RESPONSE TO COMMENTS

Expanded Site Review Work Plan
for the Proposed Strecker Forest Development

Wildwood, Missouri

Prepared by:

U.S Environmental Protection Agency

August 19, 2011

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On July 1, 2011, the United States Environmental Protection Agency released for public comment an Expanded Site Review Work Plan for the Proposed Strecker Forest Development, Wildwood, Missouri. The document describes the EPA's approach for further characterization of environmental conditions at three contiguous properties proposed for residential development located at 165, 173 and 177 Strecker Road in Wildwood, Missouri (Strecker Forest property), and a parcel located to the south at 210 Strecker Road (Callahan property), also in Wildwood, Missouri. Public comments were accepted by the EPA on the work plan through July 27, 2011. A neighborhood meeting was also hosted by the EPA on July 13, 2011, at the Daniel Boone Branch of the St. Louis County Library in Ellisville, Missouri, to present and discuss the EPA's proposed approach for the ESR, and to provide additional opportunity for public comment. This document presents the EPA responses to all comments received during the comment period and neighborhood meeting.

This document is organized into three sections. The first section addresses comments received from three technical consultants retained by the city of Wildwood to provide comments on the work plan. These three consultants all have been involved in previous investigations and assessments of the Strecker Forest property commissioned by the City of Wildwood. The second section addresses comments received from residents and other private parties with interest in this ESR. The third and final section presents questions and comments received during the July 13, 2011, neighborhood meeting and associated responses from the EPA.

In consideration of all comments received, the EPA will finalize the work plan for the ESR and will then post this document on the EPA Region 7's website at http://www.epa.gov/region7/cleanup/strecker_forest/index.htm. A paper copy or compact disk of the EPA's response and final work plan are available by special request to Ben Washburn, Community Involvement Coordinator, at (913) 551-7364, or toll-free at (800) 223-0425, or by email at washburn.ben@epa.gov.

I. Comments Received from Environmental Consultants Retained by the City of Wildwood

1. Until removal and remediation activities have been completed, the National Priorities List (NPL) area, the central solid waste and eastern disturbed area, and the western pond area should be restricted with fencing to prevent direct contact with the surficial materials present in those areas.

Response: The EPA performed a screening level health assessment of all available data for the Strecker Forest property, including data presented in the Phase II Environmental Site Assessment Report prepared by Mundell & Associates (Mundell Phase II ESA, March 3, 2010). The results of the screening level health assessment are incorporated into comments provided by the EPA (Attachment 1) on the draft Human Health Risk Assessment prepared by Environmental Stewardship Concepts and the Mundell Phase II ESA. Results of the EPA's screening level health assessment were summarized in a February 7, 2007, letter to the city of Wildwood (Attachment 2). On the basis of the EPA's screening level health assessment, data have not been presented that indicate that current conditions at Strecker Forest are not protective of human health for direct contact with surface soil. Restricting access to the property is not warranted at this time. The EPA will work with the property owner to ensure that proper signage is posted prohibiting unauthorized trespassing and local officials will be alerted to the presence of equipment remaining on the property. The EPA's Expanded Site Review will provide considerably more data that will be used to assess potential human health risks associated with direct contact with surface soils and increase the level of certainty regarding conditions at the Strecker Forest property.

2. All visible waste debris and shallow impacted soils identified within the central drainage valley on Site should be removed and disposed of at an approved waste disposal facility. In addition, the subsurface buried metallic debris and associated impacted soils identified during the present study should also be removed. This includes impacted soils in the vicinity of the western pond.

Response: Physical hazards associated with debris and solid waste do not fall within the scope of the EPA's authority under the Comprehensive Environmental Response, Compensation, and Liability Act, more commonly referred to as the Superfund law. Therefore, response actions to address the identified physical hazards cannot be funded with Superfund resources. Actions to address physical hazards associated with debris and solid waste are typically the responsibility of the property owner.

As stated previously, the EPA's assessment of current conditions based on existing data does not indicate a need to conduct a response action to provide protection of human health at this time. In particular, reported soil concentrations in the vicinity of the Eastern Pond do not exceed U.S EPA RSL screening levels for direct contact. The EPA's ESR will provide additional data to assist in making a final determination regarding the need for response to any buried metal or impacted soil that is identified.

3. Following waste and soil removal activities, visual inspection coupled with a geophysical survey and a final confirmation sampling and testing program should be completed over the area to document the waste removal has been fully completed and appropriate soil cleanup levels have been achieved with confidence.

Response: A geophysical investigation is planned as part of the subsurface investigation to identify the presence of any buried metallic objects. Visual inspection and confirmation sampling would be performed following removal of any materials that are determined to exceed health-based levels.

4. Appropriate health and safety precautions including Site air quality and dust (particulate) monitoring should occur during the excavation operations to document the removals are being completed in a manner that protects the health and well-being of the adjacent residents. The health and safety issues should also include provisions for a) appropriate worker protection (personal protective equipment (PPE), b) dust suppression activities during the excavations, c) vehicle and minimizing vehicular tracking of on-site soils and waste residue from the Site during removal and waste transportation activities.

Response: In the event that removal of soil is determined to be necessary to protect human health and the environment, a site-specific health and safety plan would be developed to ensure protection of workers and nearby residents. Soil removal operations would be conducted in a manner that involves dust suppression, as required, and decontamination of vehicles, personnel and equipment leaving a designated exclusion zone where contact with contaminated materials could occur. Any hazardous substances removed from the property would be transported in covered trucks in accordance with applicable state and federal regulations.

5. The waste and soil removal should be overseen and documented by competent environmental professionals acting on behalf of the City of Wildwood and independent of the developer of the Site.

Response: The city of Wildwood is welcome to provide professional representation to observe all field operations.

6. The western pond area, identified as a developing sinkhole during the study, and the central drainage areas of the Site require special attention should the Site be developed. Because they act as the primary discharge pathway of all precipitation, surface runoff and ground water from the Site, they have the potential for increasing the potential for off-site ground water impacts at the northeast corner of the Site unless proper design and water management practices are taken into consideration. Consideration should be given for the re-direction and/or control of surface waters away from the remaining soil and ground water impacts within the northeast corner of the Site.

Response: Surface water diversion described by the commenter is a type of response action that would be considered if conditions at Strecker Forest are determined to pose an unacceptable risk to human health and the environment. The level of risk that is considered unacceptable is established by the National Contingency Plan which represents the implementing regulations of the Superfund law. The EPA, in consultation with the Missouri Department of Natural Resources and the Missouri Department of Health and Senior Services has performed an assessment of existing data and determined that conditions do not warrant a response action to address the identified levels of site contaminants at this time. Surface water diversion may be considered as a component of a response action if the ESR investigation determines a need to take action to provide protection for human health and the environment.

7. Based on the results of this investigation, the NPL area in its present condition should remain inaccessible to contact and off-limits for future residential development. In its current condition, it represents a continuing chemical source and threat to human health and the environment. Ongoing impacts to the nearly ground water system downgradient from the area is expected to continue without additional chemical source removal and a plan for ground water control and treatment.

Response: On the basis of the EPA's screening level health assessment, data have not been presented that indicate that current conditions at Strecker Forest are not protective of human health for direct contact with surface soils. The EPA response to restrict access to the property is not warranted at this time. Additional characterization of surface and subsurface soil and potential ground water impacts are incorporated into the work plan. An assessment of data generated during the ESR will be performed in consideration of existing data to determine if there is a need for additional response action in the northeast area of the Strecker Forest property. The NPL area is not part of the proposed future residential development.

8. Based on the karst development occurring at the Site, future development will require the further geotechnical engineering assessment of the ground so that suitable foundation support can be provided. This will include additional drilling and possibly two-dimensional resistivity profiling to accurately map the weathered and solutioned bedrock surface.

Response: The role of the EPA and other state and federal agencies is to determine if hazardous substances represent an unacceptable level of risk to human health and the environment for the anticipated future residential use. It is the responsibility of the developer to perform a geotechnical engineering assessment or other work that will be required to ensure that the property is safe for development.

9. To delineate the extent and severity of bedrock ground water impacts above health-based levels, a system of bedrock monitoring wells should be installed in the tributary between the Bliss site and Caulks Creek, near the intersection of Strecker Road and Clayton Road. The wells should be screened across the upper bedrock water table. If dissolved contaminants are found within this valley, it may be necessary to install wells in topographically higher locations above the valley hillsides to delineate the lateral extent of the contaminant plume. The optimal location of any wells can be determined based on the results of geophysical surveys (specifically Very Low Frequency (VLF) techniques and 2-dimensional resistivity profiling) to map the locations and orientations of ground water flow pathways through the fractured/weathering/solutioned upper bedrock.

Response: MDNR is conducting an ongoing investigation of potential ground water impacts caused by residual conditions at the Bliss property which is located adjacent to the Strecker Forest property. As part of this investigation, MDNR has installed three additional bedrock monitoring wells several hundred feet downgradient of the former source areas on the Bliss and contiguous properties. Ground water results from these monitoring wells show limited migration of contaminants in ground water at the Bliss property. The intersection of Strecker Road and Clayton Road is located a distance of more than 4,000 feet from the Bliss property. The installation and monitoring of ground water monitoring wells at this distance from the original source area is not warranted at this time. The existing monitoring wells at the Bliss and contiguous properties will continue to be monitored by MDNR, and the monitoring well network will be expanded, as needed, if data indicate that significant migration of contaminants is occurring beyond the current monitoring well network.

10. To evaluate for potential ground water impacts at the other two Ellisville Superfund Site (ESS) properties, bedrock monitoring wells should be installed in the valley area south of the Callahan drum burial area and in the Caulks Creek valley in the vicinity of the Rosalie property. As in the case of the proposed work within the valley north of the proposed Strecker Forest Development Site, geophysical surveys within these valleys will aid in locating wells in appropriate ground water flow pathways within the upper bedrock surface.

Response: The work plan includes installation of a bedrock monitoring well south of the former Callahan drum burial area. This monitoring well and the other two bedrock monitoring wells to be installed on the Callahan property will help characterize ground water quality at the Callahan and Strecker Forest properties.

An investigation of ground water conditions near the former Rosalie site is not necessary to characterize potential impacts to Strecker Forest. The former Rosalie portion of the Ellisville site is located approximately 3,000 feet west of the Strecker Forest property. There is no indication that ground water has been impacted from the former Rosalie site, which was cleaned up more than 26 years ago; nor is it conceivable that current or former conditions at the Rosalie site could potentially impact the Strecker Forest property.

11. Based on the results of this phase of study, additional ground water impact delineation may be needed in areas further hydraulically downgradient of the ESS, along Caulks Creek.

Response: The need for expansion of the proposed ground water monitoring network will be assessed on the basis of new data generated during the ESR investigation.

12. A thorough evaluation of all water wells in the vicinity of the Caulks Creek watershed hydraulically downgradient of the ESS should be completed. Any well in this area determined to be screened within the Burlington-Keokuk Formation should be tested. A MUNDELL review of available water well logs on the MDNR website revealed four (4) private wells located between the ESS and the vicinity of Lewis Spring, in an interpreted hydraulically downgradient direction. It is recommended that these water wells be tested, if they are still in existence.

- **MDNR Well No. 004461**
- **MDNR Well No. 005669**
- **MDNR Well No. 010641**
- **MDNR Well No. 026395**

Response: MDHSS periodically collects samples from private wells in the vicinity of the Bliss Ellisville NPL site. The wells sampled include those recommended for sampling in the Mundell report. Contaminants of concern have not been detected during this sampling.

13. Also, the open-hole portions of the wells appear to be partly in hydraulic connection with the Burlington-Keokuk Formation, as well as deeper water-bearing bedrock material. If the upper bedrock aquifer is impacted at these well locations, the open-hole completed wells may represent a potential conduit for contamination into deeper material that supplies water to a number of private wells. Consideration should be given to properly closing and abandoning either unused wells, or wells within significantly impacted shallower ground water areas in order to prevent cross-contamination of the shallow impacts into deeper drinking water supply aquifers.

Response: In accordance with State regulations, monitoring wells will be closed once a determination is made that they are no longer required for hydraulic or chemical characterization of ground water, or if they are determined to represent a potential conduit for contamination to reach deeper, water-bearing formations.

14. Additional chemical source removal of affected soil appears to be warranted at the Bliss and Callahan properties. Confirmatory soil testing should be completed at the disposal areas at the

Rosalie site to determine if chemical soil impacts are present to such a degree to result in contaminant partitioning and/or leaching into ground water.

Response: The EPA performed a screening level health assessment of existing data at the Strecker Forest and Callahan properties and determined that detected contaminant levels in soils do not warrant additional soil removal at this time. Confirmatory sampling performed following cleanup actions at the Bliss and Rosalie sites indicated that soil conditions were protective for unrestricted future use and did not threaten ground water quality. New soil and ground water data will be collected during the ESR and evaluated to determine if soil and/or ground water conditions pose unacceptable risk to human health or the environment. If unacceptable risk to human health is determined, an appropriate response will be performed to achieve protectiveness. Soil removal is one type of response that could be considered of an unacceptable level of risk is determined to exist. Confirmatory testing would be performed following any additional soil removal that is determined to be necessary.

15. A focused remedial strategy should be developed after site characterization and ground water impact delineation activities are complete. Based on the geologic and hydrogeologic observations made during this study, the ground water contamination present within the upper bedrock zone may be controlled by both surface topography and the karst character of the underlying bedrock. As such, the extent of impacted ground water may be restricted to preferential flow pathways through the bedrock within the Caulks Creek valley and tributary leading from the Bliss site. This may allow for a more targeted ground water recovery and/or treatment evaluation once the extent of the impacts has been defined.

Response: If assessment of data determines that conditions are not protective of human health and the environment, a focused remedial strategy will be developed following site characterization to address hazardous substances representing an unacceptable level of risk.

16. Based on the types of chemicals detected at the ESS, including those impacts observed in the northeast corner of the Site within the NPL area, there is the possibility that both dense non-aqueous phase liquids (i.e., 'DNAPLs', or liquids such as chlorinated solvents that are heavier that ground water and tend to sink to the bottom) and light non-aqueous phase hydrocarbons (or 'LNAPLs', liquids such as gasoline, diesel fuels or waste oils that are less dense that ground water, and tend to float on top of it) exist in the upper bedrock aquifer zone. While a typical shallow water table monitoring well should be able to allow the identification of LNAPLs, consideration should be given to the installation of a subset of deeper wells to allow the evaluation of the presence or absence of DNAPLs. The well placement (location and depth) and installation will be aided by the completion of the geophysical surveys recommended earlier.

Response: Existing monitoring wells and those planned for in the ESR will be completed and screened in the competent bedrock. These monitoring wells should be effective at detecting both hydrocarbons and chlorinated compounds. The EPA has determined that it is unlikely that DNAPLs and/or LNAPLs

are present in ground water for a number of reasons. MDNR has collected several rounds of ground water data on the Bliss property in the NPL area with no indication of significant DNAPL/LNAPL presence. All identified source area soils have been removed from the Bliss property preventing further degradation of ground water conditions. Finally, area domestic wells that are completed in the deeper water bearing zones are monitored periodically by MDHSS for the presence of compounds including DNAPLs. To date, DNAPL compounds have not been detected in these nearby domestic wells. If significant DNAPL concentrations are detected in future monitoring events, a set of deeper wells may be considered to more fully characterize this potential threat.

17. Given the scope of the recommended work associated with this potential study, the U.S. EPA and the MDNR should be contacted with the results of this current study to consider re-opening the project and re-instituting five year reviews until environmental impacts to the community have been fully assessed and shown to be at acceptable levels.

Response: The EPA and MDNR have been contacted and are participating in the performance of the current ESR. Five-year reviews are required at Superfund sites where hazardous substances remain in place above a level which allows for unrestricted use and unlimited exposure. Confirmation sampling performed by the EPA following removal of contaminated material during the 1996 remedial action performed at the Bliss and contiguous properties indicated that conditions were protective for unrestricted use. The EPA has further determined that more recent data generated at the Strecker Forest property do not indicate that conditions are not protective of human health and the environment. Five-year reviews are required under the Superfund law when the EPA makes a determination that hazardous substances are present at levels that are not considered protective of human health and the environment.

18. In Section 6.0, page 10, U.S. EPA has proposed performing additional characterization of conditions that could affect Strecker Forest and surrounding areas to increase confidence in the assessment of potential human health risks. MUNDELL appreciates this effort, but also believes the scope of activities outlined in the U.S. EPA work plan should summarize steps to delineate the presence and extent of chemical impacts in the bedrock aquifer across the entire ESS (specifically in areas north of the Bliss property and in the vicinity of the Rosalie property area). While the dye tracing activities offered in the U.S. EPA work plan may yield some useful information regarding the movement of water across the Site and presence of preferential pathways, MUNDELL believes that a more expansive well network installed at the Callahan, Bliss, and Rosalie sub-sites is required, as indicated in the MUNDELL "Surrounding Area" Recommendation No. 1 and No. 2. The MUNDELL *Phase II ESA Report* identified apparent incomplete historic delineation of bedrock aquifer conditions across the ESS, and this must be a fundamental objective of future investigations. There is reference in the EPA work plan to activities being completed by the Missouri Department of Natural Resources (MDNR) near the Bliss site. If delineation work is being completed, it would be useful for a specific synopsis of the combined regulatory effort be summarized either by U.S. EPA or by MDNR.

Response: As part of the investigation being conducted by MDNR, shallow ground water is being monitored on the Bliss property. Three monitoring wells are located at the northern-most extent of the northwest arm of the Bliss property. Initial data indicates there is limited migration of the contaminants off the Bliss property. Additionally, three soil gas monitoring wells have been installed in the common area of Turnberry Subdivision. These wells are immediately north of the Bliss property. To date, no soil gas samples have indicated contaminant levels that would adversely affect public health.

The deep ground water samples collected from private wells downgradient of the Rosalie property have never indicated the presence of contaminanation. At this point, there is no indication that additional wells are necessary downgradient of the Rosalie Site.

19. In Section 6.0, page 11, the draft work plan states that:

> **MRBCA LDTL criteria have been considered in the design of this investigation, but will not be used for the initial screening level assessment of results. Following the initial screening of results, a more in-depth human health risk assessment may be performed if conditions warrant.**

MUNDELL requests further clarification on what specific conditions/criteria would trigger completion of a HHRA.

Response: The screening level risk assessment proposed in the work plan is a type of human health risk assessment. The screening level risk assessment focuses on the most significant exposure pathways that would result in the highest potential health risks. While they tend to be more qualitative in scope and rely on the comparison of maximum detections to risk-based screening levels, they allow for a more expedited evaluation and communication of potential health risk. A more in-depth human health risk assessment may be performed if the screening level risk assessment and/or investigation identify exposure pathways that have the potential to pose unacceptable health risks and/or exposure pathways that cannot be evaluated in the screening level risk assessment.

20. MUNDELL believes that using only RSLs to complete the initial screening may not provide the most conservative evaluation, which would likely be in the best interests of the City of Wildwood. In some cases, U.S. EPA RSLs for compounds that have been or may be detected at the ESS at levels above MRBCA LDTLs may be present below the corresponding RSL, and therefore be considered as an acceptable level by U.S. EPA. What is acceptable to U.S. EPA may not meet the level of scrutiny required by the City of Wildwood or its citizenry. It is of utmost importance for conditions at the Site and the surrounding areas to pass the litmus test of public scrutiny. MUNDELL recommends the most conservative value of each compounds RSL or MRBCA value be used in screening data.

Response: When comparing soil levels to screening level criteria, it is important to consider the type of criteria that is appropriate for the comparison. Missouri Risk-Based Corrective Action Lowest Default

Target Levels for most compounds, including those to be investigated at Strecker Forest, are based on protection of ground water. These MRBCA criteria correspond to a soil concentration that will not contaminate ground water above drinking water standards (i.e., maximum contaminant levels). Since the shallow ground water in the area does not represent a potential potable water source, screening level criteria which are based on protection of ground water are not relevant or appropriate for evaluation of risks associated with direct contact with soil. Comparison of soil levels at the Strecker Forest property to soil screening criteria based on protection of ground water would not provide meaningful information for assessing potential health risks from exposure to soil.

Contaminant concentrations in ground water are of importance, however, due to potential risks associated with a vapor intrusion pathway. Vapor intrusion risks can occur when certain contaminants are transported through ground water and then volatilize into structure interiors. This potential vapor intrusion pathway was considered in the screening level assessment of existing data previously performed by the EPA. The assessment of data to be performed by the EPA based on results of the ESR will include comparison to both soil screening levels associated with direct contact risk, and ground water levels associated with potential vapor intrusion.

The EPA's assessment of site investigation data will be based upon an objective science-based analysis of both cancer and non-cancer human health risks. The EPA welcomes the level of scrutiny that the assessment of health risks will be afforded by the city of Wildwood, its residents and other interested parties. The EPA's assessment of sample results will be based on a comparison of site data to applicable risk-based criteria. It is not meaningful to compare soil and ground water levels measured during the investigation to inappropriate criteria that would be arbitrarily applied because the standards appear to be more conservative. The EPA's assessment of data will be consistent with applicable and relevant standards in accordance with Superfund requirements, and performed in consultation and coordination with other state and federal agencies.

21. In Section 6.0, page 12, the draft work plan indicates that qualified data will not be considered representative of conditions or directly influence the U.S. EPA study design. MUNDELL has not been in a position to formally respond to the various regulatory responses regarding this subject, but nonetheless maintains that the qualified data are not invalid or unrepresentative simply because a formal data validation study has not been prepared to date. MUNDELL feels compelled to at least provide some level of response to this issue, as it is vitally important in the understanding of conditions at the Site, and should not be used to unnecessarily dismiss qualified data.

A. MUNDELL accepts that some of the data in the MUNDELL report included qualifier flags. Specifically, however, the soil and ground water VOC, SVOC, and PCB data contain only a limited number of qualifiers, and the MUNDELL report attempted to identify associated suspect results as appropriate.

B. The majority of qualifiers present in the MUNDELL data set are associated with the dioxin and furan results. This appears to be associated with either the extremely low detection limits

used in the analyses, which was necessitated by the project requirements or in some cases by elevated analyte concentrations that exceeded the method calibration range.

C. To summarize, qualified data included:

A) "B" flag: The analyte is present in the associated method blank at a reportable level. For the associated analysis, there is no method specified reporting levels, other than the qualitative criterion that peaks must exhibit a signal-to-noise ratio of 2.5-to-1. Therefore, the presence of any amount of the analyte present in the blank will result in an B qualifier on all associated samples. In each case where a B flag was reported, it was reported at a level below the minimum level (essentially a J flag within a method blank). It should be noted that some labs do not report method blank contamination unless it is above the lower calibration limit. If the MUNDELL data set was reported in this fashion, there would be no B flags. The 16138 method also recognizes that there is a possibility of low level hits within the method blank. A method blank is considered acceptable if all hits are below the minimum level. The reported method blank detections are well within the method criteria. The presence of this flag does not limit reliability of the data.

B) "E" flag: The reported result is an estimate; the native amount of the analyte reported is above the Upper Calibration Level. The method did not require further action be taken, therefore, the result was reported as is with an "E" qualifier. The presence of this flag does not limit reliability of the data.

C) "J" flag: A situation where an analyte detected, but a concentration below the associated minimum quantitation limit of the method. The presence of this flag does not limit reliability of the data.

D) "Q" flag: Estimated maximum possible concentration. Qualifier is used when the result is generated from chromatigraphic data that does not meet all the qualitative criteria for a positive identification given in the method.

i. The reasons for the "Q-flagged" value being estimated are as follows:

1. **The ion abundance ratio is outside the +/- 15% theoretical ratio limits. This can be caused by a matrix interference which is co-eluting with either the primary or secondary mass.**

2. **If an isomer is the 2378 substituted, it is required to maximize within -1 to +3 seconds of its corresponding labeled retention time standard. The peaks can be influenced by matrix interferences.**

3. **The secondard and primary masses are required to maximize within 2 seconds of each other. If they do not a "Q" qualifier is used. If peak are at low concentrations the apex of the peak can vary due to matrix interferences.**

4. **If a peak is a furan there is the possibility of a polychlorinated diphenyl ether peak maximizing within 2 seconds. If this peak is present, the analyte will be qualified with a "Q".**

There are method designated cleanup procedures which can be used to eliminate the matrix interferences; however, they are not always 100% effective. The laboratory utilized for the sample analyses employs cleanup procedures used in the method to remove interferences. If any of the above criteria are not satisfied the results are not considered to be invalid or suspect but rather the estimated maximum possible concentration for the analyte with which the "Q" is associated.

D. Regardless of this explanation, there appears to be some disagreement in the literature on the subject as to whether or not the Q-flagged data should be discounted when calculating the associated TEQ value. Excluding a Q-flagged result from TEQ calculations may lead to a false negative or artificially low TEQ value; the Q data may simply be qualified as a conservative upper bound estimate. Dioxin-furan results for "total" congeners are not used in TEQ calculations, so the Q-flag discussion appears to be relevant only to the individual congener results in the MUNDELL data set.

E. MUNDELL recognizes the importance of viewing qualified data with a keen level of scrutiny, and respects regulatory concerns regarding the data. However, a review of the qualified data associated with the MUNDELL report indicates the data is arguably valid and reliable for the purpose of the *Phase II ESA Report* and the U.S. EPA work plan development, and will also likely be valid for use in a future risk assessment, once data validation activities are completed for that purpose.

Response: The EPA recognizes that in some cases qualified data may be useful for certain purposes. However, the EPA maintains that it is inappropriate to use the qualified data presented in the Mundell Phase II ESA for risk assessment or decision-making without a satisfactory data validation study to support the use of such data. The work plan may have overstated the limitation on the use of qualified data in the development of the current study design. In fact, the qualified data presented in the Mundell Phase II ESA were considered in the development of the work plan. Areas at the Strecker Forest property where qualified detections of analytes were reported will be further investigated for those compounds in the current ESR. Language in the final work plan will be modified to reflect the consideration of qualified data in the ESR study design.

The commenter acknowledges that the qualified data will likely be valid for use in a future risk assessment, once data validation activities are completed for that purpose. This comment is consistent with the EPA's contention that a data validation study must first be completed before using such data for risk assessment or decision-making purposes. It is not clear how or when a satisfactory data validation study will be performed for the qualified data presented in the Mundell Phase II ESA. The scope of the ESR does not include performance of a validation study for data reported in the Mundell Phase II ESA, nor does EPA have access to all data and laboratory information that would be required to perform such

a study. The EPA would certainly be interested in any further efforts made to assess the validity of qualified data presented in the Mundell Phase II ESA.

