body of sampling data, including the shortcomings associated with individual data sets. In general, the overall approach in identifying the sampling data to be included in the evaluation of potential current risks was to make use of the most recent information available for a given stretch of the drainage channel and surge basins. Also, due to the problems with the subjectivity of eliminating individual samples, the decision was made to either include or exclude entire data sets related to particular sampling

events. If samples from an older round of investigation provided information on areas not recently investigated, that entire data set was retained. For example, since certain samples from the USEPA sampling event in 1993 represented the only results for particular stretches/features of the Lower Surge Basin, (see main report, Figure 10), the entire data set associated with that sampling event was retained. In cases where spatially overlapping samples were available from both recent and historical sampling events, data from the recent sampling event was selected in preference to the historical data. This approach is consistent with USEPA RAGS guidance, which states that the risk assessor may “use only the most recent data in a quantitative risk assessment and evaluate older data in a qualitative analysis of changes in concentration over time.” The rationale for including some but not all historical datasets in the evaluation will be clarified in the Final Report.

Velsicol believes that the available information is sufficient for the purposes of general characterization and preliminary risk evaluation. This type of information then serves to address questions about whether sampling coverage is adequate, or likely to be too limited, in particular areas. The Work Plan and the Report specifically identify the current evaluation as a screening level, preliminary assessment intended to identify the need for further investigation and assessment activities. Based on the results of this investigation, and the agreements reached during the meeting with TDEC and EPA on October 29, 2001, further investigations are warranted and will be performed in Sub-Area III. Finally, with regard to the EPA’s request for an ecological risk evaluation, Velsicol continues to maintain the position that Cypress Creek has been, and continues to be, classified as a storm water channel. As stated in Velsicol’s January 16, 2001, response letter to EPA’s September 5, 2000, comments on the Cypress Creek Work Plan, the April 1977 declaratory ruling by the Tennessee Water Quality Control Board is valid, and per Tennessee Code Annotated (TCA) Section 4-5-223(b), “it shall be binding on the agencies and the parties...unless it is altered or set aside by the agency or a court in a proper proceeding.” In that response letter, Velsicol presented the reasons it believes that an official reclassification of Cypress Creek has not taken place. Furthermore, Velsicol suggested a method to resolve the disputed issues of the classification of Cypress Creek and the need for an ecological evaluation. This method includes:

1. TDEC should provide documentation, if available, to support the Agencies’ claim that the April 1977 declaratory order has been properly rescinded.
2. If TDEC’s documentation does support their claim, the Agencies should then bring all appropriate parties to the table to discuss the need for and means of performing an ecological risk assessment.

Velsicol is not aware of any additional information or documentation that has been provided by TDEC in response to item no. 1. Velsicol also continues to believe that the resolution of item no. 2 will require input from other parties including the City of Memphis and other industrial dischargers to the Creek.