22. In Section 6.0, page 12, the draft work plan indicates that dioxin analysis is not being completed at the Callahan property. It is MUNDELLs opinion that dioxin/furan analysis shouldn't be excluded from analysis from the Callahan site. U.S. EPA indicated that dioxins were not detected at the Callahan site, but based on review of historic results, detection limits appear to have ranged between 20 to 80 parts per trillion for soil. Also, the only congener analyzed for was 2378 TCDD. It should also be noted that the RSL for 2378 TCDD is 4.5 ppt. The possibility exists that dioxin is present at levels above this RSL and below the former detection limits. In addition, TEQs were not calculated as part of the Callahan studies. As such, a full dioxin/furan suite should be analyzed for and TEQs calculated.

Response: Dioxin contamination is not expected to be of concern at the Callahan property because the EPA is aware of no information that would suggest that dioxin-containing wastes were disposed of either in the former drum burial area or on surface soils at this property. Dioxin contamination has been of concern at other nearby locations due to the possible spraying of dioxin-contaminated waste oil for dust control on unpaved roadways, parking lots and horse arenas by the Bliss Waste Oil Company in the early 1970s. Investigations into the activities of this company have never identified the Callahan property as a location that was potentially sprayed for dust control. As the commenter points out, soil samples were, in fact, collected and analyzed for dioxin in the early 1980s due to the association of the former property owner and the waste oil company. Dioxin (2,3,7,8-TCDD) was not detected in any of the samples collected from the Callahan property. Analysis was limited to 2,3,7,8-TCDD since this particular congener had been determined to dominate the toxicity which can be calculated in terms of dioxin Toxic Equivalents (TEQ).

Despite the limited basis for concern, the EPA acknowledges that a primary goal of the ESR is to address public concern, and has elected to include high resolution dioxin analysis within the scope of the ESR for surface soil samples collected from the Callahan property. The final work plan will be modified to reflect this additional analysis for these samples.

The EPA acknowledges that an RSL of 4.5 parts per trillion currently exists for dioxin (2,3,7,8-TCDD). For purposes of the current ESR and anticipated screening level health assessment, the EPA is generally utilizing values from the RSL table for compounds where more advanced criteria have not been established. In the case of dioxin, the EPA has established Interim Preliminary Remediation Goals of 1.0 parts per billion for residential soil which remain current and valid.[1] U.S EPA will consider this dioxin PRG for residential soil and the RSL value in the assessment of ESR results. The EPA anticipates that the high-resolution dioxin analysis performed for the ESR will provide detection limits that will enable calculation of dioxin TEQ levels in the low ppt range.

[1] In 2009, the EPA proposed to revise the Interim PRGs for dioxin. To date, further action has not been taken by the EPA toward finalizing the proposed values, and the Interim Preliminary Remediation Goals established in 1998 by EPA for dioxin in soil remain in effect.

23. In Section 6.1, pages 14 and 15, additional geophysical surveying is proposed. While MUNDELL believes all mapping can increase the accuracy of the conclusions, it was apparent from the first geophysical survey that MUNDELL completed as part of its Phase II Study that the technique used did an excellent job of picking up all observed surficial debris present at the Site and, in a few locations, observed anomalies that were not apparent at the ground surface. The detailed mapping already completed provides the information in a well-documented manner. MUNDELL believes that it would be much more prudent and rational to remove all remaining surficial debris and nonhazardous wastes as part of the current scope of work activities prior to conducting another geophysical survey. In this way, after the debris is removed, the survey completed could be used to assure that the removal of all unnatural fill materials was complete. In fact, since the effort for exploratory trenching is included in the scope of work (section 6.2 of the ESR), the removal of the materials could easily be completed rather than just documented (for about the third time), so that existing exposure and risk to nearby residents and children who trespass on the property can be minimized.

Based on its own geophysical survey and detailed field observations, MUNDELL does not believe that exploratory trenching without removal of the materials/wastes will provide that much more benefit in the understanding of the current materials. In fact, if the materials are removed, the effort to sample below the removed materials can then act as a confirmation whether additional removal is necessary in the future. All of this would result in several key objectives - the off-site removal and disposal of all observable wastes, the documentation of the remaining conditions with the wastes removed, and the expedition of site restoration while achieving short-term risk reduction for the adjacent residents. Please refer to MUNDELL's first two recommendations regarding prevention of contact with the existing waste materials and the removal of the wate [sic] from the site (see Comment 1 previously discussed).

Response: As the commenter points out, the scope of the ESR involves additional geophysical investigation and exploratory trenching in areas at the Strecker Forest property where previous geophysical investigations have reported responses potentially consistent with the presence of buried containers. Geophysical investigation is also planned for the former drum burial area at the Callahan property. As the commenter recommends, observed metallic objects that could cause interference with the methods will be removed from the surface and set aside prior to conducting the geophysical investigation. Off-site disposal of any nonhazardous metal debris that is set aside prior to the geophysical investigation, or may be present in other locations at the Strecker Forest property (i.e. the solid waste area) is not a response action authorized under the Superfund law, and is not within the scope of the current ESR. The Superfund law provides authority to the EPA to respond to hazardous substances. Removal of solid waste, including metal debris that may represent a physical hazard to trespassers, is typically the responsibility of the individual property owners.

24. One additional comment regarding recommended geophysical testing, MUNDELL believes that 2-D resistivity profiling needs to be added to the scope along the southern property line, and across the drainage feature at the site, in order to provide better documentation of the karst character of the bedrock. These profile lines will also aid in the understanding of ground water flow, and will provide needed supplemental information to understand and interpret the results of the proposed dye tracing study.

Response: The EPA does not believe that further characterization of the karst conditions known to exist would be justified or beneficial at this time without identification of waste source areas that would trigger concern for potential transport mechanisms. The existing scope of the proposed hydraulic and hydrogeological investigation is sufficient to adequately characterize ground water flow to achieve the goals of the ESR.

25. In Section 6.3, page 16 and 17, the draft work plan indicates the surface sampling program that will be followed. While MUNDELL believes that while the general technical approach is sound, it is concerned that testing of only the 0 to 2" surficial layer may, in some cases, result in a 'false negative', i.e., near-surface exposure to additional sediment/dust deposition and or weathering, may result in slightly lowered levels of dioxins/furans as compared to the concentrations at slightly deeper depths.

A. To allow for this, MUNDELL recommends that additional sampling be completed at a depth of 6" (0.5 ft) at the same time at all the locations planned, with the same number and compositing approach as described for the 0 to 2" sampling.

B. As part of the program, we would recommend that 1 out of 5 DUs complete the 0.5 ft depth testing along with the planned program. Depending on if we observe consistent results from the testing (i.e., sample concentrations are lower in the 0.5 ft depth sampling than the 0 to 2" sampling), we can then choose to test all remaining samples or not.

C. The additional testing would then 1) help determine the vertical extent of impacts should they occur over an established health-risk standard, or 2) provide additional confirmation that concentrations are the highest in the shallow depth samples.

Response: The incremental sampling approach involves the collection of 36 individual sample aliquots from each decision unit (9 aliquots from each of 4 sampling units per Decision Unit). To collect this large number of sample aliquots from each Decision Unit in a cost-effective manner, sampling techniques must be relatively simple and fast. Surface soil samples can be collected in such a manner, and provide data that are representative of exposure point concentrations. Subsurface sampling techniques, even at a depth of only 6 inches, are more resource intensive, and would be complicated by the presence of surface vegetation (brush and undergrowth) that would hinder the use of anything but simple sample collection equipment (e.g. a small trowel or spoon). Collection of subsurface incremental

composite samples would provide limited information useful for assessing human health risks and would significantly increase level of effort and costs.

The EPA recognizes the interest in comparing near-surface concentrations to surface concentrations, particularly in areas where soil disturbance is anticipated. To accommodate this interest, the scope of the ESR will be expanded to include analysis of the 0 to 2 feet below ground surface interval for all soil borings collected at the Strecker Forest property (SB-1 through SB-24, SB-29 and SB-30) and the Callahan property (SB-25 through SB-28). Samples collected from these discrete soil boring locations will be analyzed for all analytes proposed for surface soil samples. This will enable comparison of subsurface soil levels to near-surface concentrations and provide for comparison of discrete sample results to composite results from surface samples. The work plan will be modified to incorporate these additions to the planned scope of the investigation.

26. In Section 7.0, page 28, boring cuttings are proposed to be deposited on-site. MUNDELL questions if this is the most appropriate handling method for material potentially impacted by contaminants. Soil/MW cuttings should be drummed and held, pending the results of the analytical testing program. Once those results are shown to not exceed acceptable residential levels, the soils/cuttings may or may not be disposed of at the site.

Response: The EPA guidance for management of investigation-derived waste[2] provides several options for management of waste materials generated during CERCLA field investigation activities. IDW includes drilling muds, cuttings, purge water, soil and other materials from collection of samples. Management of IDW involves use of best professional judgment by the site manager in consideration of site-specific factors. Depending on the characteristics of soil IDW generated from well installation, borehole drilling and soil sampling, management options include returning IDW to the borehole immediately after generation, spreading around the boring or source, interim storage of generated material pending receipt of analytical results or sending off site immediately for disposal or treatment. Language in the work plan will be modified to reflect these management options and the use of best professional judgment by the EPA On-Scene Coordinator managing the field work. If significantly elevated organic vapor levels are detected or other indication arises that significant contaminant levels may be present in any of the IDW generated, the EPA OSC may elect to place the generated material in interim storage pending receipt of sampling results or immediately ship off-site for disposal. Storage and shipping supplies will be present during field activities to accommodate these options. Since significantly elevated levels of hazardous substances have not been observed or detected at the Strecker Forest property during past investigations, the EPA anticipates that generated waste material can be returned to the borehole or spread on surface soil consistent with applicable guidance.

27. In the Quality Assurance Project Plan, page 1, Tetra Tech is subcontracting another firm (Seagull Environmental) to carry out the work scope. While MUNDELL does not have any reason

[2] Management of Investigation-Derived Waste During Site Investigations, EPA/540/G-91/009, May, 1990.

to question the technical ability of Seagull to complete the work in accordance with approved plans, it is recommended that the City of Wildwood retain an independent consultant to oversee all on-site activities to provide additional review and quality assurance that the plan is carried out according to accepted practices and to ensure the City interests are being considered. Since part of this additional ESR work plan scope is a partial review and check on previous U.S. EPA work, care should be taken so that there is not undue political pressure on subcontractors that could alter the opinions expressed or the manner in which the results are evaluated.

Response: Seagull Environmental is a team subcontractor under the EPA's START contract. No type of inappropriate pressure, either political or otherwise, is exerted on START contractors or subcontractors in performance of their tasked work. Personnel employed under the START contract perform their contracted responsibilities in a professional manner.

28. The following issues are recommendations from the MUNDELL *Phase II ESA Report* (previously summarized) that do not appear to be addressed in the draft work plan. As one of the purposes of the Expanded Site Review is to characterize the potential for conditions to impact existing residences in nearby areas (to Strecker Forest), it is MUNDELL's opinion that U.S. EPA and/or MDNR, need to ultimately address these concerns. As part of long-range planning the regulatory agencies should provide a formal written response to the City of Wildwood or in a revised Expanded Site Review work plan on what steps will be taken to consider the following items:

Response: Each of these individual comments and suggestions has been addressed previously in this document. Previous responses are cited below. The city of Wildwood will be provided with a copy of this document and the final work plan for their planning purposes.

A. Proposed Strecker Forest Development Site

a. In its current condition, the NPL area represents a continuing chemical source and threat to human health and the environment. Ongoing impacts to the nearly ground water system downgradient from the area is expected to continue without additional chemical source removal and a plan for ground water control and treatment.

Response: See response to comment 1.

B. Surrounding Areas

a. Additional ground water impact delineation may be needed in areas further hydraulically downgradient of the ESS, along Caulks Creek.

Response: See responses to comments 9, 10, 11, and 18.

b. A thorough evaluation of all water wells in the vicinity of the Caulks Creek watershed hydraulically downgradient of the ESS should be completed.

Response: See response to comment 12.

c. It is recommended that these water wells be tested, if they are still in existence.

Response: See response to comment 12.

d. Additional chemical source removal of affected soil appears to be warranted at the Bliss and Callahan properties. Confirmatory soil testing should be completed at the disposal areas at the Rosalie site to determine if chemical soil impacts are present to such a degree to result in contaminant partitioning and/or leaching into ground water.

Response: See response to comment 14.

e. A focused remedial strategy should be developed after site characterization and ground water impact delineation activities are complete.

Response: See response to comment 15.

f. Based on the types of chemicals detected at the ESS, consideration should be given to the installation of a subset of deeper wells to allow the evaluation of the presence or absence of DNAPLs. The well placement (location and depth) and installation will be aided by the completion of the geophysical surveys recommended earlier.

Response: See response to comment 16.

g. The EPA should re-institute five-year reviews until environmental impacts to the community have been fully assessed and shown to be at acceptable levels.

Response: See response to comment 17.

29. Determining the nature and extent of contamination at the Strecker Forest site should serve as the basis for an extended site review. Past investigations have identified contamination exceeding screening levels, areas of concern and data gaps which deserve more sampling attention. As is, the work plan, still needs to present a comprehensive investigation of these areas and assess the extent of contamination in the northeast corner, the eastern disturbed area and the former pond area.

Response: The EPA believes that the scope of the ESR, in combination with previous data collection efforts, will provide sufficient data to support a valid and defensible assessment of human health risks for the Strecker Forest property. The ESR includes additional data collection in the northeast portion of the property (NPL area), the eastern disturbed area and the western pond area. Results of the ESR will be presented with results of past investigations in a comprehensive report characterizing conditions at the Strecker Forest property.

30. Composite sampling methods do not provide data that are specific enough to determine a detailed picture of contamination nature and extent.

Response: The goal of the ESR is to collect adequate and appropriate data that will support a valid assessment of current and future human health risks at the Strecker Forest property. Based on the relatively low concentrations of contaminants detected in previous investigations of Strecker Forest surface soils and other information pertaining to the site, potential human health risks would be associated with chronic exposure that occurs over many years. When assessing chronic human health risks resulting from exposure to surface soils and other environmental media the average concentration is generally regarded as the most representative and reasonable estimate of the concentration across an entire exposure unit that an individual would be expected to come in contact with over a prolonged period. For the assessment of human health risks at Strecker Forest, an incremental composite sampling approach is being employed to estimate exposure concentrations within each decision unit, which have been configured to approximate expected exposure units. These decision units range in size from 0.2 to 0.43 acres in the area planned for home sites which correspond to the individual property boundaries presented in the preliminary plat submitted for the development. Decision units configured for the planned preservation area of the Strecker Forest development are somewhat larger, ranging from 0.96 to 1.17 acres. Decision units for the NPL area of the Strecker Forest development are smaller, ranging from 0.18 to 0.26 acres. The incremental composite sampling approach outlined in the work plan for surface soils will provide a representative measurement of average concentrations across each decision unit for the purpose of assessing potential current and future human health risks. Incremental composite sampling is also less likely to miss potential "hot spots" relative to discrete sampling since a large number of aliquots (i.e., high density of samples) are collected from each decision unit. Consistent with the EPA policy and guidance for assessment of risks associated with chronic exposure to surface soils, composite sampling will be retained for characterization of potential contaminant levels in surface soils.

31. Any contaminants detected at elevated levels on the Bliss-Ellisville Site should be considered a contaminant of concern at the Strecker Forest site, given the extending of the Superfund Site in the north and eastern borders.

Response: The selection of analytes for the ESR is based upon compounds previously detected at the Bliss portion of the Ellisville site and during previous investigations performed at the Strecker Forest property. Selection of contaminants of concern would occur at a later phase of the remedial process if the screening level health assessment determines that conditions at the Strecker Forest property may not be protective of human health and require further evaluation in a human health risk assessment.

In accordance with the EPA procedures, the boundaries of the Ellisville Superfund site are established by the Area of Contamination (AOC) that is determined to exist through site characterization activities. Site characterization activities subsequent to the 1996 remedial action performed at the Bliss and contiguous properties, including recent investigations performed at the Strecker Forest property, have not identified contaminant concentrations exceeding a level of concern for protection of human health. The AOC for the Bliss portion of the Ellisville site has not expanded, and, therefore, the site boundaries have likewise not expanded on the basis of existing data.

32. Individual soil samples, not composites, should be collected in the northwest quadrant that has not been sampled at all. These samples should be collected in areas labeled DU 25, 26, 27 and 28 in order to complement the soil borings and ground water well installations.

Response: See response to comment 30. The sampling design has been prepared in consultation with state and federal toxicologists and risk assessors to ensure that appropriate data is collected to support assessment of human health risks.

33. The work plan does not present an approximate project schedule or sequence in which the sampling activities will take occur. The work plan would be improved by the addition of a timeline for conducting the work, even if such a timeline is approximate.

Response: The work plan states on page 13 that "…sampling activities for the current investigation will require approximately 2 weeks to complete." The EPA anticipates that field activities will be performed in September 2011. Surface and subsurface soil sampling, monitoring well installation and sampling can be performed independently of each other, and a sequence of events will be finalized once equipment and personnel are scheduled for this effort. Following scheduled field activities in September 2011, ongoing data collection efforts will involve periodic recording of static ground water levels and/or maintenance of automated recording equipment.

34. The Work Plan makes a number of assumptions concerning previous investigations and removals that are not all identified.

Response: The EPA will address these issues individually.

35. The basis for and justification for the exclusion of metals from the sampling/measurement plan is not sufficient. The sampling and measurement should be expanded to include the metals, at least the ones that have been identified in samples from the Bliss-Ellisville (and contiguous properties) Site. A wide range and scope of wastes and other materials were identified in the Superfund Site Investigation, especially in the listing of labels on the drums removed from Callahan. Chromium was measured at levels exceeding "natural background" levels in ground water and lead was measured at a concentration greatly exceeding naturally occurring lead levels in soil in Missouri. This information supports the inclusion of metals on the list of analytes in soil and in ground water samples.

Response: The list of analytes to be analyzed for in surface and subsurface samples will be expanded to include Resource Conservation and Recovery Act metals using EPA Method 6010B/7400. These metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. The work plan will be modified to reflect this addition.

36. The plan calls for a limited number of new ground water monitoring wells, and has no provision for additional sampling should this round of ground water investigations provide data to indicate further information is needed.

Response: Language will be added to the work plan to indicate that additional ground water monitoring will be conducted if results from the current investigation support the need for further data to characterize ground water quality at the Strecker Forest property.

37. It is not clear that three additional ground water wells will suffice to characterize ground water flow and is not likely to characterize ground water quality. Another ground water well between MW10 and SB 09, closer to SB 09 would provide a more complete characterization of the flow patterns and ground water quality, especially downslope of the western pond area.

Response: The additional monitoring wells to be installed and sampled on the Strecker Forest property during the ESR were proposed for the three specific locations previously recommended by Environmental Stewardship Concepts (the same party that provided this particular comment) in a January 10, 2011, presentation to the city of Wildwood City Council. This newest proposed location for an additional monitoring well recommended by ESC is central to an area bounded by MW-4, MW-8, MW-9 and MW-10. It is not clear that this additional monitoring well would provide data that would significantly improve characterization of flow patterns and ground water quality. The EPA will consider the proposed location as a backup location for a new monitoring well if difficulties are encountered in the installation of MW-8, MW-9 or MW-10.

38. The Work Plan provides a site history with information on dioxin (2,3,7,8 TCDD) that is not consistent with current information or information elsewhere in the Work Plan –the differences should be explained in the text or a footnote. Specifically, the top of page 5 refers to a screening level of 0.3 ppb, cleanup level of 1 ppb and the figures refer to an RSL of 4.5 ppt.

Response: The commenter refers to the following discussion in the draft work plan:

Dioxin was undetected in surface soils at a detection limit of 0.3 ppb in the area which defined the clean perimeter. Dioxin was detected above the action level of 1 ppb in three sampling areas to the north which were partially located on the Strecker Forest property (95 percent mean upper confidence levels of 2.248 ppb, 1.366 ppb, and 1.269 ppb). Soil remediation performed in these areas involved removal of soil in lifts until reaching a residual dioxin concentration of less than 1 ppb in the upper foot (2 feet in stream bed areas) or less than 10 ppb at depths greater than 1 foot (2 feet in stream bed areas).

An explanation will be added to the work plan that during the remedial action performed at the Bliss and contiguous properties portion of the Ellisville site, an action level of 1 ppb which triggered soil removal was applied. Once triggered, soil removal proceeded until reaching a cleanup level of less than 1 ppb in the upper foot (2 feet in stream bed areas) or less than 10 ppb at depths greater than 1 foot (2 feet in stream bed areas). The actual Minimum Reporting Level for dioxin (2,3,7,8-TCDD) analysis performed during the remedial action was 0.3 ppb.

39. The hydraulic conductivity and dye trace studies should provide important information on ground water movement in the area.

Response: The EPA concurs with this comment.

40. The proposed sampling plan for the Callahan property, including installation of new monitoring wells, should be sufficient to fill in significant data gaps that presently exist.

Response: The EPA concurs with this comment.

41. 6.0 Sampling Strategy and Methodology: The Expanded Site Review Work Plan states that metals analyses will not be included in the Expanded Site Review. For the following reasons, I believe that a metals analysis is needed for a sufficient site characterization:

A. The Brucker Engineering Ltd. *Phase II ESA* did not include ground water sampling. Ground water sampling efforts on the Bliss-Ellisville site, conducted in 2010, detected concentrations of barium, chromium, and lead above their respective MCLs in ground water on a portion of the Bliss Property which lies immediately across the property border to the Strecker Forest site.

B. The Brucker *Phase II ESA* sampling locations are not included in the pdf version that I received for review. It is unclear if a map is provided in any version of the report. Additionally, a map of the sampling locations, which is referenced in the Brucker *Phase II ESA Work Plan* text as the "site plat," is not in the report, which is included with the *Phase II ESA* as *Appendix B.* Because the nature and processes involved in past uses of the Bliss property, it is important to fully characterize site metals contamination. It is not possible to assess the robustness of the Brucker's *Phase II ESA* metals analysis without considering location of the past sampling efforts.

C. Background levels for metals need to be explained. On page 13, it is stated that, during the Phase II ESA conducted in 2004, lead concentrations were detected at concentrations consistent with background lead levels, based on past investigations of the study areas. The site lead background level is not explicitly stated; the methodology used to determine the lead background level at the site is unclear as well. This section implies that the lead concentration in background soil is well above "the mean concentration of lead in soils in Saint Louis County, Missouri, [which] is 40.95 mg/kg." Because the study area background is higher than the average St. Louis County concentration, an explanation of the background establishment methodology is needed to illustrate that the background is representative of the area and is not affected by past activities related to the Superfund Site.

Response: Refer to the response to comment 33. The list of analytes to be analyzed for in surface and subsurface samples will be expanded to include RCRA metals. Background metals concentrations discussed in the Work plan were obtained from the U.S. Geological Survey's Mineral On-Line Resources Spatial Data at http://tin.er.usgs.gov/geochem/county.php?place=f29189&el=As&rf=east-central. The commenter is directed to the USGS's website for further information regarding derivation of these reported background levels.

42. 6.3 Surface Soil Sampling Methodologies: The surface soil sampling plan is not appropriate to collect data that may be used in an in-depth human health risk assessment. The sampling plan, as outlined in the draft work plan, considers composited samples from thirty-eight Decision Units, with only a single sample representing up to an area of 1.17 acres. Composite sampling is not usually used to collect data for a human health risk assessment because composited samples do not provide "the full range of contaminant levels that a receptor may be exposed to;" compositing samples also "tends to 'dilute' the analytical results" (Byrnes 2009}. Sampling point results, rather than sampling area results, will produce more usable data to be used in a health risk assessment and better describe the specific nature and extent of contamination, supporting a clearer site characterization.

Response: See response to comment 30. The incremental composite sampling approach described in the ESR will provide data that is representative of exposure-point concentrations for assessing potential human health risks associated with exposure to surface soil. A very large number of discrete samples would be required to characterize surface soil concentrations to the same degree as an incremental composite sampling approach, and the results of the discrete sampling would then be mathematically averaged to assess potential human health risks. Characterization of surface soil concentrations for the purpose of assessing human health risks using a discrete-sample collection approach would be far more costly and is not technically justified compared to composite sampling.

43. Appendix A *Figures:* Figure 7

A. The proposed ground water installation locations, as shown in figure 7, do not adequately characterize the central region of the Strecker Forest site. An additional monitoring well should be installed in a centrally location to address this data gap.

Response: See response to comment 35. MW-4 from the previous Mundell Phase II ESA provides soil boring and ground water data for the central portion of the property.

B. Under this proposed work plan, the northern portion of the site, excluding the northeast corner, will not be adequately characterized. A fuller characterization is crucial here, considering parts of this portion lie within close proximity to a residential area.

Response: The previous Mundell Phase II ESA provides soil boring and ground water data for the extreme northwest corner of the property (MW-7). Otherwise, DU-27 will characterize surface soil in the northwest portion of the Strecker Forest property. An additional soil boring will be included within the scope of the investigation located between MW-7 and SB-19 in close proximity to existing residential properties. The Work plan will be modified to reflect this additional soil boring.

44. Appendix B *Tables:* Several of the values in Tables 4 and 6 are listed in red, but there is not key or text describing the use of the red font.

Response: The red print for several of the values highlighted in yellow on Tables 4 and 6 has no additional significance beyond the yellow highlighting which identifies soil concentrations exceeding

the corresponding RSL values. The red print will be replaced with black in the work plan, consistent with other highlighted values.

45. Appendix C Quality Assurance Project Plan Form: The amount of QC samples, listed in Table 1, is less than a typical testing frequency. The amount of QC samples should be increased to a more typical frequency QC sampling standard (at least 1 for every 20 samples → 5% of samples collected).

Response. The frequency of QA/QC sample collection will be increased to a minimum of one QA sample for every 20 matrix samples collected. The work plan will be modified to reflect this change.

46. The Expanded Site Review Work Plan does not detail how many Sampling Areas, SA, are located within each Decision Unit, DU. I have heard that there will be four SAs located within each DU.

Response: The work plan discusses subdividing each Decision Unit into multiple Sampling Units. Each Decision Unit will, in fact, be subdivided into four Sampling Units (SU). As discussed in the work plan:

> A nine aliquot sample will be collected from each SU, homogenized, and split to provide sample portions to be combined to form a top-tier sample for each DU, and other portions retained for subsequent analysis, if required."

This clarification will be added to the work plan.

47. Table 4 and Table 6 appear identical. Based upon the sequence, one would expect Table 6 to be data from Strecker Forest.

Response: Table 4 should present data from samples collected at the Strecker Forest property. Table 6 correctly presents data from the Callahan property. The corrected Table 4 will be inserted in the Final work plan.

48. Getting a low detection limit will be paramount for successful project. Detection limits in the range of 1 ppt to 10 ppt have been reported by labs. At a detection limit of 10 ppt, an entire Sampling Unit contaminated at Missouri's recommended level of dioxin cleanup objective of 37 ppt will show an analysis of below 10 ppt. At a detection limit of 1 ppt, an entire Sampling Unit contaminated at the Regional Screening Level of 4.5 ppt will show an analysis of 1.125 ppt, just over the detection limit.

Response: The dioxin analysis to be performed on soil samples collected from the Strecker Forest property will be in accordance with EPA Method 1613B, or equivalent. This method is capable of achieving detection limits in the low ppt range for dioxin Toxic Equivalents, depending on the sample matrix and potential interferences.

The state of Missouri has not established risk-based cleanup criteria for dioxin-contaminated soils. It appears that the commenter is attempting to compare hypothetical soil criteria for dioxin to maximum SU concentrations that could exist if other SU concentrations within the Decision Unit were set to zero. This exercise is correct mathematically, but does not accurately represent the proper approach for assessing human health risks. First, the 37 ppt soil criteria presented does not represent appropriate criteria for dioxin in soil at the Strecker Forest property. The concentration of 37 ppt is a value proposed by the state of Missouri in response to a 2010 EPA proposal to revise the Interim PRG for dioxin in soil. The state of Missouri has taken no further steps to finalize or adopt this value. The EPA has taken no further steps toward finalizing proposed revisions to the Interim PRG of 1 ppb for dioxin in residential soil.

Potential human health risks associated with chronic exposure to surface soils are assessed by considering the average surface soil concentrations across an entire exposure unit. Decision units at the Strecker Forest property have been configured to represent exposure units for the purpose of assessing human health risks. The concentration measured in the Decision Unit sample result represents the exposure point concentration of interest for assessing human health risks at Strecker Forest. The potential concentration within each SU is not of primary importance for assessing human health risks, since the SU concentrations do not reflect the average concentration across the entire exposure unit (Decision Unit). Sampling Unit samples are collected and retained for later analysis to provide additional information about the distribution of potential contaminants across the Decision Unit. The SU samples may be analyzed if the Decision Unit concentration exceeds a level of concern. This additional information on the distribution of potential contaminants would be useful to help focus response actions in the event that the overall Decision Unit sample exceeds a level of concern.

49. Give the desire for actionable results, it appears the following is necessary:

A. Ensure detection limits of less than 1 ppt,

Response: Detection levels for high resolution dioxin analysis are dependent upon matrix characteristics and potential interferences. Detection limits of less than 1 ppt (TEQ) can be requested, and laboratory calibration of instrumentation can be performed to potentially achieve that level, but the ability of the laboratory to actually achieve those levels will be dependent upon individual sample characteristics. Other compounds present in the soil samples that interfere with the analysis could raise the level of detection.

B. Increase the number of Decision Units, DU, particularly within the area slated for home construction and decrease the number of Sampling units within a DU.

Response: Decision units have been configured to correspond to exposure units for the purpose of assessing potential human health risks as described above in the response to comment 30. Increasing the number of Decision Units or decreasing the number of SUs will not affect the detection limits achieved by the laboratory performing the high resolution dioxin analysis.

50. Will the new well elevation be tied into Mundell Well elevations and the new that MDNR has installed at the north end of the Bliss ranch?

Response: As with the Mundell wells, all new monitoring wells will be surveyed in accordance with MDNR requirements. MDNR requires that:

> …a land surveyor registered in the State of Missouri must determine the location and elevation of all wells and piezometers. Borings, excavation pits and all transects performed as part of a geophysical exploration will be located to the nearest one-tenth (0.1) foot by a land surveyor registered in the State of Missouri. All elevation measurements, grid patterns, and coordinates must be established and used consistently throughout the investigation and referenced to North American Datum (NAD) 1983 and National Geodetic Vertical Datum (NGVD) 1929 or north American Vertical Datum (NAVD) 1988. Monitoring well and piezometer measuring-point elevations must be accurate to the nearest one-hundredth (0.01) foot.

51. How will ground water samples be collected from each monitor well, bailing or low flow?

Response: Ground water samples will be collected using low-flow procedures. The work plan will be modified to include this clarification.

52. Past geophysical surveys that use GPS locating have had issues with the tree cover.

Response: The EPA recognizes that tree cover and underbrush have hindered geophysical investigation in some portions of the Strecker Forest property in the past. The terrain conductivity meter and magnetometer that are proposed for use require a minimal amount of operating space. The three areas planned for geophysical survey, the western pond area, the eastern disturbed area and the former drum burial area on the Callahan property are all relatively accessible. The EPA recognizes that some amount of brush clearing may be required to perform the geophysical survey as proposed in these areas.

53. The Expanded Site Review Work Plan does indicate how many Sampling Units, SUs will be located in each decision unit.

Response: As described previously, four SUs will be configured within each Decision Unit.

54. It also does not list the detection limit anticipated for analysis of dioxin samples.

Response: The EPA may elect to acquire high resolution dioxin analytical services through the EPA's Contract Laboratory Program or may procure dioxin analysis through an alternative contracting mechanism. The following table provides the Contract Required Quantitation Limits (CRQLs) for the target dioxin/furan analyte list acquired through the CLP. This list represents the contract-required reporting limits. The Method Detection Levels (MDLs) are typically lower that the CRQLs for the individual dioxin/furan congeners, but the actual MDLs are dependent upon the instrument sensitivities for each particular laboratory. If the EPA elects to procure high-resolution dioxin analysis through an

alternative contacting mechanism, detection limits will be at least as sensitive as the CRQLs presented in the table below.

Chlorinated Dibenzo-p-dioxin/Chlorinate Dibenzofuran(CDD/CDF) Target Compound List (TCL) and Contract Required Quantitation Limits (CRQLs)

CDD/CDF	CAS No.	WATER (pg/L)	SOLIDS (ng/kg)
2,3,7,8-TCDD	1746-01-6	10	1.0
1,2,3,7,8-PeCDD	40321-76-4	50	5.0
1,2,3,6,7,8-HxCDD	57653-85-7	50	5.0
1,2,3,4,7,8-HxCDD	39227-28-6	50	5.0
1,2,3,7,8,9-HxCDD	19408-74-3	50	5.0
1,2,3,4,6,7,8-HpCDD	35822-46-9	50	5.0
OCDD	3268-87-9	100	10
2,3,7,8-TCDF	51207-31-9	10	1.0
1,2,3,7,8-PeCDF	57117-41-6	50	5.0
2,3,4,7,8-PeCDF	57117-31-4	50	5.0
1,2,3,6,7,8-HxCDF	57117-44-9	50	5.0
1,2,3,7,8,9-HxCDF	72918-21-9	50	5.0
1,2,3,4,7,8-HxCDF	70648-26-9	50	5.0
2,3,4,6,7,8-HxCDF	60851-34-5	50	5.0
1,2,3,4,6,7,8-HpCDF	67562-39-4	50	5.0
1,2,3,4,7,8,9-HpCDF	55673-89-7	50	5.0
OCDF	39001-02-0	100	10

55. Table 4 and Table 6 appear identical. There is not a table like Table 4 or 6 for the results of soil sampling from the Strecker Forest Investigations.

Response: The corrected version of Table 4 will be included in the Final ESR.

56. I have been advised there is to be four Sampling Units located in each of the Decision Units. From the work plan it appears there will be nine aliquots collected from each sampling unit. This generates thirty-six samples that will be homogenized and analyzed as a top tier sample

1 samples x 37 ppt + 35 samples x 0 ppt = 1.0278 ppt
2 samples x 37 ppt + 34 samples x 0 ppt = 2.0556 ppt
3 samples x 37 ppt + 33 samples x 0 ppt = 3.0833 ppt
4 samples x 37 ppt + 32 samples x 0 ppt = 4.1111 ppt
5 samples x 37 ppt + 31 samples x 0 ppt = 5.1389 ppt
6 samples x 37 ppt + 30 samples x 0 ppt = 6.1667 ppt
7 samples x 37 ppt + 29 samples x 0 ppt = 7.1944 ppt
8 samples x 37 ppt + 28 samples x 0 ppt = 8.2222 ppt
9 samples x 37 ppt + 27 samples x 0 ppt = 9.2500 ppt

A. If the detection limit is 10 ppt, then an entire SU can exceed Missouri's recommended cleanup objective for dioxin, 37 ppt and the analytical result would be less than the detection limit

Response: See response to Comment 48.

B. If the detection limit is 1 ppt, then an entire SU can exceed the Regional Screening Level of 4.5 ppt and the analytical result would be less than the detection limit.

Response: See response to comment 48.

C. I spoke with one of the labs that perform the dioxin analysis learned that detection limit may range from 1 ppt to 10 ppt.

Response: The EPA agrees that detection levels will vary depending on the sensitivity of the laboratory instrumentation and matrix effects. The presence of interfering compounds in the soil matrix can increase the detection levels that are achievable.

57. Looking at the foregoing example with a concentration of 4.5 ppt, the Regional Screening Level, RSL and considering a detection limit of 1 ppt, we find that an entire Sampling Unit, SU, can be contaminated at the RSL and the results would come back less than the detection limit.

Response: See response to Comment 48.

58. Some areas from which one of the aliquots are collected can approach 40 feet by 40 feet.

Response: The EPA agrees that for the largest exposure units in the preservation area of the Strecker Forest property, each aliquot represents an area of approximately 1,415 square feet which corresponds roughly to a 38-by-38 foot area. In the portion of the property which is planned for home sites, each aliquot represents a much smaller area, some as small as 16-by-16 feet. These Decision Units and their corresponding SUs have been configured in consultation with state and federal toxicologists and risk assessment staff for the expressed purpose of generating data to support assessment of human health risks at the Strecker Forest property. The configuration of Decision Units at the Strecker Forest property is appropriate for assessment of risks in consideration of site-specific exposure factors.

II. Comments Received from Residents and Other Private Parties

1. Pg. 2, para. 3 - Mundell claimed the ground water divide to be located north of MW-02 and not Strecker Rd.

Response: The Mundell report does not specifically identify Strecker Road or the area north of monitoring well MW-02 as the ground water divide. The Mundell Report states, "…in the southwest

corner near the Site southern perimeter, a ground water divide appears to be present". TheEPA will delete this sentence from the report to prevent any confusion.

2. Pg. 5, #3 -Besides analyzing for metals, pesticides, PCBs, SVOCs and VOCs-Brucker also tested for cyanide, mercury, 10 surface soil samples for 2,3,7,8-TCDD and one subsurface sample at A-4 where the result was 0.63 ppb. Would that exceed the proposed standard?

Response: In December 2009, the EPA proposed to lower the PRG for dioxin in residential soil to 72 ppt, which is less than the concentration of dioxin in the Brucker soil sample. In response to the proposed PRG, the state of Missouri's proposed a level of 37 ppt for 2,3,7,8-TCDD in soil which is also less than the Brucker value. However, neither the EPA nor the state of Missouri has taken further action to finalize the proposed standards. These proposed levels do not represent valid criterion for dioxin in soil. The EPA has established an Interim PRG for dioxin in residential soil of 1 ppb. EPA has also established a site-specific cleanup standard of 1.0 ppb in surface soils for the Bliss and Contiguous Properties portion of the Ellisville Site.

3. The statement: "No unusual observations or PID detections were reported'' is incorrect. A-4 was described as gray to black soil, heavy odor and PID exceeded 250 ppm on cold soil in the highlift bucket. GP-H at 3' to 6' deep had soil discoloration, odor and 300 ppm. GP-H at 9' to 12' deep had soil discoloration, strong odor and 950 ppm. A-4 was located on the property line and their Work Plan, Phase II Report and maps concur; therefore, you need to correct Figures 3, 4 & 7. The significance of this information is that A-4 lies within the 10' utility easement and will be excavated for the sewer line.

Response: The statement in the work plan will be corrected to indicate that locations A-4 and GP-H had PID detections, odors, and staining. The maps will not be changed, since the precise locations of the previous samples cannot be discerned with confidence. Previous sampling locations were not surveyed or located using a global positioning system which would have allowed for a more precise location. However, all previous maps were used to determine the most precise position for all prior sampling locations.

4. Pg. 5, #5- After all of Mundell's dioxin testing and detections- and there is no mention of it?

Response: The EPA did identify in the work plan that dioxin exceeded soil RSL levels at boring location B-10 and monitoring well MW-06.

5. B-10 and MW-06 are noted on Table 1 for Soil but MW-06 didn't deserve to be listed on Table 2 for Water?

Response: Monitoring well MW-06 results are listed on Table 2.

6. Referencing the EPA's Draft for PRGs (Dec. 30, 2009) are the following two comments: First, on page 5, the NCP expresses concern regarding the selection of standards to be sufficiently

protective when in the presence "of multiple contaminants at a site or multiple pathways of exposure." How are you addressing this concern?

Response: The EPA will take into account all contaminants and exposure pathways when assessing potential human health risks on the basis of data generated during the ESR.

7. Second, on page 13, regarding OSWER's policy to not set cleanup levels below background levels, it states: " ... soil background levels would need to be identified at CERCLA sites in order to develop appropriate cleanup levels."

How is that accomplished when we don't know exactly where drums may· have been buried; or contents of drums/tankers poured out; or migration from elsewhere?

Response: The draft policy cited by the commenter relates to development of cleanup levels in cases where the EPA has made a determination that response action is required to protect human health. The purpose of the current investigation is not to develop cleanup goals, but to generate additional data that will be used to assess potential human health risks. Additionally, the EPA has no documentation that would suggest that dioxin was contained in drums that were buried or contents that were poured on the Strecker Forest property.

A. Would it be helpful to sample an undisturbed nearby property?

Response: See response to previous comment.

8. The fact that Mundell detected dioxins in every soil and water sample is not a reason for arbitrarily designating any of them to be background levels. They were detected at various depths and often accompanied by the presence of other manmade toxins. This tract is non-urban/residential- not rural/farm or urban/industrial.

Response: The EPA determined that most of the dioxin results were of limited use because they represented qualified data that were not supported by a data validation study, not because the data were considered representative of background concentrations. It is inappropriate to use the qualified data presented in the Mundell Phase II ESA for risk assessment or decision-making without a satisfactory data validation study to support the use of such data. The qualified data presented in the Mundell Phase II ESA were considered in the development of the work plan. Areas at the Strecker Forest property where qualified detections of dioxins were reported will be further investigated for those compounds in the current ESR.

9. Nor should any of the congeners be dismissed on the basis that only 2,3,7,8-TCDD was historically associated with the Bliss Site. Historically speaking, that was the only form of dioxin testing – even during the 1996 Superfund cleanup. The Bliss property was sprayed with the contaminated oil -but that's only half of the equation. Although some dioxins may occur from natural events, many are a byproduct from industrial processes and since Bliss and Callahan hauled thousands of drums and an unknown number of tanker truckloads from a long list of industries – various congeners were likely to be present.

Response: The work plan includes analysis for the dioxin congeners used to calculate dioxin Toxic Equivalents (TEQ).

10. Also, I'd like to see the testing for dioxin/furan congeners expanded to include 2,4-D and 2,4,5-T. These are the main ingredients of Agent Orange produced by Hoffman-Taft (in Verona) and Monsanto; and Bliss hauled large quantities of waste from both places in drums and tanker trucks.

Response: Previous sampling events at the Strecker Forest and Callahan properties did not detect the presence of pesticides/herbicides (including 2,4,5-T and 2,4-D) at concentrations exceeding the screening levels for residential soil above RSLs or MRBCA. Therefore, the presence of pesticides will not be further investigated during the ESR.

11. Pg. 6 - I think this Previous Investigations section should include pertinent data from the 2008 DNR geoprobe sampling.

Response: The 2008 geoprobe sampling performed by MDNR was directed at characterizing conditions at the Bliss property, although precise sample locations relative to property boundaries were not determined during this investigation. The EPA recognizes that some of this data may be pertinent to the assessment of risks at the Strecker Forest property. All pertinent data from previous investigations conducted at the Strecker Forest property will be considered in assessment of potential human health risks.

12. Although property lines were not illustrated on their aerial map, it appears that 9 borings were conducted on or adjoining the Primm property (numbers 17, 19, 20, 26, 28, 29, 36, 38, and 64 was defined as Primm drainage).

Response: Boring locations 26, 28, 36 and 38 appear to be located on the Strecker Forest property, although a precise determination of the location of these borings relative to property boundaries was not included with the investigative results. The results from the cited soil borings will be considered in the screening level assessment of human health risks at the Strecker Forest property.

13. Geoprobe #19 was also used as a temporary well and #20 was used for dioxin analysis.

Response: Boring locations 19 and 20 appear to be located on the Bliss property.

14. Pg. 10, #6.0- It is stated: "The purpose of this ESR is to build upon previous studies to establish a comprehensive data set that will support a valid assessment of human health risks ... " In the HHRA, Dr. deFur mentioned data gaps in some areas. The MDHSS agreed and stressed the necessity for a SAP and FSP to determine the usability of data necessary to achieve the DQO. In other words, have those Plans been prepared and will your data, combined with Brucker's and

Mundell's, be of sufficient quantity and quality to establish the desired 95% UCL in each area of investigation?

Response: Establishing a 95 percent mean upper confidence level in each area of investigation is not required for assessment of potential human health risks, and is not an objective of the ESR. The objective of the ESR is to collect enough data of sufficient quantity and quality to support a valid assessment of human health risks.

15. Pg. 13- Historic data may warrant the analysis for metals in the following areas: pond, A-4 (eastern side) and GP-H (NPL). As noted on your Table 1, cadmium exceeded standards at A-4. Although minimally, arsenic exceeded at the pond and lead exceeded at GP-H. Of Brucker's 19 samples: arsenic, barium, chromium and lead were all elevated at the pond, A-4 and GP-H (the last 2 are known dump areas). The other 12 samples clearly establish the actual background levels for those metals.

Response: The scope of the ESR will be expanded to include analysis for metals in surface and subsurface samples using EPA Method 6010B/7400. This analysis includes arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. The work plan will be modified to reflect this addition.

16. Pg. 14, #6.1 -The areas defined for terrain conductivity and magnetometer surveys seem to replicate Mundell's investigation. I'd rather see them performed in previously unexplored areas. Brucker and Mundell intended to metal detect the drainageway (both SCI and URS recommended it) but neither did so.

Why not remove the surface metal and investigate it this time?

Response: Prior geophysical investigation in this area did not detect the presence of subsurface metallic objects. During a site reconnaissance, The EPA walked the drainage way and determined that getting heavy equipment into the steep ravine would be difficult and beyond the scope of the ESR. The EPA is not authorized to manage discarded solid waste and the scope of the ESR does not include removal of debris in the ravine. The EPA does intend to move surficial metallic objects aside prior to conducting the geophysical investigation in the areas designated for that survey.

A. The URS aerials show the swath of trees along the drainageway and south of the old haul road (running southwest to northeast). The aerial years 1960 to 1970 there appears to be a path or roadway along the south side of the trees and from 1969 to 1971 there appears to be unidentified material within the trees. Couldn't this area be detected without interference from the solid waste disposal area?

Response: The EPA has reviewed the aerial photos and cannot discern any unidentified material in the trees as described by the commenter.

17. Pg. 15, #6.2 - When soil is trenched, toxic vapors cannot be recaptured. In the past, along with a PID, an OVA monitor was used.

A. Why not now?

Response: A PID will provide organic vapor detection and sensitivity equivalent to OVA meters referenced in historic investigation reports.

B. Will water be applied to control fugitive dust?

Response: Water will be sprayed to control fugitive dust during earth-disturbing activities, as required.

18. Pg. 16, #6.3 - Taking a DU and dividing it into 4 SUs and then taking 9 aliquots from each SU would mean that 36 samples would eventually be composited down to 1 sample. The dilution factor would be so high that unless a lab can analyze dioxin at 1 part per zillion, how could the congeners be detected? Since the agencies discredited much of Mundell's data as ubiquitous due to blowing in on the wind from industries, forest fires, etc. - how could you now validate the data from this incremental surface sampling? Also, wouldn't all that homogenizing severely degrade the semivolatiles?

Response: For assessment of chronic human health risks associated with exposure to relatively low concentrations of contaminants in surface soils over a period of years, the average concentration across an exposure unit is the most representative measure of the overall exposure level. For the assessment of human health risks at Strecker Forest, Decision Units have been configured to correspond to appropriate exposure units in consultation with state and federal toxicologists and risk assessors. The incremental composite sampling approach provides a measurement of average exposure concentrations within each Decision Unit for the purpose of assessing potential human health risks. Incremental composite sampling is also less likely to miss potential "hot spots" relative to discrete sampling since a large number of aliquots (i.e., high density of samples) are collected from each Decision Unit. Incremental composite sampling to be applied in the ESR is appropriate for characterization of potential exposure levels in surface soils at the Strecker Forest property.

The EPA considered excluding SVOC analysis for the incremental composite samples but elected to retain these analytes to provide supplementary data for assessment of human health risks and comparison to the discrete soil data. Two discrete samples will be collected at each borehole located on Strecker Forest property and analyzed for SVOCs. A discrete sample will be collected at the 0 to 2 foot interval and at the interval with the highest PID detect, visible staining or the deepest interval along the boring.

19. Pg. 18 -I didn't find the Lake Retention mentioned in the text or shown on Figures. It will require both cut and fill grading; it's a large area of disturbed soil; and it will be an attraction feature to the public. It will involve Brucker's GP-A, B, E and F; Brucker's TP-6, 7 and 8; and Mundell's B~I4, 15, 16, 17, 18, 26. 27, 28, 32 and 34. Will you address it in the text and add it to the Figures?

Response: The EPA will identify the area designated as "Lake Retention" on the preliminary plat submitted by the developer in the work plan figures for the Strecker Forest property.

20. Pg. 19 - Mundell did not do any surface or subsurface sampling near the Primm residence. They did 2 subsurface samples near the Dozier (B-24 at PAGE 04 1 '-2' deep detected 6 congeners and 10.26 TEQ: B~25 at 0.5'-1.5' deep detected 11 congeners and 1. 74 JEQ). The presence of VOCs and SVOCs is questionable. The presence of all these congeners make me think that Bliss sprayed the driveway either before 1971 or after 1974. Over the decades, the configuration of the driveway changed but it has always ended up at the garage doors - and yet no one has tested there. I urge you to add a test sample in front of the doors or move SB-03 from the backyard. Bliss would back into a driveway and spray on the way out. The test location should be several feet from the door or the truck would have sprayed the facade with oil.

Response: During the course of the eastern Missouri dioxin investigations conducted since the 1980s which included numerous interviews with former Bliss employees, the private driveways were never identified as areas that were potentially sprayed with contaminated waste oil for dust control. However, the driveway to the Primm residence is located in DU17 which will be sampled and analyzed for dioxin. High-resolution dioxin analysis would detect the presence of dioxin exceeding health-based levels in the incremental composite surface soil sample.

21. Mundell's MW-02 is on the Schoessel property and the contaminants detected there (in both soil and water samples) could be related to the Schoessel driveway (or the Callahan Site). Their data for the Dozier driveway borings and garage dust wipe reported 11 congener varieties and possibly VOCs and SVOCs. MW-02 had 9 of those 11 congeners and the same possible VOCs and SVOCs. Both driveways need to be fully investigated (skip the Primm because it didn't exist until 1980). At the very least, locate SB-0 1 to the Schoessel driveway (if needed, reference URS aerials for location of the circle drive and the east side was prevalent).

Response: The work plan includes collection of incremental composite surface soil samples in areas that include both the Schoessel and Dozier properties. The surface soil samples will be analyzed for SVOCs, PCBs, dioxins, and RCRA metals. High-resolution dioxin analysis would detect the presence of dioxin exceeding health-based levels in the incremental composite surface soil sample.

22. Pg 21- Mundell's test plan was heavily weighted in the NPL and eastern area - and this plan appears to be also. The level areas along Strecker were easily accessible for dumping tanker loads. The old haul road could have connected to the dirt road illustrated on the following map. Yet there has not been and will not be any subsurface soil sampling in this zone between the drainageway and the pond. We already know the NPL and eastern side are contaminated. The agencies have previously taken the position that since homes will not be built in those areas - their condition should not preclude construction. The main contaminants are VOCs and dioxins -both of which are subsurface- and 41 DUs won't detect them. Could some of the subsurface samples in the northeast be moved to the aforementioned areas?

Response: The scope of the ESR will be expanded to include an additional soil boring located between the pond and the drainage way. Discrete samples will be collected and analyzed for all designated analytes in both surface and subsurface depth intervals from this soil boring. The work plan will include this addition.

23. Pg. 22, #6.5- On other dioxin sites, higher levels were obtained in the rafters than on the floor because arenas were mucked out.

A. Since the homeowners vacuumed the floors in the Primm and Dozier residences, should securing dust from the tops of windows and doorframes be included?

Response: It is not appropriate or necessary to include dust from the tops of windows and door frames in interior dust samples. The primary purpose for collecting dust samples is for characterization of debris resulting from demolition of the structures for disposal purposes. Dust samples will be collected using a protocol that is representative of most surfaces within the former residences. Structure interiors are not being characterized for the purpose of assessing risks associated with residential occupancy.

B. The Dozier garage/shed was dust wiped by Mundell and detected 10 congeners and 8.5 TEQ. Shouldn't this structure be vacuumed, too?

Response: No additional sampling of the former Dozier garage is necessary. Previous data collected from the interior of the former Dozier garage is adequate to characterize debris resulting from building demolition for disposal purposes.

C. On page 3 of the EPA's Draft for PRGs (Dec. 30, 2009) was stated, "Inhalation exposure is not included for the draft ... PRGs, because at present, there is no available inhalation unit risk value for dioxin that has been derived in accordance with current guidance for inhalation risk assessment (EPA 2009d)" Fine particulate dust bypasses the human body's natural defenses. What standards will be applied?

Response: The default non-site-specific residential soil RSL accounts for the ingestion, inhalation of particulates and dermal contact exposure pathways. However, the RSL for 2,3,7,8-TCDD is driven by the ingestion and dermal contact routes of exposure. The inhalation of 2,3,7,8-TCDD via particulates does not significantly affect the RSL or overall health risk estimates. Also, the dioxin results will be compared against the site-specific cleanup goal of 1 ppb. The EPA established 1 ppb as the site-specific level of concern for dioxin in surface soils during formal remedy selection for the Ellisville site in 1986 and 1991. In 1998 the EPA established an Interim PRG for dioxin in residential soil of 1.0 ppb which remains current and valid. The EPA will consider the current dioxin PRG of 1 ppb for residential soil in the assessment of ESR results, although it is anticipated that the high resolution dioxin analysis performed for the ESR will provide detection limits that will enable calculation of dioxin TEQ levels in the low ppt range.

24. Page 4, A site removal evaluation (SRE) was conducted by MDNR on January 31, 2005, to determine if any residual soil contamination remained at the site at concentrations that would warrant further response. A Removal Site Evaluation Report was prepared for EPA dated August 5, 2005, which incorporated the findings of the MDNR SRE. This report should be included in the Expended Site Review as an Appendix.

Response: The referenced reports describe past investigation of the former drum burial area and staging areas at the Callahan property. These reports will be added to the referenced documents in the Final

ESR. Copies of the referenced documents are contained in the administrative record for the Ellisville Site and are available upon request.

25. Page 15, Unauthorized access to the site during the investigation will be restricted by the Site Safety Coordinator, and air monitoring will be utilized throughout the assessment to detect any emissions that may threaten workers or neighboring properties. I am concerned about several issues in regard to this process;

A. How will unauthorized access to the property be accomplished during the periods when the EPA and / or workers are not on site. Neighbor children could and probably will go on the property. I believe the area should be fenced and signs be posted so unauthorized access will not happen.

Response: As explained in previous comments, soil concentrations reported to date in previous investigations do not represent an unacceptable risk to human health. The reported data do not indicate that access restrictions are required to prevent access to hazardous substances at the Strecker Forest or Callahan properties. Heavy equipment will be present in the study area during field activities including drill rigs, mini-excavators, loaders, trailers and other equipment that could be expected at a typical construction site. All such equipment will be properly secured before workers leave the jobsite on a daily basis. Open excavations or other dangerous conditions will be safeguarded at the end of each work day. The equipment could represent a physical hazard to trespassers, and the EPA will work with the site owner to ensure that proper signage is posted to discourage trespassing. Local authorities will be alerted that equipment will be left at the worksite overnight.

B. Families in Strecker Farms should be given additional protection from dust particles.

Response: Dust suppression will be applied, as needed, to control generation of dust during trenching and other earth-disturbing activities.

C. Some additional safety measures should be taken for Strecker Farms residents to insure no harm or exposure will result from testing the Site.

Response: All field activities will be performed in accordance with an EPA-approved Health and Safety Plan which will be developed to ensure protection of site workers and nearby residents during field activities. The Health and Safety Plan will provide detailed measures that will be taken to protect Strecker Farms residents during the investigation.

D. All residents should be notified in writing when any testing will take place.

Response: A fact sheet will be distributed to all parties on the site contact list prior to beginning field work. The fact sheet will discuss the nature and timing of the various field activities that will be performed during the ESR.

26. Page 24, Seasonal static water level measurements will be taken at the monitoring wells to define variation in ground water gradients over an annual cycle. Needed is a timetable as to when these measurements will be taken and for how long this will go on.

Response: Static ground water elevations are currently being measured monthly by MDNR at all monitoring wells on both the Bliss and the Strecker Forest properties. These measurements will be taken at least monthly for one year. Some monitoring wells will be equipped with automated water-level-measuring devices to maintain a continuous record. As additional monitoring wells are installed, they will be incorporated into the measurement system. The EPA anticipates that adequate data will be generated after several months of measurements to characterize ground water flow with a high degree of confidence. Measurements will continue for the entire year to observe any seasonal fluctuations that may occur.

27. Page 30, I noticed that the Final HHRA Report was not included in the references. Even though there was no test data in this report, I believe because of its significance it should be included.

Response: The March 14, 2011, Human Health Risk Assessment for the Proposed Strecker Forest Development Site prepared by Environmental Stewardship Concepts, LLC and Henshel EnviroComm for the city of Wildwood will be added to the list of references in the ESR.

28. Figure 7, In regard to the Western Pond Area, two homes are proposed to be constructed on lots 11 and 12 of the proposed Strecker Forest Subdivision. The Western Pond Area was referred to as a possible sink hole. There should a concern about constructing homes in close proximity to this possible sink hole. Sufficient tests should be conducted to determine if there is a sink hole. The Western Pond Area has a jaded past when water was drained and the area filled with dirt without a permit from the City of Wildwood.

Response: The role of the EPA and other state and federal agencies is to determine if hazardous substances represent an unacceptable level of risk to human health and the environment for the anticipated future residential use. It is the responsibility of the developer to perform a geotechnical engineering assessment or other work that will be required to ensure that the property is safe for development.

29. Figure 7, Additional testing with both wells and soil boring should be conducted all along the property line of Strecker Farms and Strecker Forest to ensure there has been no migration of contamination to the Strecker Farms property. Of concern is the area in the Northwest corner where several homes border an area that has not been tested and those homes in close proximity to the infamous Western Pond Area.

Response: The ESR includes new monitoring wells and soil borings along the boundary between the Strecker Forest property and Strecker Farms. In response to public comments, an additional soil boring has been added to the scope of the ESR to be located north of soil boring SB-19 near the northwest corner of the Strecker Forest property, adjacent to Strecker Farms. This additional soil boring will provide a series of 7 new soil borings and two new monitoring wells along the boundary with Strecker

Farms. Three new soil borings and a new monitoring well are located near the western pond area. This new monitoring well is located between the western pond area and Strecker Farms and is intended to intercept any ground water flow migrating west toward Strecker Farms.

30. Figure 6. Additional testing needs to done on the Callahan property all the way to the Southern property line even if it means cutting a path to the Southern end with a bulldozer. Anything less would only be half of the contamination test levels.

Response: The scope of the ESR includes a soil boring and monitoring well located as far south of the former drum burial area as possible, given the thick woods and underbrush that exist in that area. If this soil boring indicates that significant migration of contamination is occurring to the south from the former drum burial area, the need for additional soil borings and/or monitoring wells located closer to the southern boundary of the property will be assessed. At this time, clearing of land to enable access to the southern portion of the property is not warranted without data that shows potential migration of contamination toward this area.

31. To get a proper assessment of the land discussed and the factors affecting it, it is of the utmost importance that the test samples be taken from the right places, at the proper depth and tested for pertinent contaminants.

Response: The EPA concurs with this comment. The scope of the sampling to be conducted for the ESR has been designed in consultation with state and federal toxicologists and risk assessors to ensure that the data generated will support assessment of human health risks.

32. I am also particularly concerned that the EPA is proposing using composite samples instead of letting each sample stand alone. Composite samples are merely an average of all samples taken. In a situation where it is so very important for the protection of lives to determine the level and location of contamination, any blending of samples only serves to water down the results, giving a false report of the actual dangers present.

Response: See response to comment 30 in Section 1. Human health risks associated with exposure to surface soils are assessed by considering average concentrations across an exposure unit. Decision Units have been configured at the Strecker Forest site in consultation with state and federal toxicologists and risk assessors to provide data that can be used to assess potential human health risks associated with exposure to surface soils.

33. I also take issue with the reported lack of need for testing for heavy metals. This, despite tests which show samples from the site which are over 34 times (3400%) the RSL for residential soil (at 13.6 vs. 0.39). The draft explains this away because it has been deemed that the mean concentration for St. Louis County is 10.561.

Response: The scope of the ESR has been expanded to include analysis of RCRA metals in all soil samples collected. These metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. The work plan will be modified to reflect this addition.

A. First, I would like to question exactly how this very elevated mean was established. Was it by averaging the many tests of contaminated industrial and military sites which the EPA has conducted?

B. Or by having those site results comingled with more ordinary samples? Just because it is the "mean" average is not to say it is representative of the average residential soil of St. Louis County.

C. Where are the other statistics?

D. What is the range?

E. What is the median?

Response: Background metals concentrations discussed in the work plan were obtained from the USGS's Mineral On-Line Resources Spatial Data at http://tin.er.usgs.gov/geochem/county.php?place=f29189&el=As&rf=east-central. Further discussion of the methods used to collect samples and the complete data sets are available on the USGS's website at http://tin.er.usgs.gov/geochem/doc/averages/countydata.htm.

F. Has testing been done in supposedly non contaminated areas in Wildwood for comparison? This site is near the edge of St. Louis County where there has been no industrial or military use. In fact, much of the area was wooded before development less than twenty years ago.

Response: Samples collected for the purpose of characterizing naturally occurring or anthropogenic background concentrations in soil is not within the scope of the ESR. Data from the ESR is designed to support a risk-based assessment of potential human health risks. Comparison to other nonimpacted areas is not required for this assessment.

G. I also take issue with the characterization of two of the samples (12.1 and 13.6) as "marginally exceeding the mean" of St. Louis County. Increases of over 15% and 25% over a mean is hardly marginal; it is significant. Heavy metal testing should be done.

Response: Arsenic concentrations for St. Louis County reported by USGS range from 4.091 to 17.435, averaging 10.561 with a standard deviation of 3.307. The reported arsenic concentrations for testing performed at the Strecker Forest property represent typical background concentrations for the county. Nevertheless, the scope of the ESR has been expanded to include analysis for metals.

34. Claymont has no objection to USEPA performing the work on its property and it will provide access, if requested, however, the work already performed is more than adequate to characterize

the property. Numerous investigations have been performed at the site, many developed with extensive public input, and none of these investigations have indicated hazardous substance releases at the Strecker Forest development property. If USEPA desires to perform additional investigation, Claymont will not inhibit the work, but it is unnecessary.

Response: The EPA appreciates the cooperation of the Strecker Forest property owner in granting access for the ESR to proceed.

35. Claymont further objects to the use of the area names "Old Haul Road" and "Solid Waste Disposal Area". Somehow through various investigation reports, an area of the property has been given the name "Old Haul Road." There is absolutely no evidence of a "haul road." There is what could be considered a faint trail on a 1960s aerial photograph in the central portion of the property. There is no testimonial, anecdotal, pictorial or other evidence that anything was hauled over this trail, if it even was a trail. If hauling was even possible over this rough trail, which is doubtful, it would make no sense when much more developed roads on the Bliss property were available for hauling. We understand the ease of a shorthand name, but please do not perpetuate a misleading and prejudicial name.

Response: The EPA has maintained the nomenclature for these areas described in previous investigations, either correctly or incorrectly, to facilitate identification of previously identified areas. The final work plan will be modified throughout to refer to the "Alleged Former Haul Road," but reference to the "Solid Waste Disposal Area" will be retained due to the presence of solid waste, including scrap metal and composition roofing materials, in the drainage way located in the central portion of the property. The EPA is using this nomenclature only for identification of specific areas, and intends no prejudicial connotation.

36. Similarly, the term "Solid Waste Disposal Area" is misleading. We acknowledge that over the years some junk accumulated in the ravine behind the houses on the property. It is not unusual for this to occur in many rural and semi-rural areas. Investigation reports have characterized the materials as primarily household waste and the area as small. Calling the area a "Solid Waste Disposal Area" gives the area a damaging name, when the potential for risk from the materials is low.

Response: See response to previous comment.

37. Finally, we want to point out how many previous investigations have already been done at the property, with extensive public input and participation. With all the investigations that have been done at the property, very, very little has been found. There is no evidence of impact from the Bliss Site, except perhaps at the extreme northeast corner of the property, which is far from any development, physically difficult to access and we have agreed to fence off. In good faith, Claymont did an extensive investigation of the property, after months of developing its investigation work plan with the City. Investigations done since then have not materially changed the characterization of the property. We understand USEPA wants to increase public comfort with the results, but from a scientific standpoint, additional investigation is unnecessary.

Response: The position of the commenter is noted by the EPA and becomes part of the official record for this investigation.

38. Their [sic] needs to be more Sample Borings across the site.

Response: The scope of the ESR has been expanded to include two additional soil borings. One of the additional borings is located near monitoring well MW-07 in the northwest corner of the Strecker Forest property along the boundary with Strecker Farms. The second additional boring is located between the western pond area and central drainage way.

39. The Borings need to be much deeper.

Response: The soil borings will be completed until encountering bedrock or to the depth of refusal. This represents the maximum depth that the track-mounted, soil boring equipment is capable of penetrating.

40. Do not do composite samples. Composite samples give a false reading of actual conditions that involve toxic waste in the ground water.

Response: Soil compositing will only be performed for surface soil samples. Subsurface soil samples collected from soil borings and ground water samples collected from monitoring wells will be discrete samples and not composited. Compositing of surface soil samples is performed to characterize the overall level of exposure to surface soils.

41. Establishing background for Dioxin and any other chemicals on the site or the historic surrounding area is NOT appropriate.

Response: A background study to characterize conditions in soils surrounding the Strecker Forest property is not included within the scope of the ESR.

42. Lack of testing in the Data Gap Area ; especially along the property line of the Claymont Property (Primm Property) and Strecker Farms Subdivision. Would like to know more about any recent data on well #7.

Response: Additional sampling in the area identified as a data gap in the January 10, 2011, presentation to the city of Wildwood's City Council by ESC is included within the scope of the ESR. The additional sampling in the ESR includes 13 soil borings, 3 monitoring wells, and incremental composite surface soil sampling in the area identified as a data gap. Seven of the soil borings and 2 of the monitoring wells are located near the property boundary with Strecker Farms. Data generated from sampling of monitoring well MW-07 will be reported in the ESR Final Report and evaluated in the screening level assessment of human health risks.

43. Provide a more comprehensive analysis of offsite conditions which would include toxins in soil and natural water runoff.

Response: The screening level assessment of human health risks will include an evaluation of potential impacts to off-site receptors.

III. Questions and Comments during the July 13, 2011 Neighborhood Meeting

1. Will the monitoring wells catch all ground water contamination with this investigation?

Response: The EPA believes that the scope of the current ESR, in combination with data from previous investigations, will adequately characterize ground water quality for the purpose of assessing potential human health risks associated with this pathway.

2. How long will ground water be monitored and will all monitoring wells be sampled?

Response: Water level measurements and ground water samples will be collected from all new and existing monitoring wells on the Strecker Forest and Callahan properties during the ESR. Based on these sampling results, a continuing ground water monitoring program may be designed and implemented that includes some or all of the new or existing wells to further characterize ground water quality. Ground water level measurements of all wells will continue monthly for at least one year to assist in characterization of ground water flow rate and direction.

3. What is the definition of a screening level exceedance?

Response: Screening level concentrations in soil or ground water are intended to represent health-based levels below which further assessment in consideration of site-specific exposure factors is not warranted to ensure protection of human health in any setting. For the purpose of the work plan, screening level exceedences were considered to be any soil or ground water concentration from previous investigations that exceeded either values presented in the EPA's Regional Screening Level table, or values presented in Table B-1, Lowest Default Target Levels, All Soil Types and All Pathways in the Missouri Risk-Based Corrective Action Technical Guidance, Appendix B.

4. How will unauthorized access during field activities be prevented?

Response: Surface soil concentrations reported in previous investigations of the Strecker Forest property do not represent levels that are of concern for direct contact. Open excavations or other unsafe conditions will be safeguarded at the end of each work day. Heavy equipment will remain onsite overnight and will be properly secured, but this equipment may represent a physical hazard to site trespassers. EPA will work with the property owner to ensure that proper signage is posted prohibiting unauthorized trespassing and local officials will be alerted to the presence of equipment remaining on the property.

5. Why was the HHRA not used in developing the ESR?

Response: The ESC HHRA was not referenced in the work plan because no additional data was generated or reported for this assessment. This document will be added to the referenced documents in the ESR.

6. Are there any issues with building on a sink hole?

Response: Construction on or near a sink hole may require special engineering considerations that would be the responsibility of the property developer.

7. How representative are the boring locations in characterizing potential contamination at the Strecker Property?

Response: The EPA believes that the new and existing boring locations will produce data that will support a valid assessment of human health risks associated with residential use of the Strecker Farms property.

8. What is the protocol for dust sampling?

Response: As described in the work plan:

The sampling protocol will be based, with minor modifications, on ASTM Method "Standard Practice for Collection of Floor Dust for Chemical Analysis" (ASTM 2000). For each sample, two measuring tapes will be placed and taped down so that they are parallel to each other and on either side of each sampling area. A High Volume Small Surface Sampler will be used to collect the sample. Efforts will be made to collect a minimum of 10 grams of total dust in order to yield an analytical detection limit of 1 ppt. If the amount of dust collected from the initial sampling area at each location is not sufficient, secondary areas will be marked and sampled as needed.

9. Why the investigation not expanded further south on the Callahan property when impacts have been identified at the far end of the excavation area?

Response: As discussed above, the scope of the ESR includes a soil boring and monitoring well located as far south of the former drum burial area as possible, given the thick woods and underbrush that exist in that area. If this soil boring indicates that significant migration of contamination is occurring to the south from the former drum burial area, the need for additional soil borings and/or monitoring wells located closer to the southern boundary of the property will be assessed.

10. When can the abandoned buildings be torn down?

Response: The city of Wildwood will control when building demolition can proceed. The EPA will provide dust sampling data from structure interiors when available to assist the City in making this determination.

11. Can more attention be focused on the area near monitoring well MW-7?

Response: The scope of the ESR has been expanded to include an additional soil boring along the Strecker Farms boundary near monitoring well MW-7, north of SB-19.

12. How much clearing will be done for the investigation?

Response: The EPA does not anticipate removal of any mature trees for implementation of the ESR. However, some amount of brush clearing may be required in overgrown areas to enable sample collection, particularly to allow access to the track-mounted, soil boring equipment. Clearing will be kept to the minimum amount required for sample collection.

13. What is the projected time frame for conducting the work and preparing a final report?

Response: Field work is planned for early to mid-September. Sample results will be available within 30 to 60 days. Completion and release of the screening level human health assessment is anticipated before the end of 2011.

14. Why is sampling for metals on Strecker Forest not included?

Response: Significant metals concentrations have not been detected during previous investigations of the Strecker Forest property or the adjacent Bliss property. Nevertheless, to respond to public comments, the scope of the ESR has been expanded to include metals analysis of all soil and ground water samples collected.

15. Can EPA obtain a copy of the Phase II Report that was conducted at Strecker Farms?

Response: The EPA is attempting to assist in retrieval of a copy of the Phase II Environmental Assessment that was performed prior to construction of the Strecker Farms development. Inquiries to the consulting firm that performed this investigation were not successful in locating a copy of the report.

16. Will the stream beds and the sides of the stream be sampled?

Response: Sampling of stream beds and banks is not included within the scope of the ESR since previous sampling in these areas did not identify elevated levels of contaminants.

17. Could a different symbol be used to designate locations of monitoring wells and soil borings?

Response: Figures in the Work plan will be modified to more clearly distinguish between monitoring well and soil boring locations.

18. When will the Ellisville site be deleted from the National Priorities List?

Response: The EPA does not have a definite time frame for deletion of the Ellisville site from the NPL. Deletion of the site is a primary goal of both the State and the EPA. Data generated during the ESR will be useful toward ultimate deletion of the site, as will additional soil, soil gas, and ground water data being generated during the ongoing state investigation of the adjacent Bliss property. To delete the Ellisville site from the National Priorities List, the EPA and the State must be confident that site conditions will remain protective of human health and the environment for all portions of the site and all potential pathways of exposure.

Attachment 1

EPA Comments on the Draft

Human Health Risk Assessment

Prepared by

Environmental Stewardship Concepts, LLC

and

Henshel Envirocomm

February 7, 2011

U.S. Environmental Protection Agency
Comments on Draft Human Health Risk Assessment
And Phase II Environmental Site Assessment

Proposed Strecker Forest Subdivision
Wildwood, Missouri

The U.S. Environmental Protection Agency (EPA), Region 7, is providing the following comments resulting from EPA's review of the draft Human Health Risk Assessment (HHRA) prepared by Environmental Stewardship Concepts and Henshel Envirocomm (ESC&HE), and the Phase II Environmental Site Assessment (ESA) Report prepared by Mundell & Associates (Mundell) for the proposed Strecker Forest residential development. To some degree, both reports address physical safety hazards and geotechnical concerns for residential development. EPA comments provided below are limited to concerns relating to potential chemical contamination that could affect the proposed residential development and related health concerns. For each report, general comments are followed by specific comments. Comments that were editorial or grammatical in nature were generally excluded from the EPA review.

DRAFT Human Health Risk Assessment for the Proposed Strecker Forest Development Site, January 10, 2011

General Comments

1. EPA has identified several key miscalculations in conducting the units conversions and intake estimates. As a result, risk estimates in the HHRA are overestimated by a factor of 1,000 to 10,000-fold. Specific information on these miscalculations are provided in the Specific Comments. Miscalculation of potential cancer risk and non-cancer effects associated with dioxin levels at the site are particularly significant because the risk characterization in the HHRA identifies dioxin as the only chemical that poses elevated risks based on data from the ESA.

2. The HHRA lacks figures depicting sample locations and the sample analytical data. It also lacks tables showing all of the intakes and risk estimates for each chemical and exposure pathway evaluated in the risk assessment. Although this information is critical to all risk assessments, it is especially important to the HHRA. For example, the HHRA states that there are data gaps associated with previous sampling schemes, a figure depicting these locations is not provided. The risk assessment also asserts that a large number of chemicals have been detected at the site with "high concentrations", but there are no figures or tables provided that convey this information. In addition, several critical miscalculations of intakes and health risks have been identified. EPA is uncertain if similar mistakes were made in data/calculation tables not included in the HHRA. Given the importance of figures and data tables to risk assessments, the HHRA must contain appropriate figures depicting sampling locations and areas of contamination, as well as all analytical data used to characterize health risks and evaluate background conditions.

3. Many of the assumptions used to evaluate health risks lack supporting data and/or are technically flawed. Major assumptions used in the HHRA that lack supporting data and/or are flawed include, but are not limited to the groundwater use pathway, the depths of the stream during flooding, the duration of flooding in the ravine, erosion in the ravine (translating to stream bank erosion), dermal contact with dioxin in surface water, and inhalation modeling. Additional information regarding the necessary revisions on this topic can be found in the Specific Comments section.

4. The HHRA claims to follow EPA risk assessment guidance; however, many portions of the HHRA lack consistency with the most current EPA risk assessment guidance and policy. These inconsistencies include, but are not limited to the following elements: the conceptual site model (CSM), the methods for deriving exposure point concentrations, development of exposure units, the use of screening levels, the use of default exposure factors and toxicity values, and general report organization. Additional information regarding these inconsistencies can be found in the Specific Comments section.

5. In addition to lacking a discussion on exposure point concentrations and what they represent, the HHRA lacks justification for the concentrations used to estimate intakes. With the exception of the TEQ concentrations in surface water, results from individual wells and soil borings were entered directly into the intake equations. Data from other sampling locations, which should be accounted for in the exposure point concentration, were generally not addressed. This is of special concern for soils where the risk estimates were based on one sample, which is generally not an accepted practice when conducting a risk assessment. Given that intakes should be based on the average concentration of a chemical within a defined exposure unit, the HHRA should have derived exposure point concentrations using all samples within an exposure unit. For example, exposure point concentrations for current surface soil exposure pathways (i.e., recreational exposure) should be based on all surface soil samples collected at the site. Future residential exposure pathways should consider surface and subsurface soils (assuming excavation and surface regrading) falling within defined exposure units (i.e., residential lot). The HHRA should be revised so that exposure concentrations are based on all of the samples that fall within the defined exposure units for the exposure scenarios being addressed. EPA recommends using ProUCL, a statistical software package, to derive the exposure point concentrations (USEPA, 2007).

6. No substantive discussion is provided in the text that details the nature and extent of contamination (i.e., the sample results from the Mundell investigation and other previous investigations). Note that a significant portion of the HHRA is used to discuss data gaps in the sampling, yet the HHRA does not provide a detailed discussion on what is known about the site. Also, figures depicting monitoring well results and interpolated dioxin toxic equivalent (TEQ) concentrations are inadequate because they do not account for other contaminants. Additionally, as discussed in the HHRA, there are significant uncertainties with the interpolated dioxin data. The HHRA should include a thorough discussion of the Mundell sampling data including soil sample depths and concentration ranges of the chemicals detected in soils and groundwater. EPA's review of the soil data has indicated that there is no source of soil contamination on the proposed Strecker Forest Development Site (see comments on the Environmental Site Assessment (ESA) Report)

7. The HHRA lacks a data usability assessment. A data usability assessment is a critical piece and necessary component of a human health risk assessment. In addition to including an evaluation of the analytical data (e.g., adequate detection limits, are contaminants detected in blanks?), such an evaluation includes an analysis of the data to determine whether it is representative of potential exposures. Given that the HHRA and the EPA review of the site data have identified many data usability and quality issues, a data usability assessment should be conducted and documented in the HHRA. Per EPA risk assessment guidance, ESC&HE should evaluate the data according to the six criteria outlined in Chapter 3 of USEPA's Guidance for Data Useability in Risk Assessment (USEPA, 1992). These criteria are data sources, documentation, analytical methods (and detection limits), data quality indicators (e.g., data representativeness), data review, and data reporting. EPA recommends that a summary of the data evaluation be provided in the HHRA that is consistent with the "Data Useability Worksheets" provided in Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments) (RAGS Part D) (USEPA, 2001).

8. Despite EPA's concerns regarding the background evaluation performed in the ESA report which was limited to dioxin, a background evaluation is warranted in the HHRA. First, the findings section of the HHRA mentions that groundwater contaminants (i.e, metals and (volatile organic compounds (VOCs)) exceeded background, yet there was no background evaluation of metals in the HHRA or ESA Report. Also, the HHRA is rather dismissive of the fact that dioxin is ubiquitous in the environment, having natural and anthropogenic sources. This is especially critical given that the levels used to evaluate exposure fall within the background range. The ESA Report concluded that the higher of the two dioxin levels used to estimate the exposure concentrations in the HHRA was determined to be representative of background. A determination on the other sample was not provided in the ESA Report, because the TEQ concentration was equal to or below health-based screening levels.

9. The HHRA routinely refers to "target organism" when discussing receptors. "Target organism" is a term not typically used to describe receptors in human health risk assessments and implies that other organisms were considered in the HHRA. EPA recommends that ESC&HE replace "target organisms" with "receptors."

10. The HHRA evaluation of the drinking water pathway assumes that an adult consumed shallow groundwater for 30 years prior to the installation of the municipal water supply. No data has been provided to show that impacted shallow groundwater was ever used as a source for drinking water, and the HHRA has not provided justification for why ESC&HE believes that the shallow groundwater is a usable source of drinking water. The HHRA does not discuss the depths of drinking water wells within the vicinity of the site which would provide insight into the usability of the shallow groundwater. As discussed in Risk Assessment Guidance for Superfund (RAGS) Part A, groundwater is deemed a suitable drinking water source if it is of sufficient quality or yield (USEPA, 1989). ESC&HE should evaluate the usability of the shallow groundwater prior to addressing it in the HHRA.

A risk assessment is intended to address current and future exposure pathways. Although no data has been provided to support that the pathway was complete, past exposures are generally not evaluated in human health risk assessments. Assuming that an exposure has occurred in the past with information to the contrary is misleading.

11. The HHRA relies solely on the data from the Mundell investigation and the groundwater data provided by MDNR. It is not clear why data from previous investigations were not used that includes on and off-site soil sampling and groundwater monitoring. Note that some of this data (i.e., results from soil sampling in 2004) was also provided in the Phase II ESA. The exclusion of this data is problematic because ESC&HE has asserted that there are data gaps across the site, which, in part, could be addressed by the previous investigation data and other historical information. The HHRA should account for all environmental sampling conducted in relation to this site. If particular data sets are not used, ESC&HE should provide the rationale and account for this information in identifying data gaps.

12. The HHRA repeatedly infers that the existence of numerous karst features occur in the area of the proposed development. Whereas conduits and caves may develop in a karst environment, there is no evidence that these structures exist in the area of the proposed development. Boring logs from the Phase II ESA indicate the presence of residuum along the silty clay/bedrock interface. These logs do not indicate limestone fractures, bedding planes/dip direction or solution cavities (although some logs indicate voids of 6 in to 2 ft). The log for MW-1 (on the Bliss-Ellisville site) indicates fracturing from 29 ft to 52 ft. Two geophysical logs from wells MW-2 and MW-6 indicate fracture zone(s) with associated weathered zones. The connectivity of these fracture zones is not known.

13. The HHRA lacks a discussion on how qualified data may affect the HHRA. A large percentage of the dioxin and furan results were qualified as estimated values ("J" or "QJ") and a couple of others were detected in the associated method blanks. Many of the VOC detections, which had exceptionally low detection limits, well below their screening levels, were also qualified. Given the uncertainties associated with the accuracy of qualified data, it is critical that the HHRA provide a detailed and balanced discussion on the data quality and how it affects potential site-related health risks. EPA also recommends that the data validation reports be referenced in the HHRA. As discussed in previous comments, data quality and usability assessments are critical elements of the risk assessment process (USEPA, 1989).

14. Throughout the report, reference is made to the Bliss-Ellisville site. The Bliss and Contiguous Properties portion of the Ellisville Site is sometimes referred to as the Bliss-Ellisville site. Historically, the Ellisville site has been considered as three separate sub sites, which include the Bliss and Contiguous Properties, the Callahan Property, and the Rosalie Investment Company Property. The extreme northeast portion of the proposed Strecker Forest subdivision is part of the Bliss and Contiguous Properties, which is defined geographically by the identified area of contamination. The Bliss and Contiguous Properties sub site is a component of the Ellisville Superfund site which appears on the National Priorities List.

Specific Comments

1. **Executive Summary (p. 6).** The final full sentence on this page refers to soil, groundwater and surface water ingestion as accidental. EPA recommends using the term "incidental" when referring to soil and surface water (via swimming) ingestion. Notwithstanding comments regarding the drinking water pathaway, neither "incidental" nor "accidental" should be referred to when characterizing the drinking water pathway (i.e., ingestion of groundwater).

2. **Executive Summary (p. 6 &7).** The sentence spanning these pages states that chemicals detected above detection limits and regulatory standards were carried through the human health risk assessment. Notwithstanding comments on Table 13, EPA's risk-based screening levels provided in that table are **not** regulatory standards or cleanup standards. EPA risk-based screening levels, such as the Regional Screening Levels (RSLs) (formerly the preliminary remediation goals (PRGs)), are intended to assist with the investigation of sites and to determine if further investigation is needed (USEPA, 2010). Because the RSLs are not regulatory standards, the HHRA must not refer to them as regulatory or cleanup standards. The HHRA should also clarify "detection limits." Many of the dioxin congeners were detected below the laboratory reporting limit, which is often referred to as the detection limit.

3. **Executive Summary (p. 7).** The second full paragraph on this page inaccurately states, "Total dioxin toxicity (for all toxic forms, measure as toxic equivalents) was elevated above new soil standards proposed by EPA, but not uniformly across the site." It is unclear what EPA standards the HHRA is referring to. Except for three samples collected within the NPL area, the dioxin TEQ concentrations in other areas of the site, including the areas evaluated in the HHRA, are not elevated above EPA's draft recommended interim PRG of 72 ppt. ESC&HE should provide a more accurate characterization of areas and soil depths of the site that have dioxin TEQ above the draft recommend interim residential soil PRG in the HHRA.

4. **Executive Summary (p. 7 - 9).** The text within the executive summary will need to be revised per the following Specific Comments on the exposure assessment, toxicity assessment, risk characterization, uncertainties, and findings and conclusions.

5. **Section 1.2 (p. 13).** EPA disagrees with ESC&HE that eight potential drum burial areas were identified. The Mundell geophysical investigation identified only three areas where subsurface readings were consistent with the possible presence of subsurface metallic objects.

6. **Section 1.3 (p. 19).** The third paragraph on this page inaccurately states that the draft recommended interim residential soil PRG of 72 ppt is based on a non-standard assumption that all of the dioxin comes from the contaminated site and that ordinarily only a fraction of the dose is assumed to derive from other sources. To the contrary, the non-carcinogenic PRG of 72 ppt is based on standard Superfund risk assessment assumptions and guidance. It is **not**

standard practice to include dietary intake when deriving soil PRGs. While relative source contribution (RSC) was considered in the interim PRGs, the draft recommended PRG document provides specific reasons why it was not adjusted from 1.0. ESC&HE should remove and or revise the final passage starting at "…although this number is based…"

7. **Section 1.3 (p. 19).** The discussion regarding EPA's proposed cancer slope factor (CSF) and reference dose (RfD) is problematic. First, EPA's reassessment of dioxin is not final and those toxicity values are subject to change. Second, the slope factors' units were mistakenly left out of the text. ESC&HE should revise the HHRA so that it states that EPA is in the process of finalizing the dioxin reassessment and that the toxicity values may be lower than previous values, including the toxicity values used to derive the interim PRGs. The CSF units should also be provided.

8. **Section 1.3, Table 1 (p. 20).** This table suggests that EPA has derived an alternate non-cancer PRG of 36 ppt, assuming 50% of the total dioxin is from the site. USEPA, including the draft recommended PRG document, has not derived a PRG of 36 ppt. The use of a RSC of 50% is not supported by the draft recommended PRG document. ESC&HE should revise the table so that it does not suggest that EPA has derived an interim non-cancer residential soil PRG of 36 ppt. In addition, because the recommended interim PRGs are draft, this table should be revised so that it indicates that the PRGs are draft. Note that the table heading inaccurately refers to the PRGs as EPA dioxin standard. If the table intends to list standards, then ESC&HE should list the current PRGs of 1,000 ppt and 5,000 ppt for residential and occupational soils, respectively.

   ESC&HE should make the following revisions to Table 1. First, the toxicity values provided in the draft dioxin reassessment should be removed. Second, the table should provide the units for CSFs. Third, the table should provide the reference dose (RfD) (i.e., ATSDR chronic MRL) used to estimate the draft recommended interim PRG.

9. **Section 2.0 (p. 20).** The introductory paragraph mistakenly refers to EPA's 1997 *Exposure Factors Handbook (EFH)* as guidance for calculating health risks. This document does not provide guidance on how to calculate health risks. The 1997, EFH provides recommendations for exposure factors to use in risk assessments. The introductory paragraph should reference EPA's 1989 *Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)* (RAGS Part A) and supplemental parts (i.e., RAGS Parts B, C, D, E, and F), assuming these documents are used in the revised HHRA.

   The last sentence on this page states that the four steps used to create a risk assessment are: hazard identification, exposure assessment, toxicology assessment, and risk characterization. The toxicology assessment should be replaced with "dose-response assessment" if ESC&HE is referring to the risk assessment process in general. Note that the toxicity assessment of a human health risks assessment includes two steps, hazard identification and dose-response assessment. If, however, ESC&HE is referring to the organization of a site-specific human health risk assessment, then "hazard identification" should be replaced with "data collection and evaluation" per RAGS A (USEPA, 1989). Furthermore , "toxicology assessment" should be replaced with "toxicity assessment."

10. **Section 2.0 (p. 21).** The terminology on this page should be revised so that it is consistent with the four steps listed on the previous page. For example, this page refers to dose-response assessment, not toxicity assessment.

11. **Section 2.1.** This section mentions that RfDs and reference concentrations (RfCs) were obtained from EPA's RSL table and cancer slope factors were obtained from EPA's Integrated Risk Information System (IRIS). Additional toxicity information was obtained from ATSDR. The toxicity values used in the HHRA should be obtained in a manner consistent with EPA's toxicity value hierarchy provided in OSWER Directive 9285.7-53, which includes IRIS, EPA's Provisional Peer-reviewed Toxicity Value (PPRTV) database, and other original sources of toxicity values (e.g., CalEPA and ATSDR). While the RSL table follows OSWER Directive 9285.7-53, it may lag behind the changes to toxicity values in the IRIS, PPRTV, CalEPA, and ATSDR databases.

12. **Section 2.1 (p. 22).** The last sentence of this section mentions that chemicals lacking toxicity values were not included in the HHRA. Although health risks cannot be quantified for these chemicals, they should be carried through the HHRA and the lack of toxicity data for these compounds should be discussed in the uncertainties section.

13. **Section 2.3 (p. 23).** The passage stating "…residents' verbal accounts of widespread illnesses within the area, possibly related to past chemicals contamination." should be removed. A risk assessment is intended to be an objective document that provides factual information supported by data. The risk assessment should be devoid of unsubstantiated claims that could prejudice and/or mislead the reader. If ESC&HE has any documented accounts of health effects in the community, that information should be shared with the local, state, and federal health agencies and USEPA. General health concerns should also be directed to local, state, and federal health agencies.

14. **Section 2.4.** This section, which presents the conceptual site model (CSM), exposure pathways, and potential receptors, is relevant to the exposure assessment. Section 2.4 should be moved to the exposure assessment provided in Section 3.0 of the HHRA.

15. **Section 2.4 (p. 24).** Figure 3, which depicts the CSM, is inaccurate and incomplete. Elements of the figure that should be revised include the following:

    - Per the figure, barrels and spraying (presumably waste oil containing dioxin) are listed as on-site (i.e., proposed Strecker Forest Development Site) and off-site sources of contamination. With regards to the proposed Strecker Forest Development Site, the figure is not entirely consistent with the text in Section 2.4.1, nor is it consistent with potential sources identified in Section 2.2.4 of the ESA Report. Furthermore, previous EPA investigations have indicated that spraying had not occurred on the proposed Strecker Forest Development Site. This figure must be revised so that it provides an accurate account of potential sources of contamination that were released directly onto the proposed Strecker Forest Development Site.

- This figure depicts contaminant migration directly from historical activities to groundwater. With regards to groundwater contamination, the CSM should depict the transport of contaminants from the source to groundwater via soils (i.e., soil leaching). The current figure does not indicate that contaminants can migrate from soils to groundwater.
- The figure does not account for current and future complete exposure pathways. This is a critical element of the CSM and should be included in the figure.
- The figure does not list dermal contact as a route of exposure. Dermal contact is a potential route of exposure and it is addressed in the HHRA. Thus, it should be included in the figure.
- Vegetable gardening is mistakenly listed as a route of exposure. Vegetable gardening is an activity, not a route of exposure. Routes of exposure for vegetable gardening would potentially include soil ingestion, dermal contact, inhalation of vapors or particulates emitted from soil, and the ingestion of home grown produce. The figure must be revised to account for potential routes of exposure associated with vegetable gardening.
- The figure shows that off-site soils could have been impacted by historical activities. No potential routes of exposure or migration pathways have been identified for off-site soils.
- Recreational users should be substituted for visitors.
- Outdoor workers are listed in the CSM, but the exposure assessment does not discuss the outdoor worker exposure pathways nor are risk estimates derived for this scenario. Although risks to an outdoor worker would be less than to a resident, the HHRA should provide some information on why this pathway was not evaluated further.
- The CSM should be revised to account for transport and release mechanisms (e.g., soil leaching, volatilization) between sources and exposure media.
- This figure is unclear in identifying complete exposure pathways. A footnote should be provided that notes that an "x" represents a complete exposure pathway.
- The CSM should account for sediments within the ravine. A recreational user's direct contact with sediments should be evaluated in the HHRA.
- The CSM does not account for the construction worker scenario that is discussed in Sections 2.4.1 and 3.1. The CSM should be revised to account for the construction worker if the exposure pathway is complete.

16. **Section 2.4.1 (p. 25).** Citing ATSDR, the first paragraph states that a complete exposure pathway consists of five parts including a source of contamination, an environmental media and transport mechanism; a point of exposure; a route of exposure, and a target organism. The paragraph should be revised so that it is consistent with EPA risk assessment guidance. Target organism should be removed because a receptor is accounted for in the exposure point and route of exposure parts of the exposure pathway.

17. **Section 2.4.1 (p. 25).** The first sentence of the second paragraph states, "…contamination sources include waste buried in drums, waste on the ground, or waste poured into pits." The referenced statement lacks specificity regarding the sources of contamination and indicates

that there is some uncertainty regarding the presence of all three sources. Note that the sentence states that contamination sources include drums, waste on the ground, **or** waste poured into pits. ESC&HE should revise this section so that it defines "waste" and provide references to reports that document that source of contamination may include buried drums, waste on the ground, or waste poured into pits. Note that the data collected by Mundell, which was intended to address the most likely affected areas of the site, does not indicate any significant sources of contamination within the site as is insinuated in the referenced statement. Chemicals were generally not detected in on-site soils and detections fell within or below EPA's cancer risk range and below a non-cancer hazard index of 1.

18. **Section 2.4.2 (p.26).** The age groups provided in the first paragraph are not consistent with EPA's age group/bins provided in the 2008 *Child-Specific Exposure Factors Handbook* nor the 2005 *Supplemental Guidance for Assessing Susceptibility From Early-Life Exposure to Carcinogens*. ESC&HE should revise the paragraph so that it is consistent with EPA's most current age groups/bins and that the HHRA provide a distinction between those related to exposure and the groupings associated with toxicokinetics and toxicodynamics. The latter should be discussed in the toxicity assessment.

19. **Section 2.4.2 (p. 26).** The third paragraph mentions that construction workers are assumed to have different characteristics and exposure conditions compared to residents. The example provided for different characteristics is that adults have greater mass. A different example should be provided because adults are also evaluated under a residential scenario. For example, soil ingestion rates, particulate emission factors, and volatilization factors differ under construction worker scenarios. Furthermore, EPA generally assumes that men and women (including women of child-bearing age) will be engaged in construction work. This section does not indicate the construction worker's gender and it is unclear if the preceding paragraph is intended to be inclusive of the construction worker and recreational user receptors. Note that EPA's default body weight of 70 kilograms is an average body weight for men and women. The HHRA should evaluate men and women for all exposures involving adults.

    In addition, this section does not discuss the outdoor worker. The outdoor worker scenario, typically a scenario EPA evaluates under a commercial or industrial setting, should be discussed in this section.

20. **Section 3.1.1 (p. 27).** This section should be revised to incorporate the relevant text on the exposure populations from Section 2.4. Also, the discussion regarding routes of exposure should be moved to the following discussions on the exposure pathways. The route of exposure discussion currently provided in this section is incomplete.

21. **Section 3.2.1.** Although this section is intended to discuss complete exposure pathways associated with groundwater, a majority of this section is used to discuss the hydrogeology of the site and surrounding areas. EPA was unable to locate any discussion regarding pathways associated with the drinking water pathway, which is later characterized in the HHRA. The

exposure pathway discussion should discuss all four elements of the complete exposure pathway. Furthermore, a physical setting section should be provided in the exposure assessment that details the site's hydrogeology and other physical characteristics pertinent to exposures at the site.

22. **Section 3.2.1a (p. 29).** The text suggests it is possible for a conduit to develop underneath the groundwater divide that could transport groundwater from the south to the development area. No evidence of conduits exists at the site.

23. **Section 3.2.1b (p. 30).** The text cites Ewers (2010) to indicate that water levels from monitoring wells in a karst environment are typically low; on the order of a few feet of difference could exist if the well intersected a conduit. To date, no evidence of conduits or caves exists at the site. The Ewers article promotes the use of tracer tests to evaluate groundwater flow in a karst environment. As noted in the Additional Remedial Investigation report of March, 1998, dye tracer studies were conducted at the Bliss-Ellisville site. The studies indicate a hydraulic connection between this site's watershed and the Lewis Springs, approximately 2.6 miles north of the site.

24. **Section 3.2.1b (p. 30).** The text indicates hydraulic heads in karst aquifers could vary by 50 ft to 100 ft vertically under extreme precipitation/flooding events. Only one sampling event was conducted at the development area. Site or near site-specific evidence that indicates this magnitude of water table fluctuations in this area were not presented in this report.

25. **Section 3.2.1c (p. 31).** The text indicates that conduits do not provide a filtering mechanism to contaminants in the aquifer. There is no evidence of conduits noted in the 10 boring logs associated with wells at the proposed development or at the Bliss-Ellisville site.

26. **Section 3.2.1d (p. 32).** The text indicates that terrain elevations should not be used to determine local flow directions and the location of water divides. The Phase II ESA depicts a groundwater divide in the southwest corner of the property, near monitoring well MW-2. A review of the USGS map for this area depicts topography that could represent a groundwater divide. The HHRA indicates that monitoring well MW-2 has a lower head than monitoring well MW-4 and that this infers flow in a southwesterly direction in that area of the site and that groundwater could also flow from monitoring well MW-2 to monitoring well MW-5 (north-northeast) if a conduit connects the two areas. The report indicates the limitation of one sampling event that has been conducted at this site. This limitation and the subsequent inferences are misleading. There is no apparent evidence that conduits exist at this site.

27. **Section 3.2.1d (p. 33).** The last paragraph on this page mentions that in addition to dioxin TEQ, other contaminants were also very high in monitoring well MW6. Although several chemicals are detected above screening levels, EPA disagrees that the concentrations of these other contaminants, which range from a few µg/L to a few hundred µg/L, are "very high." Also, only three of these other contaminants exceed MCLs and/or EPA's acceptable risk

levels (i.e., $>10^{-4}$ and HI of 1). Typically, concentrations in the thousands to hundreds of thousands of µg/L would be defined as "very high." The HHRA should specify the chemicals detected above screening levels and/or MCLs and accurately characterize the levels of contaminants in this well.

28. **Figure 6 (p.36).** The TEQ concentrations presented in the figures are incorrectly presented in units of µg/kg or ppb.

29. **Section 3.2.1d (p. 36-39).** The following discrepancies have been identified in the discussion regarding the hydrogeology and exposure pathways from the Bliss Property.

    - The report indicates that the stream adjacent to the Bliss property is not connected to the aquifer for part of the year. Past reports indicate this is a losing stream and dry during an on-site visit. The HHRA should cite evidence that groundwater has been detected in site-associated monitoring wells at shallower depths that may indicate flow into this stream during other parts of the year.
    - The text indicates that during the November sampling period, the water table was approximately 5 ft below the stream adjacent to the Bliss property. The measured water table in the seven monitoring wells on the proposed development area ranged from approximately 31 ft to 113 ft below ground surface (bgs). The HHRA should cite or provide data that indicates the depth to water in this area is 5 ft below the stream.
    - The text indicates that the water table at the Bliss Property (well MW-5) is 4 ft lower than in monitoring well MW-2. The November 2009 data indicates a difference of 2.71 ft rather than 4 ft.
    - The HHRA presents scenarios for groundwater flow and contaminate migration from the Bliss-Ellisville site to the southwest. The assumptions in these scenarios (e.g., water table fluctuations of ±10 ft at monitoring well MW-5 and a water table that may or may not be stable during precipitation events at monitoring well MW-2) are speculative and are not based on existing data.
    - The HHRA indicates a range of groundwater velocities that may occur in karst aquifers. However, there is no evidence of conduits on this site that may be able to transmit water at rates of up to 150,000 ft/day. Existing data does not suggest that a high degree of fracture connectivity is present for this rapid contaminant transport. The limited groundwater data set is not adequate to make this determination or support this supposition.
    - The HHRA presents another set of scenarios for flow to the existing residential area. As above, the scenarios assume conduits are at this site and that seasonal water table fluctuations can cause the migration of contaminants. No seasonal site groundwater data is available. The report suggests that high contaminant concentrations present at monitoring well MW-6 could spread throughout the ravine. The November 2009 sampling event indicated that the water table at monitoring well MW-6 was about 31 ft bgs. This head difference would have to be overcome and migrate from an elevation of approximately 638 ft to 680 ft (a 42 ft difference) to fill the ravine. Data that suggests this has occurred at the site was not available for review.

30. **Section 3.2.1d (p. 39).** This section inaccurately states that the sinkhole is a known source of dioxin and other contaminants. Previous EPA investigations have not indicated that the sinkhole is a known source of dioxin and other chemical contamination. Furthermore, data collected during the Mundell investigation do not indicate it as a known source of contamination.

31. **Section 3.2.1d (p. 39-40).** The text indicates the sinkhole is likely a local recharge hotspot that would raise the local water table and spread contaminants from the pond in all directions. The depth to water in this area is greater than 50 ft. In general, the water table will respond slower to infiltration in deeper wells than shallower wells. Surface water runoff or precipitation that infiltrates the area of the pond will be primarily controlled by the connectivity of the residuum and/or bedrock fractures. The residential area is approximately 200 ft north of the pond. Based on topography, surface water runoff will flow in an easterly direction toward the ravine. The ESA depicted groundwater flow in this area toward the ravine. To date, there is no evidence of conduits at this site or that contaminants at the pond can spread in all directions. No data or information is presented to support the statement that the pond (sinkhole) is a known source of dioxin and other contaminants.

32. **Section 3.2.1d (p. 39-40).** The headings provided on these pages indicate that this section will provide a discussion on the complete exposure pathways related to the sinkhole (i.e., pond area). However, this section fails to provide a complete discussion of the complete exposure pathways (i.e., a discussion of all the steps of the complete exposure pathway). No information is provided on the routes of exposure associated with pond water exposure nor the activities that receptors will be engaged in that will bring them into contact with pond water. Also, this section does not provide specifics on the receptor that will contact pond water under current conditions. Furthermore, under the future exposure pathway (i.e., proposed Strecker Forest subdivision) this section assumes that the pond will continue to exist. No discussion has been provided to support this assumption. This section should be revised to include a discussion on all elements of the complete current and future exposure pathways associated with the sinkhole. Assumptions regarding future conditions should also be clearly pointed out and supported in the text.

33. **Section 3.2.1d (p. 40).** Under the Callahan Property heading, the text again assumes there are conduits that could readily transmit groundwater from the south to the Strecker site. To date, there is no evidence that conduits exist at this site.

34. **Section 3.2.1f (p. 41).** The text indicates that there is a lack of data and because of this there are several uncertainties that should be considered in the exposure analysis. The lack of data should not give credence to suggestions/scenarios that karst features known to exist in other areas/regions may be present at this site.

35. **Section 3.2.1g (p. 42).** The text indicates that there is an exposure pathway for dioxins and other contaminants from the sinkhole to the residential area. The text also indicates that it is not clear how contaminants may spread in the subsurface. The text indicates that based on observations of the terrain the Callahan area appears to be a potential source of contaminants. Based on the area topography, it is unlikely that groundwater from the Callahan site will

migrate up-gradient to the proposed development area. A topographic high exists in the area of Strecker Road. The text indicates a network of unknown conduits can extend for many miles to spread contaminants unpredictably and very quick. Boring logs from numerous monitoring wells and soil borings at the proposed development area and the Bliss-Ellisville site did not indicate the presence of these features.

36. **Section 3.2.2.** This discussion is intended to discuss soil exposure pathways. However, this section is deficient in identifying all of the elements of the complete exposure pathways for soils. No discussion is provided on the soil exposure units (e.g., a future residential yard), which will depend on land-use. Also, this section does not cover all of the routes of exposure for the receptors identified. For example, incidental soil ingestion is not listed as a route of exposure in Section 3.2.2c, which discusses the routes of exposure for soil. This section should be revised to provide a more complete and accurate discussion of the complete exposure pathways for site soils.

37. **Section 3.2.2a (p. 43).** Although the second sentence of this section is a bit out of place, it incorrectly states that TEQ measurements were only recorded in dioxin TEQ and thus there is no distinction between water soluble and insoluble contaminants. Note that the laboratory analysis of groundwater and soil samples collected by Mundell included a congener analysis of dioxins, furans, and dioxin-like polychlorinated biphenyls (PCBs). Dioxin TEQs were derived from the analytical data for the dioxin, furan, and dioxin-like PCB congeners provided in the ESA Report for the purposes of screening groundwater and soil samples against dioxin's (i.e., dioxin TEQ and/or 2,3,7,8-TCDD) screening levels. Therefore, one can evaluate the transport of dioxins in soil with respect to the water solubility of individual congeners. However, dioxins tend to sorb to clayey/organic soil/sediment and are not very mobile in the environment. ESC&HE should revise the referenced sentence so that it is consistent with the analyses performed on the groundwater and soil samples collected at the site. Additional discussion should be provided regarding the solubility (or lack thereof) of dioxins and their fate and transport in soil (see below). The discussion should be moved to Section 3.2.2b, which discusses fate and transport of contaminants

    With regard to the mobilization of dioxins, the text apparently assumes the mobilization of these chemicals to conduits for contaminant transport. The text infers that once these chemicals migrate to the ravine/stream/groundwater they are then spread across the soil throughout the site during flooding events. To date no evidence of conduits exist at this site; only one groundwater sampling event has been conducted; no apparent stream flow or flood data exists; and, supplemental soil sampling was not conducted to verify the interpolations.

    The discussion in this section lacks clarity and coherency. For example, the reference to dioxin water solubility and its relation to soil migration and concentration levels are not explained. Thus, the sentence regarding solubility appears out of place. In addition, the discussion immediately following solubility refers to the linear kriging.

38. **Section 3.2.2a (p. 43-44)**. It is EPA's judgment that there is insufficient data to perform the dioxin TEQ kriging. This section lacks a thorough discussion on kriging, including the technical basis, underlying assumptions, calculations, limitations, and uncertainties. It is

unclear how the kriging applies to the exposure assessment (i.e., the exposure concentrations). Other than identifying some potential data gaps, the HHRA does not use kriging to extrapolate exposure concentrations, yet places the discussion within the exposure assessment. This is problematic because no technical basis or discussion is provided in support of the exposure point concentrations for dioxin TEQ. The section should be revised so that it discusses how the exposure point concentrations for dioxin TEQ were derived. A complete and detailed discussion should be provided in the proper context (i.e., section discussing data gaps and/or the nature and extent of contamination).

39. **Section 3.3.2a (p. 44).** The last sentence of this section states, "Of particular interest are the soil boring measurements taken at the pond area (B33), which contained ethylbenzene and naphthalene, and the ravine (B26), which contained benzene and di-n-octyl phthalate." References to data tables containing this information are not provided and no additional discussion is provided that discusses why these results are of particular interest. The statement appears to be an incomplete thought; regardless, the detections of these contaminants are insignificant. The trace levels of these contaminants are more than 1000 times lower than their respective residential risk-based screening levels, and their detections were below reporting limits (i.e., J-coded). In addition, the detection of di-n-octyl phthalate, a commonly used plasticizer, may have originated from plastics used in the sampling and analytical processes. Furthermore, this section did not take into account the soil sample results surrounding B33 and B26, where VOCs and semivolatile organic compounds (SVOCs) were generally not detected or detected at similar levels well below screening levels. ESC&HE should revise the text of this section to specifically discuss the levels of chemicals detected in soils and provide information on the samples used to derive exposure point concentrations. The current text is misleading and fails to address a critical element of the exposure assessment and the exposure point concentration. A discussion of the nature and extent of contamination is generally provided prior to the exposure assessment. The exposure assessment should focus on the elements of the complete exposure pathway, with particular attention given to the receptors, exposure point concentrations, routes of exposure, and contaminant migration routes.

40. **Figures 9-13 (p. 45-49).** Figures 9-13 are misleading, specifically the symbols and shading used to indicate dioxin concentrations at the site. For example, the second largest circles span a concentration of 20 – 400 ppt. With regard to the proposed Strecker Forest Subdivision, the highest detected dioxin TEQ concentration was 23.32 ppt. However, the figures would suggest otherwise. The colors indicating concentrations between 5-20 ppt and 20 and 400 ppt are not significantly different (i.e., same color slightly different shade) and could be easily misinterpreted. EPA strongly recommends that these figures be revised to be more legible and provide a more accurate characterization of dioxin TEQ levels. This would include using EPA's current dioxin PRGs and proposed draft PRGs as cut-off points demarking dioxin TEQ concentrations. Furthermore, more distinct colors should be used to differentiate dioxin TEQ concentrations.

41. **Section 3.2.2b (p. 49).** The text indicates that contaminants of concern (COCs) sorbed to soil may spread throughout the proposed development by erosional forces generated by heavy storm flow. The HHRA should present data that documents these types of

catastrophic events that have occurred at this site and/or in similar settings. Based on a review of Google earth aerial photography, there appears to be substantial woody/shrub/grass cover over the entire site. This cover would inhibit site-wide erosion from continually stripping soil for re-distribution over the entire proposed development.

42. **Section 3.2.3 (p. 50).** The two approaches used to evaluate surface water exposure pathways are technically flawed and conflict with each other. This section presents three dioxin TEQ concentrations for particulates in surface water. These concentrations are mistakenly listed as 0.06 µg/kg, 3.3 µg/kg, and 0.6 µg/kg, which equate to 60, 3,300, and 600 ppt, respectively, which are much higher than the concentrations detected in the stretch of the ravine being evaluated. Per Appendix II, these are based on soil concentrations where the units were not correctly converted and as a result are overestimated by a factor of 1,000. Of equal concern, is that the HHRA erroneously estimated dermal contact for dioxin entrained on particulates in water using dermal contact equations for soils. Thus, exposure parameters applicable to soil only, such as the soil adherence factor and absorption factor (ABS), are applied to water exposure. Note that dermal absorption of contaminants in water will differ significantly from soil. Additionally, despite the technical flaws in estimated TEQ concentrations, the dioxin TEQ concentrations in water can be calculated by dividing the mass of dioxin TEQ in soils eroded from the ravine by the daily stream flow (see the Specific Comments on Appendix II). Sediment exposures can be evaluated similar to soils. Given the significant technical flaws associated with the surface water exposure pathways, ESC&HE should revise the entire exposure pathway. There are also technical flaws in the use of shear stress modeling and other hydrologic models to derive dioxin TEQ (discussed in later comments).

    This section should be revised to provide a more complete characterization of the surface water exposure pathways as indicated in its heading. The discussion only defines how exposure point concentrations were derived. This discussion should include characteristics of the ravine that affect exposures, such as depth and how often water is present within the stream. Depth is especially critical because it drives the types of activities (e.g., swimming versus wading) that will occur in the stream. Additionally, the types of activities that are assumed to occur within the ravine should be discussed in this section. These types of activities can be extracted from the intake factors provided in Appendix III. However, the technical basis and assumptions behind these activities are not provided in the appendices. Finally, this section should include a discussion on the routes of exposure for surface water exposure pathways.

43. **Section 3.2.3 (p. 50).** The text indicates the clay layer ranges from 10 to 30 ft thick. A review of the boring logs indicates the clay layer to be as thin as 1.2 ft. The text indicates that cracks in the clay will allow for some precipitation to infiltrate. A review of the boring logs does not note any cracks in the clayey soil, but rather is described as being a combination of moist, wet, soft and/or plastic. The text should be revised to accurately characterize the thickness and characteristics of the clay layer.

44. **Section 3.2.3 (p. 50 and 51).** The second paragraph states the naphthalene and trimethylbenzene were measured in groundwater at 390 and 210 µg/L, respectively. EPA was not able to locate a concentration of 210 µg/L for 1,2,4 or 1,3,5- trimethylbenzene. This

section did not provide the rational for only using monitoring well MW-06 results, nor does it discuss any of the other contaminants detected in groundwater (see below). Note that the concentrations of the trimethylbenzene isomers should not be combined. Furthermore, naphthalene and trimethylbenzenes were generally not detected upgradient on the proposed Strecker Forest site. Therefore, this section gives the false impression that these contaminants may be present at the specified concentrations in surface water within the proposed development area.

As noted above, this section did not mention other contaminants that could also be found in surface water via groundwater. It is unknown if the HHRA addressed these chemicals in the exposure assessment and risk characterization, which were detected in monitoring well MW-06.

Given these inconsistencies and the uncertainties with the approach to estimate surface water concentrations, ESC&HE should revise this section so that it specifies and provides rationale for the monitoring wells used to estimate surface water concentrations. This section should specify the exact location(s) where the exposures will occur. If surface water contact occurs upgradient, then groundwater data collected on the Proposed Stecker Forest site should also be used. The HHRA should also provide intake rates and risk estimates for all chemicals carried through the evaluation. If chemicals are eliminated from particular exposure scenarios (e.g., via risk-based screening), then that information should be provided in the HHRA.

45. **Section 3.2.3 (p. 50).** The text indicates that groundwater tables will rise and connect to the outflow of the ravine. Based on the one sampling event, groundwater levels in monitoring well MW-6 are approximately 31 ft bgs. This head difference would have to be overcome during the event. The HHRA should present evidence that this has occurred in the past.

46. **Section 3.2.3 (p. 51).** Per the text, this section states, "During stormflow, the groundwater tables in the area will rise and connect to the outflow of the ravine…" Although EPA has significant concerns regarding the attenuation factor of 0.1, this section should specify the areas of the site where the water tables will rise and connect with the outflow of the ravine. If groundwater will enter the ravine within the proposed Strecker Forest Development Site, then groundwater from that area should also be used to derive the surface water exposure point concentrations.

47. **Section 3.3.1.** Although this section lacks clarity regarding the types of exposure scenarios being evaluated (e.g., residential versus recreational), the exposure factors and assumptions provided in this section are not consistent with those recommended by EPA guidance and used in EPA risk assessments. These inconsistencies include the following:

    - This section specifies that the calculations are based on a 10 year old male child body weight of 30 kilograms unless otherwise noted. It is not clear why the HHRA did not use an average body weight for boys and girls in the age groups accounted for in the 10 year exposure duration (e.g., average body weight of boys and girls between the ages of 1-10). Under residential scenarios, EPA uses a body

weight of 15 kilograms, which represents an average body weight of young children between the ages of 1 and 6. Note that young children have a greater intake to body weight ratio (i.e., higher exposures) compared to the unspecified age group (having a body weight of 30 kg) used in the HHRA. Also, under recreational scenarios, Region 7 generally calculates the average body weight from all age groups that would potentially visit a site. Region 7 typically evaluates older children between the ages of 7-16 under recreational scenarios. EPA recommends that ESC&HE use an average body weight that is representative of the age groups accounted for in the exposure duration.

- The second sentence of the first paragraph mentions that a child spends 200 days/year playing in soil. Although the source of this value is not provided, the HHRA should mention that this exposure frequency is applicable to dermal contact routes of exposure, because it differs from exposure frequencies used for the inhalation and ingestion routes of exposure shown in Appendix IV.
- The last sentence states, "We will assume that the child has never ingested ground water and has only drunk city water, which is assumed to be free of contaminants in question." It is unclear why ESC&HE had to make an assumption regarding past groundwater use at the site. Information is available regarding the use of groundwater in the area and the source of drinking water for surrounding areas. The HHRA should be revised so that it accurately characterizes all current and future complete exposure pathways.
- The second paragraph provides a body weight of 74 kg and 87 kg, for women and men, respectively. The source(s) of these values is not provided and they exceed the mean body weight recommended by EPA guidance and the 1997 Exposure Factors Handbook (EFH). The HHRA should use the mean adult body weight of 70 kg recommended in EPA guidance (USEPA, 1989, 1991a).
- The last sentence states, "Finally, we will assume that the adults have lived at the residence since 1970 and ingested groundwater for a 30 year span before the area switched to city water." This assumption is without basis, considering the age of adjacent subdivisions, the timeframe of exposure (i.e., 1970), and that there is no data to support that the water-bearing unit containing site-related contaminants has been used as a source of drinking water. In other words, the past exposure pathway is incomplete. A risk assessment is an objective document that should evaluate current and future complete exposure pathways. Assuming that a pathway was complete in the past with an abundance of information to the contrary is unsound and misleading.

48. **Section 3.3.2 (p. 52-54).** Numerous errors and inconsistencies with regards to the dermal contact example calculation have been found and are discussed below. Note that many of these comments also apply to other routes of exposure and their corresponding intake equations provided in Appendix IV.

    - The example equations mistakenly provide a dioxin TEQ concentration of 0.02332 mg/kg (or 23,320 ppt) from soil boring B33. The dioxin TEQ concentrations were not correctly converted from pg/g (ppt) to mg/kg and as a result the concentration and corresponding cancer and non-cancer risk estimates

are overestimated by a 1,000-fold. The dioxin TEQ concentration should be 0.00002332 mg/kg or 23.32 ppt, which is provided in Tables 5 and 9 and Figure 14 of the ESA Report.

- The dioxin TEQ concentration of 23.32 ppt was detected in soil boring B19, not soil boring B33. The dioxin TEQ in soil boring B-33 was 1.15 ppt. This section should be revised so that it identifies the correct boring or uses a concentration of 1.15 ppt.
- The example does not indicate the timeframe of the exposure scenario and type of receptor (i.e., residential or recreational) being addressed in the equations. Unless ESC&HE uses surface soil samples in the derivation of exposure point concentrations, the scenario must be described as a future exposure scenario. It is not plausible that current receptors (e.g., recreational visitors) are coming into direct contact with subsurface soils, especially soils at 4-8 ft bgs, which was the depth of the sample used to derive the exposure point concentration.
- The HHRA mentions that uncertainties associated with the chemical concentrations include that the data was collected at 4-8 ft bgs and that the soil concentrations located above 4-8 ft bgs are unknown and the effects of residential construction are unknown. These assertions are problematic. First, ESC&HE has disregarded surface soil samples collected near Boring 19 that shed light on the nature and extent of contamination. Furthermore, ESC&HE has failed to address the biased sampling scheme used by Mundell. Finally, a HHRA should not be performed on a data set where the nature and extent of contamination is "unknown."
- This example mistakenly provides a surface area of 1.16 cm^2/event for a child. The example provided in RAGS Part A is 1.16 m^2/event and represents a 50^{th} percentile value of total body surface area. In addition to lacking plausibility (i.e., whole body exposure to soil), EPA dermal risk assessment guidance was updated with the issuance of EPA's RAGS Part E. RAGS Part E provides a default surface area of 2,800 cm^2 for a child between the ages of 1 and 6 and assumes that the areas available for dermal contact with soil are the face, hands, forearms, lower legs, and feet (USEPA, 2004).
- The HHRA should use the default soil to skin adherence factor of 0.2 mg/cm^2-event (USEPA, 2004). The value provided in the HHRA is applicable to the hands only. The default value provided in RAGS Part E is weighted according to the face, forearms, hands, lower legs, and feet and assumes children playing in wet soil. Also, the soil to skin adherence factor is a contact rate. EPA recommends that the equations account for the number of events the receptors will contact on a daily basis. The exposure frequency should be adjusted to days/year.
- The HHRA assumes an exposure frequency of 200 events/year for dermal contact with soils. Although it is unclear if the example is for a residential scenario, EPA generally assumes that the exposure frequency for dermal contact is identical to the exposure frequencies for the other routes of exposure. ESC&HE should use a dermal contact exposure frequency of 350 days/year for a residential exposure scenario.

- The HHRA specifies an exposure duration of 10 years. Generally, EPA assumes the default exposure duration of 30 years for a residential exposure. However, non-cancer average daily doses are typically based on a child's 6 year exposure duration because they will have a higher intake per body weight and that chronic non-cancer toxicity values are averaged over the duration of exposure (e.g., 6 years). Cancer lifetime average daily doses are based on 30 year time-weighted exposure of 6 years as a child and 24 years as an adult.
- This section erroneously cites page 6-35 of RAGS Part A, which **does not** provide a child's body weight. The sources of all exposure factors used in the document should be correctly cited.
- EPA could not replicate the non-cancer intake estimate using the numbers provided in the equation. Notwithstanding comments regarding the exposure point concentration, body weight, exposure frequency, exposure duration, surface area, and the soil to skin adherence factor, the intake and subsequent hazard quotient are overestimated by a factor of 10. It appears that the mg to kg conversion factor of 10^{-6} may not have been correctly converted to scientific notation (i.e., 1E-06).
- Similar to the non-cancer intake, EPA could not replicate the cancer intake. ESC&HE should check and recalculate all exposure and risk estimates.

49. **Section 3.4 (p. 54-55).** There are several inconsistencies and inaccuracies with the uncertainties provided in this section. A list of these inconsistencies and inaccuracies are listed below.

- The composition of dioxin TEQ is erroneously listed as an uncertainty. The results of the dioxin, furan, and dioxin-like PCB congener analyses **are** provided in the ESA Report. ESC&HE should remove these statements regarding dioxin TEQ composition.
- EPA disagrees that physical properties, such as body weight and surface area are significant uncertainties. These exposure factors are well-studied and are based on large data sets.
- ESC&HE should replace "sociological properties of the target organisms, such as habits and durations" with "behavior characteristics of the receptor, such as activity patterns and intake."
- This section erroneously lists historical groundwater ingestion concentrations as an uncertainty. There is sufficient information available that indicates that this pathway was not complete in the past or under current conditions. This statement is also problematic because previous sections indicated that it was uncertain that this pathway was complete in the past, but the referenced statement would suggest that the pathway was complete and the only uncertainty is in regards to the groundwater concentrations. ESC&HE should remove the referenced statement.
- The HHRA inaccurately states that the outflow of the ravine at different periods of the year is "unknown." Per Section 3.2.3 of the HHRA, the intermittent stream in the ravine goes dry during periods of low precipitation and floods during periods of heavy precipitation. Using historical rainfall data, ESC&HE should be able to predict the periods of the year where outflow of the ravine is significant. ESC&HE should

revise the referenced statement to indicate that the precise outflow of the ravine is difficult to predict. Assertions that the outflow is "unknown" should be removed.

50. **Section 3.5.** This section lacks text and only provides tables and figures. Text should be provided in this section describing the tables and figures.

51. **Section 3.5, Table 3 and 4 (p. 55).** The average daily doses (non-cancer intake) and lifetime average daily doses (cancer intake) provided in this table are overestimated by a factor of 10. This results in risk estimates that are overestimated by a factor of 10. ESC&HE should check and recalculate all exposure and risk estimates.

    Tables 3 and 4 do not provide an inhalation intake for dioxin TEQ because it is not volatile. Note that the inhalation of dioxin can be evaluated via the inhalation of particulates emitted from surface soil pathway. A particulate emission factor (PEF) will need to be derived to evaluate this pathway.

52. **Figures 14 and 15 (p. 56).** Figures 14 and 15 are generally unnecessary. The supporting text is lacking and the underlying modeling and calculations for these tables were not provided in the HHRA. If retained, the HHRA should provide the models and calculations used to derive these figures. The headings of these figures should be shortened and a discussion on the effects of temperature on volatilization in the text should be provided.

    In addition, per EPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)*, inhalation exposures are no longer evaluated as a dose (USEPA, 2009). RAGS Part F updates Superfund's methods for evaluating inhalation risks and hazards so that they are consistent with EPA's *Inhalation Dosimetry Methodology* (USEPA 1994). Based on this update, inhalation rate and body weight are no longer accounted for in the intake equation. Rather an exposure concentration (e.g., $\mu g/m^3$) is estimated, which takes into account exposure time. RAGS Part F and its implementation memo are available on-line at http://epa.gov/oswer/riskassessment/ragsf/index.htm. The HHRA (i.e., intake equations) should be revised to account for RAGS Part F.

53. **Section 3.5, Table 5 and 6 (p. 57).** Similar to the comments on Tables 3 and 4, the intakes are overestimated by a factor of 10 on Tables 5 and 6. EPA could not replicate the dioxin TEQ cancer intake of 6.64E-7 mg/kg-day provided in Table 6 using the intake factors provided in the HHRA and a concentration of 23.32 ppt. For reference, EPA derived an intake of 2.22E-08 mg/kg using the intake factors provided in Appendix IV and a dioxin TEQ of 23.32 ppt.

54. **Figures 16 – 20 (p. 58-60).** See the Specific Comment on Figures 14 and 15.

55. **Tables 7-10 (p. 60-61).** The headings for Tables 7 - 10 are misleading because it suggests that adults ingested groundwater from 1970 to 2000 from monitoring wells MW-1 - MW-7. It is not clear why children would not have been included. However, the HHRA provides no information or technical basis to support that impacted groundwater was used as a source of

drinking water at the site from 1970 to 2000. Depending on the results of the groundwater usability evaluation, the HHRA must evaluate future drinking water scenarios. References to past exposures that did not occur should be removed.

These tables should also define "NA," and differentiate between those that are not available because the contaminant was not detected in a specific monitoring well or that a toxicity value is lacking for that particular route of exposure.

56. **Table 11 (p. 61).** This table lists "NA" for dermal contact with naphthalene and trimethylbenzene in surface water. Both of these chemicals should be evaluated under the dermal contact route of exposure. Chemical-specific information regarding the dermal absorption of these chemicals is provided in RAGS Part E.

57. **Table 12 (p. 62).** This table lists "NA" for ingestion of dioxin in surface water. Per EPA comments on Appendix II, dioxin surface water concentration can be estimated and used to estimate the ingested and dermal contact dose from surface water.

58. **Section 4.1 (p. 64).** The text regarding EPA's cancer slope factor (CSF) and RfD for dioxin should be revised to indicate that they are proposed values. The current text suggests that they are final values.

    The last paragraph states:

    > "The EPA response to the NRC gives an RfD for dioxin of 0.7 pg/kg-day (US EPA 2010a). This dose is for all sources, including the amount in food and in environmental media from a specific site such as the Proposed Strecker Forest Development Site. For many situations, cancer potency is the most sensitive value for protecting health, especially over long periods of time. There are situations in which the non-cancer effects are the more sensitive measure, but protecting for both types of effects for future exposures will mean lower level exposures are needed to prevent cancer at a rate of 1 cancer per million people."

    Portions of this passage are inaccurate, lack clarity, or are not applicable to the proposed toxicity values for dioxin. The paragraph should state that the proposed dioxin RfD and CSF can be used to evaluate health risks resulting from exposure to dioxin in the diet and environment. The last two sentences should also be removed. In addition to lacking applicability to dioxin at the cancer risk level provided, the passage is unclear and lacks consistency with EPA's point of departure, which is one in a million individual **excess** cancer risk. If non-cancer effects were the more sensitive measure, the corresponding cancer risk would be less than one in a million. It is not clear how (nor is it plausible that) protecting for both types of effects, will mean that the lower exposure levels will need to be reached to achieve the same cancer risk level. Such a statement would apply to cumulative cancer risks.

59. **Section 4.2.** Rather than focus on the toxicity values of the chemicals of potential concern, this section performs risk-based screening and provides general information on chemical, physical, and toxic characteristics of the contaminants of potential concern. Note that risk-

based screening to identify chemicals of potential concern should be performed prior to the exposure assessment. Although information regarding a contaminant's chemical, physical, and toxic characteristics is important, specific information regarding the contaminants' toxicity values and sources should be provided in this section. A table providing the toxicity values for these contaminants is not provided until the risk characterization section.

60. **Table 13 (p. 65 – 66).** Although this table should be moved out of this section, EPA has identified several inconsistencies. These inconsistencies and recommended revisions are listed below:

    - Table 13's heading mistakenly refers to EPA's "maximum concentration level" and a footnote to this table refers to MCLs. Note that MCL is an acronym for maximum contaminant level. Regardless, MCLs are not applicable to soil. "Maximum concentration level" and MCLs should be replaced with EPA's RSLs (see below).
    - As noted in EPA's comments on the ESA Report, EPA no longer uses the Region 9 PRGs, which were last updated in October of 2004. A majority of the Region 9 PRGs are outdated due to updates in toxicity values and risk assessment guidance (e.g., RAGS Part F). EPA uses the RSLs available on-line at: http://www.epa.gov/region9/superfund/prg/. The most current version is dated November 2010.
    - Table 13 does not indicate the exposure scenarios (e.g., residential soil) that the screening levels are applicable to. This information should be provided on the table.
    - In a few instances the Table 13 notes that a chemical is "unregulated" when a screening level is not available. Note that these chemicals lack toxicity values, and therefore, RSLs were not derived. MRBCA screening levels were derived using other methods that may not be consistent with EPA guidance or policy. This table should be revised to indicate that RSLs are not available for those chemicals due to a lack of toxicity values.

61. **Table 14 (p. 66-67).** Although Table 14 should be moved out of this section, the following revisions should be made: First, as noted above, MCL is an acronym for maximum contaminant level, not "maximum concentration level." Also, for the purposes of screening, the HHRA should use EPA's tapwater RSLs. Finally, this table provides an MCL for naphthalene. Naphthalene does not have an MCL.

62. **Section 4.2 (p. 67-70).** The information provided on these pages should be retained, but the HHRA should include a discussion on the chronic effects associated with the chemicals of potential concern, including tables and text on the toxicity values used to estimate non-cancer and cancer risks. With the exception of the cancer classifications, EPA recommends moving the discussion on these pages to the appendix and revising the text to incorporate a discussion on the toxicity values used to estimate health risks. Furthermore, the references to OSHA's permissible exposure limits (PELs), which are often hundreds to thousands of times higher than EPA screening levels for air, are not applicable to the HHRA.

63. **Table 15 (p. 70).** EPA recommends using EPA's tapwater RSLs for screening metals. As indicated above, the term "maximum concentration level" should be replaced with "maximum contaminant level." It is also recommend that clarification be provided on lead's action level in the footnote. The HHRA should provide specific information regarding the location of these detections and include the analytical data for all groundwater samples collected by Mundell and others. This information is needed, given that ESC&HE alleges that widespread metals contamination is identified in groundwater across the site in Section 6.1.

64. **Section 4.3 (p. 71-73).** See comment above on Section 4.2.

65. **Section 4.4 (p. 73-74).** The information provided in this section is relevant to the risk characterization, not the toxicity assessment. This section should be moved to Section 5.0. ESC&HE should provide clarification on EPA's cancer risk range, especially cancer risks between the point of departure (i.e., 10^{-6}) and 10^{-4}. Additional language regarding cancer risk within EPA's acceptable (or target) cancer risk range can be found in OSWER Directive 9355.0-30 (USEPA, 1991b). Also, the summary information regarding the risk estimates must be revised to account for the revisions in unit conversions and daily dose calculations.

66. **Section 5.0 (p. 75).** The last sentence of the first paragraph on this page states, "These final calculations will be compared to background levels of risk range ($1x10^{-6}$ to $1x10^{-4}$) when evaluating cancer risk and an HI of 1 when evaluating total noncarcinogenic hazards for each target organ." ESC&HE should replace "background levels of risk range" with EPA's "acceptable cancer risk range." Note that the current passage mistakenly suggests that background cancer risks are between 1 in a million and in 1 in 10,000, which is not consistent with the overall (i.e., lifetime) risks of developing cancer that are 1 in 2 and 1 in 3 for men and women, respectively (NCI, 2010).

67. **Section 5.0 (p.75-76).** The paragraph spanning these pages is inaccurate and generally not relevant to the risk characterization section of the HHRA. Due to its placement and inaccuracies, this paragraph will likely mislead the reader regarding site contaminants and potential health risks. Specific discrepancies are discussed below.

    The first sentence states that per the ESA Report, the chemicals of concern include VOCs, SVOCs, PCBs, RCRA metals, herbicides/pesticides, and dioxins/furans. This is not consistent with the specific chemicals carried through the HHRA and suggests that all of these types of chemicals are present at the site and pose health risks, which is false. In addition, "chemicals of concern" is a common Superfund risk assessment term used for chemicals that pose unacceptable health risks. It is not appropriate to apply that term to the entire analyte list nor should the risk characterization section reiterate the entire analyte list. The risk characterization section should focus on the chemicals carried through the HHRA.

    The remaining portions of the paragraph discuss general acute and chronic health effects of VOCs, SVOCs, PCBs, and dioxins/furans. Although this information is relevant to the toxicity assessment and should be moved to that section, EPA has significant concerns

regarding the placement of this information. Based on the available information and because only chronic exposures are evaluated in the HHRA, acute health effects are **not** of concern at the site. Thus, the inclusion of acute health effects in the risk characterization section, which is intended to discuss the qualitative and quantitative risk estimates for complete exposure pathways, is misleading. The discussion also lacks specificity regarding the toxicity of individual chemicals. Instead, the paragraph provides a generalized discussion regarding the carcinogenic potential and acute and chronic health effects of VOCs, SVOCs, PCBs, and dioxin/furans. Again, the HHRA should focus on the health effects and risks associated with the chemicals carried through the risk assessment.

As mentioned above, this paragraph should be removed from the risk characterization section. Relevant portions of the paragraph should be added to the toxicity assessment. Furthermore, pesticides/herbicides and RCRA metals analyses **were not performed** during the Mundell sampling event nor were they identified as COCs in the ESA Report. ESC&HE should ensure that the HHRA accurately portrays the information provided in the ESA Report.

68. **Table 16 (p. 76).** Table 16, which provides toxicity values for chemicals of potential concern, should be moved to the toxicity assessment. The table heading inaccurately states that the chemicals in the table were detected above cleanup standards. The levels used to identify chemicals of potential concern in the HHRA are screening levels, not cleanup standards as discussed in previous comments. In addition, the following corrections should be made to this table:

    - Table 16 does not provide inhalation cancer toxicity values for the chemicals of potential concern. Due to the lack of information provided in the HHRA, EPA was unable to determine whether cancer risks were characterized for the inhalation route of exposure. Inhalation unit risk (IURs) are available for benzene, ethylbenzene, naphthalene, 1,1,1,2-tetrachloroethane, and 1,1,2,2-tetrachloroethane, and should be used to quantify cancer risks resulting from inhalation exposures to chemicals of potential concern. The table below provides the IURs for these chemicals and the sources of the values.

	IUR $(\mu g/m^3)^{-1}$	**Source**
Benzene	8.8E-06	IRIS
Ethylbenzene	2.5E-06	CalEPA
Napththalene	3.4E-05	CalEPA
1,1,1,2-Tetrachloroethane	7.4E-06	IRIS
1,1,2,2,-Tetrachloroethane	5.8E-05	CalEPA
Dioxin TEQ	3.8E+01	CalEPA

IRIS: Integrated Risk Information System (USEPA, 2011a).
CalEPA: California Environmental Protection Agency (CalEPA, 2011).

- The sources for the toxicity values in Table 16 were not provided. For the purposes of transparency, the source of each toxicity value must be provided in the HHRA. The HHRA should directly cite all original sources of toxicity values in accordance with OSWER Directive 9285.7-53, the sources of the toxicity values are also provided in EPA's RSL table.
- Table 16 does not provide the target organ/critical effects in which the RfD and RfC are based. This information should generally be included in the HHRA and can be obtained from the IRIS, Provisional Peer-Reviewed Toxicity Value (PPRTV), CalEPA, and ATSDR databases.
- Table 16 provides toxicity values for di-n-octyl phthalate; however, the RfD is based on a withdrawn EPA provisional toxicity value. EPA's Provisional Peer Reviewed Toxicity Value (PPRTV) database no longer provides an RfD for this compound. The RfC and its source could not be located. Thus, these toxicity values are not supported by EPA and should not be used to assess health risks. They may provide inaccurate risk estimates and contribute to the overall uncertainty of the HHRA. Per OSWER Directive 9285.7-53, the HHRA should use established toxicity values that have undergone external peer review and are publically available.
- On Table 16 it notes that CSFs are not available for ethylbenzene and 1,1,1,2-tetrachloroethane. This is incorrect, CSFs are available for these compounds. The HHRA should use a CSF of 1.1E-02 $(mg/kg\text{-}day)^{-1}$ and 2.6E-02 $(mg/kg\text{-}day)^{-1}$ for ethylbenzene and 1,1,1,2-tetrachloroethane, respectively. The source of these values are CalEPA (2011) and IRIS (USEPA, 2011a), respectively.
- Table 16 only lists trimethylbenzene, not the individual isomers (i.e., 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene) that were analyzed for in the soil and groundwater samples. The toxicological basis for evaluating these isomers together is not provided nor is this supported by EPA. The HHRA should evaluate the trimethylbenzene isomers separately. The RfC is applicable to 1,2,4-trimethylbenzene and is a PPRTV. The RfD is applicable to 1,3,5-trimethylbenzene and is a PPRTV appendix value. Unlike PPRTVs, PPRTV appendix values are generally not recommend for qualitative risk assessment.
- The RfD for 1,1,2,2-tetrachloroethane is outdated. The ESC&HE should use the value provided in IRIS of 2E-02 mg/kg-day.
- Table 16 should be revised so that it provides a RfD of 8E-02 mg/kg-day for toluene.
- Table 16 provides draft EPA toxicity values for dioxin. The EPA does not currently support the use of the draft toxicity values in the HHRA. ESC&HE should obtain the toxicity values according to EPA's toxicity value hierarchy (USEPA, 2003).
- Table 16 does not provide the chemicals' gastrointestinal absorption efficiencies (ABS_{GI}) that are used to derive dermal toxicity values from oral toxicity factors. It is unclear if these adjustments were made in the HHRA. See RAGS Part E on how to apply ABS_{GI}.

69. **Table 17 (p. 77).** The soil dioxin TEQ cancer risks for soil borings B26 and B33 (i.e., B19) and hazard quotient for soil boring B26 are overestimated by a factor of 10,000 given that the concentrations in ppt were not correctly converted to mg/kg (ppm) and the 10-fold overestimate of the cancer and non-cancer intakes. The non-cancer ingestion HQ for soil boring B33 is overestimated by a factor of 1,000. The average daily dose provided in

Tables 5 does not appear to have been carried forward in the HQ estimate. The risk estimates and Table 17 must be revised (i.e., mathematical errors corrected) so that the HHRA provides an accurate assessment of potential health risks.

The HHRA lacks a summary table that shows the risk estimates for all chemicals and complete exposure pathways. This information is critical for transparency and a critical piece of a human health risk assessment. Furthermore, this information is necessary for conveying risks posed by all compounds and to confirm the accuracy of risk estimates. As noted in many previous comments, numerous errors and inconsistencies have been identified in the HHRA and similar mistakes may have also been made in the calculation tables that were not included in the HHRA.

70. **Section 5.0 (p. 77).** Per previous comments, the text requires revisions with regards to the cancer risk and non-cancer hazard index estimates. The revised hazard indices (HI) will be below 1, so the discussion regarding high non-cancer risk is not relevant and must be removed. The discussion regarding cancer risks will also have to be revised given that the risks should fall within the range from less than 10^{-6} to no greater than 10^{-5}. All risk estimates should also be rounded to one significant digit.

    EPA has serious concerns over the sentence that discusses the risks for adults who have consumed "on-site groundwater." Suggesting that people have used on-site groundwater as a source for drinking water is false and misleading. People (children and adults) have not used on-site groundwater as a source of drinking water. Although existing site data indicates that the drinking water pathway is incomplete for the water-bearing unit evaluated in the HHRA, the HHRA should more clearly define the exposure timeframe of the exposures.

71. **Section 5.1.** The uncertainties section is intended to be a balanced discussion regarding the uncertainties associated with the HHRA that may over or underestimate health risks. However, while very brief, the HHRA tends to focus only on those that may underestimate health risks and is rather dismissive of the uncertainties that would overestimate health risks. This section does not address any uncertainties with the exposure modeling (e.g., erosion modeling) and underlying assumptions, nor does it discuss uncertainties with the exposure pathways (i.e., drinking water pathway). The uncertainties section should be revised so that it provides a balanced and detailed discussion on site-specific uncertainties that may contribute to an over or underestimation of health risks.

72. **Section 5.1.1 (p. 78).** ESC&HE should remove "one hundred percent" from the last sentence of the first paragraph. Numerous inaccuracies have been identified in the HHRA and several assumptions are based on only anecdotal information.

73. **Section 5.1.1 (p. 78-79).** EPA has concerns regarding the discussion on chemical interactions, which include the following:

    - The risk characterization fails to evaluate cumulative cancer risks and cumulative target organ/critical effect HIs. This is a necessary step in risk assessments and is

critical for determining whether site-related risks exceed acceptable risk levels. It will also reduce uncertainties pertaining to chemical interactions.

- The discussion regarding interactions is incomplete. The text does not provide any information regarding the types of chemical interactions (e.g., addition, potentiation, synergism, antagonism). Given that this document is intended for the public, the types of interactions and their definition should be provided.
- This section mentions that some chemical interactions are well-documented and understood. Although true, interactions are generally observed at concentrations that are much higher (i.e., many orders of magnitude) than the levels detected at the site. Little or no data is available on interactions at environmental doses.
- ESD&HE should revise the sentence that states, "…but to determine interactions of all chemicals is impossible." The passage could be replaced with: "… but to determine interactions of all chemicals is not currently possible."

74. **Section 5.1 (p. 79).** The last paragraph erroneously states, "Uncertainty in an exposure assessment can lead to a miscalculation and underestimation of a risk." Miscalculation generally refers to mathematical errors, which are not related to the exposure assessment. A majority of exposure factors are based on upper-bound estimates in order to evaluate the reasonable maximum exposure and to ensure that health risks are not underestimated. In fact, the exposure factors are more likely to lead to an overestimation of health risks (assuming default values are used). Finally, the brief discussion provides no examples from the exposure assessment that may cause health risks to be over or underestimated. The referenced paragraph should be revised to provide a balanced discussion on exposure factors that may lead to an over or underestimation of health risks. The discussion regarding "miscalculations" should be removed.

75. **Section 5.2 (p. 79-80).** The HHRA treats data gaps separate from uncertainties. Data gaps contribute to uncertainty and should be discussed under the context of uncertainty. The following inconsistencies have been identified:

    - Although this section refers to detection limits, ESC&HE should remove any reference that chemical readings come back as "zero." Rather, the HHRA should accurately state that chemical readings may be non-detect.
    - The definition of detection limit is not accurate. Per RAGS Part A, detection limit is defined as the lowest amount that can be distinguished from the normal "noise" of an analytical instrument or method.
    - This section states, "Often these undetectable amounts of chemicals are not harmful." This statement is unnecessary and irrelevant to this HHRA given the detection limits and the exposures being evaluated. It may mislead readers and thus should be removed.
    - Although detection limits for non-detect results are critical for estimating exposure point concentrations for data sets containing detects and non-detects, this section mentions that they are important in acknowledging data gaps. While data gaps may exist when detection limits are above screening levels, detection limits are generally not of concern when they are below screening levels and would not be considered a "data gap" or "uncertainty." The slight underestimate of risk would be negligible.

Unless the HHRA can provide site-specific information where detection limits were insufficient (i.e., above screening levels) and contribute to uncertainty regarding health risks, then the discussion should be removed.

- The last sentence of the first paragraph states, "Assuming that a non-detected contaminant does not exist, even in small amounts, often leads to underestimated risk (Smith, 1991)." This statement mischaracterizes the information provided on the EPA Region 3 web-site, which addresses the treatment of non-detects in deriving exposure point concentration for chemicals with non-detect and detect results. It does not specifically address chemicals that were non-detect for all samples. Furthermore, non-detected chemicals (having adequate detection limits below screening levels) would have a negligible effect on risk estimates. The referenced statement should be removed.
- The discussion regarding a lack of RfDs and RfC is redundant.
- The statement regarding a lack of regulatory standards is inaccurate. The chemicals in question lack toxicity values to derive screening levels. Regulatory standards are not synonymous with screening levels/RSLs/PRGs.
- The text seems to indicate the absence of soil data from the entire location. Soil samples were collected and submitted for analysis from over 50 locations in the proposed development area.
- The text indicates that monitoring wells are located on the north, east and south edge of the property. The text should be modified to indicate that monitoring well MW-4 is located near the ravine in the central portion of the site.
- The text indicates the western pond area may develop into a sinkhole into which groundwater flows. Based on depth to water measurements from site monitoring wells MW-2 (112.96 ft) and MW-4 (49.73 ft) and the site topography, groundwater in the pond area is probably greater than 50 ft bgs and may be closer to 100 ft bgs. The development of a sinkhole that extends to groundwater seems unlikely in this area.

76. **Section 6.1 (p. 81).** This section, which is intended to discuss the findings of the HHRA, is inaccurate and addresses issues that were not previously discussed in the HHRA. These discrepancies are listed below.

- This section inaccurately states that the residential soil cleanup standard of 1,000 ppt for dioxin was sufficient to define the extent of site contamination from the adjacent Bliss-Ellisville Site. The nature and extent of contamination is not defined solely by a cleanup standard. Rather EPA defined the extent of previous investigations according to detailed information regarding the types of releases that occurred at the Bliss-Ellisville Site and potential migration routes.
- The second paragraph states, "Our review found that samples according to depth were lacking across the site and were concentrated entirely in the northwest area." It is not clear if the HHRA is referring to a lack of sampling in the northwest area or that sampling was concentrated in the northeast area of the site (i.e., near the NPL site). Regardless, environmental investigations focus on (i.e., are biased toward) areas of the site that are most likely to be impacted by contamination, based on field observations and historical information/data gathered about the site regarding past activities and land uses that may have resulted in contamination. The investigations

conducted at the proposed Strecker Forest Development Site have focused on areas of the site most likely to be contaminated and extend from the southwest portion of the site (i.e., pond area) to the NPL area bordering the northwest area of the site. For example, the selection of soil samples for laboratory analysis during the ESA was primarily based on the highest PID field readings.

- This section mentions that sampling indicates soil contamination by dioxin and dioxin-like compounds, metals, and VOCs. This is not consistent with the HHRA, which discusses dioxin and dioxin-like compounds, VOCs, and SVOCs. Also, metals were not part of the ESA soil sample analysis.
- This section erroneously states, "Groundwater contamination with metals or volatile organic chemicals, or both is present (in most places sampled) at concentrations above background or regulatory (drinking water) standards." First, the HHRA has **not** evaluated background so it is not possible to conclude that chemicals detected in groundwater were detected above background. This is especially critical for metals. While the HHRA is lacking a figure and table containing metals, SVOCs and VOCs contamination above regulatory standards it is generally confined to the northeast corner, which is located in an area that is not part of the proposed development. Detections in the area of the proposed development, most of which are J-coded, are generally below screening levels. Furthermore these detections were generally found in water samples collected from soil borings, not competent monitoring wells.
- The last portion of this section briefly discusses the vapor intrusion pathway. The vapor intrusion pathway was **not** addressed in any previous sections of the HHRA including the exposure assessment, the conceptual site model, and risk characterization sections, which address complete exposure pathways.

Per the discrepancies above, this section requires a complete revision so that it accurately characterizes the scope and intent of previous investigations. This includes specifically describing the uncertainties with the investigations that provided the data for the HHRA. A more complete and accurate characterization of the groundwater contamination is also necessary and should be supported with data. Assertions that contaminants are above background should be supported with data, or otherwise removed. With regard to groundwater, consideration should also be given to the quality of the analytical data and how and where the sample was collected (e.g., monitoring well vs. soil boring and usable aquifer vs. non-usable groundwater). Lastly, the findings section of a HHRA is not an appropriate section to discuss a pathway not previously addressed. This pathway should be carried through the entire HHRA, if there is the potential that it is a complete pathway. Models and calculations should be provided.

77. **Section 6.2.** Per previous EPA comments, the conclusions section requires a complete revision. The following inconsistencies have been identified:

    - This section states, "The completed exposure pathways, including potential exposure to metals and volatile organic compounds in groundwater result in appreciable risks to human health, especially resident children." The HHRA did not evaluate a child's exposure to groundwater.

- The text indicates that contamination from almost any uphill location can move in multiple directions and carry contaminants to almost any residential location. This generic statement should be put into the context of the proposed development area. Without the proper context, these statements are potentially alarming and of limited value to the site evaluation.
- The text indicates VOCs from groundwater can result in vapor intrusion into current and future residences, based on monitoring well tests and initial models of groundwater flow in the area. However, modeling inputs and well tests were not provided for review. In addition, the vapor intrusion pathway was not evaluated in the text nor was data provided for review.
- The last sentence of the first paragraph states that there is not enough data to conclude that risks are not elevated. If ESC&HE contends that there is insufficient data (i.e., data gaps) to conclude that risks are not elevated, then there is also not enough data to conclude that risks are elevated.
- The second paragraph mentions that the comprehensiveness of the HHRA and prevalence of assumptions are directly affected by the amount and spatial distribution of available data (i.e., ESA and MDNR groundwater data). The HHRA should acknowledge and account for other data sets that are available for the site, but were excluded from the HHRA.
- The statements regarding dioxin posing cancer and non-cancer threats will need to be revised following the corrections to the intake calculations.

78. **Section 6.3.** Similar to comments on Sections 6.1 and 6.2, the recommendation section must be rewritten to account for revisions addressed in previous comments. Listed below are EPA concerns regarding Section 6.3.

- ESC&HE recommends that access to the site needs to be restricted and appropriate warnings placed. The risk estimates for direct contact with soils (when revised to account for the mathematical errors) do not warrant these actions and no other information has been provided (nor is available) to support these actions.
- ESC&HE recommends the use of personal protective equipment. It is unclear who this recommendation is intended for and it would not be an appropriate recommendation for nearby residents.
- This section mentions that buildings on the property may be contaminated with various chemicals and they should be evaluated, removed and properly disposed. This information and relevant exposure pathways were not previously addressed in the HHRA. The recommendations should be reflective of the findings of the HHRA.
- The last paragraph mentions that the community should be notified and cautioned against entering the property. It is unclear what property is being referred to. The HHRA (i.e., soil risk estimates) has not supported such actions on the proposed Strecker Forest Development Site.

79. **Appendix II.** The modeling to predict dioxin concentrations is technically flawed. Below is a list of flaws identified on Appendix II.

    - ESC&HE has used an oversimplified approach of using average rainfall totals over three months to estimate the volume of water that would flow in the ravine during flooding events. No data has been provided to support the flow used in the modeling.
    - The erosion modeling is intended to be applied to erosion within the stream. However, the modeling presented in the appendix has been applied to the whole drainage area. Note that the critical shear stress model used in this appendix is applicable to streambank erosion.
    - The model assumes a silt/clay content of 100%, but does not specifically state that this assumption had to be made to be consistent with the critical shear stress model used to estimated soil erodibility.
    - The calculated mass of soil leaving the site during high flow events over a three month period is equivalent to approximately 233 m^3 of soil (assuming a bulk density of 1,500 kg/m^3). This is not possible based on the conditions and characteristics of the site.
    - The dioxin TEQ concentrations are overestimated due to miscalculations in unit conversions.
    - The equations used to estimate dioxin TEQ concentrations sorbed to particulates are flawed stemming from the use of a conversion factor of 1 kg/m^3. No information is provided regarding this factor and based on the equation provided this conversion factor cannot mean that 1 kg of soil is contained in 1 cubic meter of water. The only other conversion would be for converting the volume of water to a mass, but a cubic meter of water has a mass of 1,000 kg. Therefore, the mass of the volume of water in the denominator has been significantly underestimated. However, because the equation divides a mass of dioxin in soil (which was derived by multiplying the mass of soil by the dioxin TEQ concentration) by the volume of water over the same period of time (i.e., a day), there is no need to convert the concentrations to µg/kg. Removing the flawed conversion factor and converting the water volume to liters will result in a dioxin TEQ concentration in surface water.

80. **Appendix IV.** ESC&HE should revise this appendix to more clearly indicate the exposure pathways being evaluated (e.g., residential receptors direct contact with surface soil).

81. **Appendix IV (Equation 1a).** Equation 1a provides a dioxin TEQ concentration of 0.00371 mg/kg (or 3,710 ppt) for soil boring B26. Per the ESA Report, the dioxin TEQ from soil boring B26 is 3.71 ppt or 0.00000371 mg/kg. In addition, the soil sample collected at soil boring B26 was collected from a depth of 8-10 feet below ground surface (bgs) per Tables 5 and 9 and Figure 14 of the Mundell Report, not 4-8 feet bgs as indicated in the HHRA. These inconsistencies must be revised and intakes and risks recalculated. See also the specific comments regarding the other dermal contact exposure factors at B-33.

82. **Appendix IV (Equation 1b).** The soil sample depth must be revised. Revisions are also necessary for other exposure factors. However, per RAGS Part E, dermal contact with VOCs in soil is a negligible pathway and need not be evaluated because they would tend to be volatilized from the soil on skin and should be accounted for via inhalation (USEPA, 2004).

83. **Appendix IV (Equation 1c).** The soil depth must be revised. Revisions to the other exposure factors are also necessary per other specific comments on the dermal contact route of exposure.

84. **Appendix IV (Equation 1d, 1e, and 1f).** The following revisions should be made to this section.

    - Benzene should be replaced with dioxin TEQ in Equation 1d.
    - The dioxin TEQ concentration in Equation 1d should be revised to 3.71 ppt or 0.00000371 mg/kg.
    - The soil sample depth for boring B26 should be revised to 8-10 ft bgs.
    - The HHRA assumes an incidental soil ingestion rate of 200 mg/day (USEPA, 1991). This upper-bound soil ingestion rate is applicable to young children between the ages of 1 and 6. Unless the HHRA is revised to account for a 30-year exposure that includes young children, the HHRA should use the default soil ingestion rate of 100 mg/day recommended by EPA guidance (USEPA, 1991a). This soil ingestion rate is applicable to older children and adults. Also, this section should be revised to state that the soil ingestion rate is an upper-bound soil ingestion rate, not an average ingestion rate as mistakenly indicated in the HHRA. For additional discussion on these values, see USEPA, (1991a).
    - The HHRA assumes an exposure frequency of 365 events/year. Exposure frequency should be expressed in days/year. Note that soil ingestion is based on mg/day and accounts for a receptor's daily soil and dust (e.g., soil-derived indoor dust) ingestion, and is intended to address chronic exposures. The exposure frequency should also be adjusted to the upper-bound residential exposure frequency of 350 days/year (USEPA, 1991) to account for vacations and other days away from the home.
    - Revisions to the exposure duration, age of receptor, and body weight are also recommended per previous comments.

85. **Appendix IV (Equations 1g and 1h).** The inhalation pathway should be assessed consistent with RAGS Part F. The equations provided are technically flawed. Per the exposure factors, they do not result in a dose (i.e., mg/kg-day) as intended. The chemical concentration is in mg/kg and it is not converted into an air concentration via the use of a volatilization factor. Note that the inhalation rate is in m^3/day. In addition, these equations do not provide the models and soil concentrations that were used to derive the VOC concentrations. It appears that Henry's Law constant was multiplied by the soil concentration. This is a misapplication of Henry's Law and oversimplification of the volatilization of chemicals in soils and the subsequent migration, dispersion, and diffusion into atmospheric air. When evaluating the inhalation of volatile chemicals emitted from soils, a volatilization factor should be derived and applied to the soil concentration. Equations for deriving chemical-specific volatilization factors are provided in USEPA (2002b). For metals, dioxin, and other chemicals lacking

volatility, a particulate emission factor should be derived to evaluate the inhalation pathway (See also USEPA, 2002b).

Under the exposure time parameter, which is not used in the inhalation equation provided (but would be used following RAGS Part F methodology); it is assumed that there is exposure to "high levels through the basement." There is no support for this assumption that high levels of contaminants are migrating through the basement. The existing site data **does not** support this assertion. It is also unclear what pathway is being referenced, but the equations and simplified modeling are not relevant to nor should they be applied to the vapor intrusion pathway. The pathway being presented (via the equations and CSM) is applicable to inhalation of volatiles emitted from soils in outdoor air. If the vapor intrusion pathway is a concern for soils, then a separate evaluation must be performed using the Johnson & Ettinger Model. However, based on EPA's review of the existing soil data, the concentrations are negligible with respect to the vapor intrusion pathway.

86. **Appendix IV (B-33).** The comments provided on the ingestion, dermal contact, and inhalation routes of exposure for B-26 also apply to B-33.

87. **Appendix IV (Equation 4c).** Again, the evaluation of dermal contact with dioxin TEQ in surface water is technically flawed. The erosion modeling and intake equations must be revised so that intake is evaluated via dermal contact with surface water.

Phase II Environmental Site Assessment Report, March 3, 2010

General Comments

1. The scope of the ESA Report is generally consistent with ASTM standards relating to the Phase II environmental assessment process (ASTM Practice E 1903 – 97). The primary objectives of conducting a Phase II ESA, as stated in the ASTM standard practice, are to investigate recognized environmental conditions (RECs) identified in the Phase I ESA for the purpose of providing sufficient information regarding the nature and extent of contamination to assist in making informed business decisions about a property and, where applicable, to satisfy the innocent purchaser defense under the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA) as defined in 42 U.S.C. § 9601(35)(B). A Phase II ESA is not intended to provide a full characterization of a site's environmental conditions or the level of investigation necessary to support remedial decision-making. The ESA Report provides a screening level assessment that is best suited for identifying areas requiring further investigation. The usefulness of the Mundell Report as a basis for risk assessment or remedial planning is limited.

2. Based on EPA's review of the data provided in the ESA Report, it will yield inaccurate and unreliable risk estimates for decision-making. Risk assessments are generally performed on robust data sets where the nature and extent of contamination has been fully delineated. The samples collected in the Phase II ESA are more in line with a screening level assessment. EPA's main concerns regarding the existing set include, but are not limited to the following:

First, the sampling scheme was biased because it focused on areas of suspected contamination and the samples were collected from depth intervals with the highest photoionization detector (PID) readings or visible signs of impacts. As a result, exposure concentrations would be expected to be biased high. Second, only one sample was collected and analyzed from each soil boring (i.e., the depth interval with the visible impacts or highest PID reading). Typically, data used in risk assessments include samples collected at multiple depths from a single boring. Given that soil samples were not collected from the other depth intervals and that the same depth intervals were not consistently collected across the site, there are significant uncertainties that the data will provide a representative characterization of exposure concentrations (horizontally and/or vertically) across the site. Furthermore, the surface soil sampling depth intervals lack consistency. Some intervals span the 0-1 foot below ground surface (bgs) interval while others span the 0-2 and 0-3 foot bgs intervals. Although this may not be of concern for screening the site, these intervals lack comparability for estimating exposure point concentrations under current conditions. Surface soil exposures generally involve exposures to contaminants (especially contaminants lacking volatility, such as dioxins) in the top 2 centimeters of soil (USEPA, 2002b). The inclusion of large sampling intervals could over or underestimate the concentration at the surface. EPA has similar concerns over the subsurface sampling intervals.

3. The Report often refers to the screening levels used to evaluate the sample results as "cleanup" levels. It is generally not appropriate to refer to screening levels as "cleanup" levels. It suggests that any concentration above a screening level requires cleanup. The ESA Report should not refer to screening levels as cleanup levels.

4. The Report briefly discusses qualified data and refers to Appendix C for QA/QC testing; however, the Report lacks a discussion of how qualified data may affect the data evaluation (i.e., comparison to screening levels), especially the dioxin and furan results, which have exceptionally low screening levels. EPA was also unable to locate data validation reports. Note that a large percentage of the dioxin and furan results were qualified as estimated values ("J" or "QJ") and some constituents were detected in the associated method blank. Many of the VOC detections, which had exceptionally low detection limits well below their screening levels, were also qualified. In addition, there are some discrepancies between duplicate samples, which are likely attributable to typical field and analytical variability. For example, the TEQ concentration for soil boring B-06 and its field duplicate are 0.27 and 6.66 parts per trillion (ppt), respectively. 2,3,7,8-TCDD was only detected in the field duplicate. Given the uncertainties associated with the accuracy of qualified data, it is critical that the risk assessment provide a detailed and balanced discussion on the data quality and how it affects site health risks. Data validation reports should be provided with the ESA Report and referenced in the risk assessment. Note that data quality and usability assessments are critical elements of the risk assessment process (USEPA, 1989).

5. The Report has set a background TEQ concentration of 4.95 ppt that is based on three samples collected at depth. Then this concentration is used in combination with the dioxin/furan congener fingerprint to determine whether the soil samples were related to a background source or non-background dioxin source material. EPA has significant concerns with this approach, especially if it is continued in the human health risk assessment. First,

the background concentration is based on too few samples to be considered statistically reliable for use in a human health risk assessment. Typically, 10 to 20 background samples are recommended for evaluating background, which is often based on a statistical estimate of the average or upper-bound confidence limit. Furthermore, surface soils may be more affected by anthropogenic background, and background determination should have included surface soil samples. Finally, the congener content analysis is problematic, which is best illustrated by the soil sample results for B-14, B-23, and B-28, which failed the background analysis. Although 2,3,7,8-TCDD was not detected in these samples, they failed due to a single qualified detection of pentadioxin at a concentration of less than 1 ppt. Almost all of the other dioxin and furan congeners were lower in these samples compared to their respective background values. Given the uncertainties regarding qualified data, especially at the analytical levels being evaluated and with consideration given to the other congener results, it is EPA's judgment that a single qualified detection is not indicative of a non-background dioxin source material.

6. The ESA Report includes only a limited amount of data that is useful for characterizing current levels of potential dioxin exposure, and does not apply the appropriate EPA dioxin criterion for comparison purposes. The dioxin cleanup criterion of one part per billion for residential soils which was applied during the 1998 EPA cleanup of the Bliss and Contiguous Properties remains current and valid. As pointed out in previous EPA correspondence to the City of Wildwood, EPA has proposed to lower the Preliminary Remediation Goals (PRGs) for dioxin in soil, but it is unclear at this time if the dioxin PRGs will be revised and what, if any, impact this action would have on assessment of conditions at the proposed Strecker Forest subdivision.

7. The ESA Report's text and tables focus on the results of the ESA sampling. In addition to providing the results of the ESA sampling, Figures 13 and 14 provide historical sample results. The complete analytical results for the historical samples are not provided. Given that the Report uses the historical samples in the figures to identify areas that exceed screening levels, EPA recommends that the ESA Report provide the complete analytical results for these samples in the data summary tables or in an appendix.

8. The soil data presented in the ESA Report were compared to the most current version of the EPA RSLs, which are dated November 2010. The maximum soil concentrations in the samples collected by Mundell exceed the respective RSL for six compounds detected in a single sample. This single sample was collected from the NPL area at a depth of 7-10 feet below ground surface. Assessment of the data must consider the potential for exposures to occur in this area. The NPL area is not included in the proposed development, and the potential for exposure to subsurface soils in this area is not considered likely under reasonably anticipated future use. The ESA Report also presents historic data from the previous Phase II Environmental Site Assessment. One test pit sample collected near the western pond area marginally exceeded the EPA RSL for a single compound. All soil levels reported in the Mundell report, including the EPA RSL exceedences, fall within EPA's acceptable cancer risk range of 1E-04 (1 in 10,000 chance of developing cancer) to 1E-06

(one in a million) and below a non-cancer hazard quotient of 1. The soil data presented in the ESA Report do not indicate that conditions warrant source removal or cause concern for protection of human health for the proposed residential development.

9. The ESA Report presents analytical results from shallow ground water samples collected from the seven monitoring wells and three boreholes. Assessment of ground water data must consider the potential for migration and the potential for ground water use (e.g., drinking water). The use of shallow ground water for any purpose has not been identified in the vicinity of the proposed subdivision. A number of private wells drawing from the deep aquifer have been identified, but no impacts to the deep ground water quality have been identified in well testing performed by the State. The shallow ground water contaminants identified in the ESA Report only marginally exceed any standards for domestic use or potential vapor intrusion, and only in the NPL area in the northeast portion of the parcel. Investigations performed by the State indicate that the shallow ground water in this area is moving away from the proposed development and is not a cause of concern for the proposed Strecker Forest Development Site. The ESA Report does not consider site-specific factors in the assessment of vapor intrusion risk, and no potential source area was identified. Mere exceedence of a conservative health-protective screening criterion without further assessment of site-specific conditions does not mean that an unacceptable human health risk exists.

10. Dioxin congener analysis was performed for soil and ground water samples collected during the Mundell ESA. Dioxin toxic equivalence (TEQ) concentrations were calculated by Mundell for the reported data. Dioxin TEQ concentrations exceeding the EPA MCL of 0.03 ppt were not detected in any of the ground water samples collected by Mundell. Dioxin TEQ concentrations for surface and subsurface soil samples collected in the area of the proposed residential development also did not exceed the current interim EPA PRG of 1,000 ppt for dioxin in residential soil. In January, 2010, EPA proposed to revise the interim PRG levels for dioxin in residential soil to 72 ppt. EPA has not completed decision-making for the potential revised PRG levels, and it is unclear at this time what, if any, effect a revision to dioxin PRG levels would have on assessment of conditions at the Bliss and Contiguous Properties and the surrounding area. Regardless, all dioxin TEQ concentrations reported in the Mundell Report in the area proposed for residential development were less than the revised interim PRG level for dioxin in residential soils proposed by EPA. The maximum surface soil dioxin TEQ concentration reported in this area was 6.96 ppt and the maximum subsurface TEQ concentration was 23.32 ppt.

    Dioxin TEQ levels exceeding the current 1,000 ppt level for residential soils were exceeded at two sample locations in the northeast portion of the subject parcel. Reported dioxin TEQ levels up to 6,527 ppt were reported for a subsurface soil sample collected from a depth of 7-10 feet below ground surface (bgs) at monitoring well MW-6 location. A dioxin TEQ concentration of 152 ppt was reported in a subsurface sample collected from a depth of 0.5 – 2.0 ft. bgs at the location of soil boring B-10, also in the northeast portion of the site. All other reported dioxin concentrations were less than the current or proposed EPA PRG levels for dioxin in residential soil. The reported exceedences of dioxin PRGs in the northeast portion of the parcel were subsurface discrete samples which cannot be used to characterize exposure potential and associated health risks. Not only were the samples collected from

subsurface soil which is not assessable for direct contact, but health risks associated with dioxin TEQ are based on overall levels across an exposure unit, not a single point. The presence of dioxin TEQ levels exceeding 1,000 ppt does not necessarily indicate an unacceptable health risk in the northeast portion of the parcel and would not affect conditions in the area proposed for development. Further assessment of dioxin TEQ levels in the northeast portion of the parcel would be required if further characterization of potential health risks in this isolated area is of interest.

11. The dioxin congener data presented in the Mundell Report is suspect due to the attachment of data qualifiers. For example, all of the detected dioxin congeners that contribute to the maximum reported dioxin TEQ of 23.32 ppt in the area proposed for development represent estimated values. Dioxin was also detected in method blanks associated with the corresponding dioxin congener analysis. EPA Region 7 standard practice is to exclude qualified (estimated) dioxin congener data in a definitive calculation of dioxin TEQ levels. The use of the qualified data for TEQ calculation in the Mundell report is questionable.

12. The Mundell Report and draft HHRA made no attempt to show correlation between the dioxin congener profile detected in Mundell samples with the dioxin congener of concern at the Bliss and Contiguous Properties where dioxin impacts have been characterized. During investigation and cleanup actions conducted by EPA at the Bliss and Contiguous Properties, the specific congener 2,3,7,8-TCDD was used as an indicator chemical due to its prevalent contribution to TEQ levels at the site. In the samples collected by Mundell from the area proposed for development, 2,3,7,8-TCDD levels were below detection limits or were not present in significant concentrations. The congener distribution in Mundell samples collected from the area proposed for development is more consistent with ubiquitous dioxin levels typically found near developed areas, and appears unrelated to hazardous waste activities that resulted in contamination of the adjacent Bliss and Contiguous Properties. The Bliss-related dioxin congener, 2,3,7,8-TCDD, did contribute significantly to dioxin TEQ levels reported in the northeast portion of the parcel, indicating some level of potential impact from the adjacent NPL site.

Specific Comments

1. **Executive Summary (p. 8).** Under the "Solid Waste Disposal Area" heading the Report states, "Based on observations made during the field study, the solid waste area poses an immediate human health and safety risk to trespassers entering the property. This is the result of the poor condition of the exposed waste materials, metallic debris and miscellaneous materials found in those areas." Given that the Report's primary focus is on human health risks resulting from exposure to chemicals in soil and groundwater, EPA recommends that the ESA Report provided a clearer distinction between physical safety hazards and health risks resulting from exposure to soil and groundwater. For example, EPA offers the following change to the first sentence above: "Based on the observations made during the field study, the solid waste area poses a physical safety risk to trespassers entering the property."

The second paragraph under the "Solid Waste Disposal Area" mentions that soil sampling results may vary from the conditions beneath particular solid waste areas. Then it mentions that without the complete removal of the accumulated waste and "associated" impacted soils, it is not possible to assess that the site conditions are acceptable for development. The data does not indicate significant impact to soils in the solid waste disposal area. It is not clear how a risk assessment could be performed for this area when the Phase II ESA has not characterized conditions. A risk assessment is performed after the nature and extent of contamination have been defined. EPA recommends that the Phase II ESA specify the data gaps, if any.

2. **Executive Summary (p. 9).** In a couple instances on this page, the Report mentions environmental risks. Unless the discussion is intended to be inclusive of ecological risks, EPA recommends replacing environmental risks with human health risks.

3. **Executive Summary (p. 10).** The Report recommends that the NPL area, the central solid waste, eastern disturbed area, and the western pond area be restricted with fencing and signage to prevent direct contact with exposed surface materials present in those areas. The technical basis for this recommendation has not been provided nor does the data support the recommendations regarding site access restrictions. The analytical results show that VOCs, SVOCs, and PCBs in surface soil were either not detected or were detected below risk-based residential soil screening levels. 2,3,7,8-TCDD and TEQ levels in surface soil fall below the current residential soil PRG of 1,000 ppt. Notwithstanding a couple of the historical samples where the sample depth is not provided, the VOCs, SVOCs, and PCBs screening level exceedences found during the Phase II ESA sampling are confined to a single subsurface soil sample collected at the 7-10 foot depth interval. The maximum detected concentration of 2,3,7,8-TCDD, which exceeds the current residential soil standard, was also detected in this subsurface soil sample. Given that the levels of VOCs, SVOCs, and PCBs in surface soil are below screening levels and that dioxin levels in surface soils are below the current residential PRG, it is unclear why the Report recommends that access to the aforementioned areas be restricted to avoid direct contact with surface material.

4. **Executive Summary (p. 11).** The second recommendation on this page discusses the removal of impacted soil in the solid waste disposal area and vicinity of the western pond. Based on the data, it is unclear why the Report recommends soil removal in these areas when VOCs, SVOCs, PCBs, and dioxins were either not detected or detected below and/or within EPA's target risk range.

5. **Section 3.7 (p. 41).** In addition to comparing soil and groundwater analytical data to MRBCA screening levels, the Report compares the data to the 2004 Region 9 Preliminary PRGs. The 2004 Region 9 PRGs, which are outdated, are no longer used by EPA and have been replaced by EPA's RSLs (USEPA, 2010). The RSLs, which account for the most current EPA risk assessment guidance and policy and toxicological data, should be used in the report.

This section also notes that the soil analytical data were compared against Region 9 PRGs to determine if the detected concentrations exceed acceptable human health risk levels. EPA screening levels do not define acceptable human health risk levels. They are intended to screen sites for additional characterization. While contaminant concentrations may exceed screening levels, they may not pose unacceptable health risks.

6. **Section 3.8.** This section makes several comparisons of the groundwater analytical data to the screening levels in EPA's 2002 vapor intrusion (VI) guidance. All of the screening levels in that guidance are outdated with the issuance of RAGS Part F (USEPA, 2009). Also, many chemicals' toxicity values have changed since 2002. The Phase II ESA should derive the groundwater-to-indoor-air screening levels by applying a conservative attenuation factor (0.001) to the residential ambient air RSLs. The full equation that is used to derive the groundwater VI screening levels is provided in Appendix F of the 2002 VI guidance and the attenuation factor is recommended in EPA's VI database (USEPA, 2008b). A more thorough evaluation of the VI pathway is needed that is consistent with EPA's VI guidance and the Interstate Technology & Regulatory Council's VI guidance (ITRC, 2007). This would include developing a conceptual site model for the VI pathway, screening the existing data, identifying data gaps, if any, and documenting the evaluation.

7. **Section 3.9 (p. 51).** This section briefly discusses the results of the dust samples collected at the Dozier Garage and provides a TEQ concentration of 8.5 parts per trillion (ppt) for the wipe sample. No information is provided in the Report as to how a wipe sample concentration, which is typically expressed in mass per area (e.g., ng/cm^2), was converted to a mass per mass concentration. Although it is not certain how this conversion was made and how reliable the estimate might be, EPA recommends that the equations, assumptions, and other information used to complete the conversion be provided in the ESA Report. EPA also recommends that a brief discussion of the wipe sampling techniques be provided in Section 3 and that wipe sample results and TEQ calculations be included in the data tables. Note that wipe samples are generally not used to assess health risk given the complications with estimating exposure.

8. **Section 4.3.2.2 (p. 55).** The second paragraph on this page states, "...while the non-cancer risk PRG (1E-05 risk) for residential soil is..." Note that the non-cancer PRG for dioxin is based on a HI of 1. Non-cancer health effects **are not** expressed as a probability (e.g., 1E-05 risk). The text should be revised by noting that the non-cancer PRG is based on an HI of 1.

9. **Section 4.3.2.3 (p. 56).** Revisions should be made to the congener content screening for evaluating background. It should include a comparison of individual congener concentrations and account for the uncertainties in the analytical data.

10. **Section 4.4.2 (p. 57).** The fourth paragraph states that chemical risk in the western pond area appears to be manageable with proper source removal. Based on review of the data from this area, it is unclear how the Phase II ESA has concluded that source removal is needed in this area. VOCs, SVOC and PCBs were either not detected or detected below screening levels and the maximum TEQ was 23.32 ppt, which is well within EPA's target cancer risk range and below a non-cancer HI of 1.

11. **Section 4.4.2 (p. 58).** The last paragraph states,

> "Assuming for a moment that the dioxin-furan TEQ exceedences are of an acceptable level, and the geotechnical stability of the pond are is determined to be adequate for residential development, then the relatively limited chemical impact observed around B-23 and near B-33 could be addressed by excavation and proper disposal of the buried object and affected soil, followed by a geophysical survey and confirmatory sampling. However, if TEQ exceedences represent an unacceptable level of risk, then more widespread excavation of near-surface soil would need to be completed, until acceptable TEQ levels were attained."

It is unclear why the Report recommends removal of soils in the western pond area if TEQ concentrations are within acceptable levels. As noted in the previous comment, other chemicals were not detected or detected below screening levels. Generally removal/remediation is only recommended when health risks exceed acceptable levels.

12. **Section 4.4.3 (p. 58).** This section appears to recommend a limited removal in the haul road area, depending on the final cleanup goal. Note that one sample was collected from this area and the TEQ concentration is 3.98 ppt. The fact that TEQ concentrations fall within target risk levels, EPA is uncertain how the limited amount of data from this area would support a removal action.

13. **Section 4.4.5 (p. 59).** This section indicates that soil removal may be warranted in the Eastern Disturbed Area. Given that the chemicals do not exceed screening levels or fall within EPA's target risk range, soil removal does not appear necessary for this area. The ESA Report should provide specific data/information that supports why soil removal is needed for this area.

14. **Section 4.4.6 (p. 60).** It is not clear why the Report recommends access restrictions to the NPL area, which has undergone clean-up in the past, including surface soil removal and the addition of clean fill. The levels of dioxin (i.e., TEQ) in the surface soil samples do not exceed the current residential PRG of 1,000 ppt and the exceedence at 6,527 ppt was found at-depth (7-10 feet bgs). The ESA Report should provide clarification on the basis for this recommendation and what type of access should be restricted in this area.

15. **Section 5.2.1 (p. 65).** See previous comment on recommendations regarding access restrictions to the site.

16. **Figure 13.** This figure depicts soil sample locations where VOCs, SVOCs, and PCBs exceed "cleanup levels" (i.e., MRBCA or EPA Region 9 PRGs). All of the VOC, SVOC, and PCB soil screening level exceedences listed in the Report were confined to one Phase II ESA sample and three historical sample locations. The Report screened soils against the protection of groundwater and vapor intrusion screening levels along with direct contact screening levels. Provided below is a summary table (Table 1) comparing the maximum detections that exceeded the screening levels in the Report to the most current screening

levels for residential soils (i.e., EPA RSLs). As shown, five out of the 12 chemicals do not exceed residential soil RSLs. The remaining seven exceed their respective carcinogenic screening levels, but would fall below levels corresponding to a cancer risk of 10^{-4} and/ or 10^{-5}. These exceedences were confined to one Phase II ESA sample (MW-06) and one historical sample location (TP–06). Furthermore, the maximum detections were generally found in subsurface samples, which are generally not evaluated under residential scenarios, except for volatiles (inhalation pathway only) or when subsurface soil is expected to be brought to the surface (e.g., via re-grading) under site development. Site development is not expected to occur in the NPL area.

Table 1. Risk-Based Screening of Soil Results

Chemical	Maximum Detection (mg/kg)	Location (Depth in feet)	Screening Levels Residential Soil RSL (mg/kg)	Above Screening Level
1,2,4-trimethylbenzene	58	MW-06 (7-10)	62 n	No
1,3,5-trimethylbenzene	53	A-4 *	780 n	No
ethyl benzene	44	MW-06 (7-10)	5.4 c	Yes
methylene chloride	1 J	MW-06 (7-10)	11 c	No
tetrachloroethylene	0.67	MW-06 (7-10)	0.55 c	Yes
m&p xylene	170	MW-06 (7-10)	3,400 n	No
naphthalene	71	MW-06 (7-10)	3.6 c	Yes
benzo(a)pyrene	0.15	A-4 *	0.015 c	Yes
dibenz(a,h)anthracene	0.11 J	MW-06 (7-10)	0.015 c	Yes
2-methylnaphthalene	8.1	MW-06 (7-10)	310 nc	No
arochlor 1248	0.24	MW-06 (7-10)	0.22 c	Yes
arochlor 1254	1.1	TP-06 (Test Pit) *	0.22 c	Yes

J: Estimated result. Result is less than the reporting limit.
nc: Based on a non-cancer HI of 1.
c: Based on a cancer risk of 10^{-6}
*: Historical sample.

Figure 15. Figure 15 depicts the groundwater sample locations and analytical results. The figure also shows that exceedences of screening levels are confined to boring location B-33(W) and monitoring well MW-06. Below EPA has provided a summary table (Table 2) comparing the maximum detections that exceeded the screening levels in the Report to the most current drinking water screening levels. Also provided is a similar table (Table 3) that compares all VOCs to screening levels that are applicable to the vapor intrusion pathway. Note that several of the maximum detections were "J" and/or "B" coded by the analytical laboratory, which contributes to uncertainty regarding the actual concentration of these chemicals in groundwater. Furthermore, our screening did not consider whether the groundwater is of sufficient quality or yield for domestic purposes, which is a critical determination when performing a human health risk assessment.

Figure 15 in the Mundell Report identifies eight chemicals that exceed either an MRBCA action level or EPA PRG. As shown in Table 2, six out of the eight chemicals exceed their respective groundwater RSLs and the four chemicals having MCLs exceeded their respective drinking water standards. All but one of the screening levels and/or MCL exceedences are confined to the NPL area where site redevelopment is not expected to occur. Except for the bis(2-ethylhexyl)phthalate (DEHP) detection in soil boring B-33(W), chemicals were either not detected or detected below screening levels in all the groundwater samples collected from the area of the proposed Strecker Forest Development. DEHP is widely used as a plasticizer and its primary use is in the production of polyvinyl chloride (PVC). Because it has the potential to leach from plastics, DEHP contamination detected in ground water samples often originates from plastic materials used in the sampling and analytical processes.

All but six of the detected VOCs are below the most conservative vapor intrusion screening levels (attenuation factor = 0.001) for groundwater (see Table 3). The exceedences of the most conservative vapor intrusion screening levels for these six compounds were confined to monitoring well MW-06 located in the northeast portion of the parcel. Two of these six VOCs (trichloroethylene and 1,3,5-trimethylbenzene) only marginally exceed the most conservative screening level. The remaining four VOCs (ethylbenzene, naphthalene, 1,2,4-trimethylbenzene, and vinyl chloride), are still below the screening level based on an attenuation factor of 0.00001. The concentrations of all VOCs in groundwater samples collected in the area of the proposed Strecker Forest development are listed below and screened against the most conservative vapor intrusion screening levels.

Based on these findings and the downgradient location of monitoring well MW-06, The EPA screening level evaluation of the vapor intrusion pathway generally indicates that the pathway is either incomplete or would not pose unacceptable health risks. This evaluation did not consider the uncertainty in the data set (i.e., qualified data), the potential karst geology, or dilution. This evaluation considered maximum detections (from a single round of sampling), not an area-wide average that may be more representative of VOC concentrations that could affect the vapor intrusion pathway over many years.

Table 2. Risk-Based Screening of Groundwater Results

Chemical	Maximum Detection (µg/L)	Location	Groundwater Screening Levels (µg/L)		Above Screening Level?
			RSL	MCL	RSL/MCL
1,2,4-Trimethylbenzene	240	MW-06	15 n	NA	yes/-
1,3,5-Trimethylbenzene	31	MW-06	370 n	NA	no/-
Methylene Chloride	7.2 J B	MW-06	4.8 c	5	yes/yes
Trichloroethylene	5.1 J	MW-06	2 c	5	yes/yes
Vinyl Chloride	3.9 J	MW-06	0.016 c	2	yes/yes
Naphthalene	390 B	MW-06	0.14 c	NA	yes/-
2-Methylnaphthalene	15	MW-06	150 n	NA	no/-
Bis (2-Ethylhexyl)phthalate	12	B-33(W)	4.8 c	6	yes/yes

J: Estimated result. Result is less than the reporting limit.
B: The associated method blank contains the analyte at a level above the method detection limit.
n: Based on non-cancer hazard index of 1.
c: Based on cancer risk of 1E-06.
NA: MCL is not available.

Table 3. Risk-Based Screening of Groundwater - Vapor Intrusion Pathway
(Volatile chemicals only per USEPA, 2002a)

Chemical	Maximum Detection (µg/L)	Location	Vapor Intrusion Screening Levels[1] (µg/L)	
			α = 0.001	α = 0.00001
Benzene	0.51 J	MW-06	1.35 c	135 c
Chloroethane	4.3 J	MW-06	22,222 nc	2,222,222 nc
Chloroform	0.29 J	MW-05	0.73 c	73 c
Chloromethane	0.077 J	B-33(W)	260 nc	26,068 nc
1,2-Dichlorobenzene	1.6 J	MW-06	2,692 nc	269,231 nc
1,1,1 Trichloroethane	0.18 J	MW-05	70429 nc	742,857 nc
1,1-Dichloroethane	2.4 J	MW-05	6.5 c	653 c
1,1-Dichloroethene	0.096 J	MW-05	197 nc	19,680 nc
cis-1,2-Dichloroethylene[2]	12	MW-06	378 nc	37,769 nc
trans-1,2-Dichloroethylene	0.84 J	MW-06	166 nc	16,579 nc
Ethylbenzene	190	MW-06	3.0 c	301 c
Isopropylbenzene	34	MW-06	894	89,362
Methylene Chloride	7.2 J B	MW-06	39.1 c	3,914 c
2-Methylnaphthalene	15	MW-06	na	na
n-Butylbenzene[3]	29	MW-06	1,859 nc	185,874 nc
n-Propylbenzene	34	MW-06	2,330 nc	232,952 nc
Naphthalene	390 B	MW-06	4.0 c	400 c
p-Isopropyltoluene	2.4 J	MW-06	na	na
sec-Butylbenzene[3]	6.2 J	MW-06	1,761 nc	176,056 nc
Tetrachloroethylene	0.37 J	MW-05	0.6 c	57 c
tert-Butylbenzene[3]	1.8 J	MW-06	2,053 nc	205,339 nc
Toluene	4.9 J	MW-06	19,155 nc	1,915,542 nc
Trichloroethylene	5.1 J	MW-06	3.0 c	298 c
1,2,4-Trimethylbenzene	240	MW-06	29 nc	2,899 nc
1,3,5-Trimethylbenzene[4]	31	MW-06	29 nc	2,899 nc
m,p-Xylene	790	B-26 (W)	472 nc	47,220 nc
o-Xylene	160	MW-06	476 nc	47,619 nc
Vinyl Chloride	3.9 J	MW-06	0.14	14

J: Estimated result. Result is less than the reporting limit.
W: Water sample collected in a soil boring.
B: The associated method blank contains the analyte at a level above the method detection limit.
na: Screening levels are not available. A suitable surrogate compound could not be identified.
n: Based on non-cancer hazard index of 1.
c: Based on cancer risk of 1E-06.

[1] Groundwater vapor intrusion screening levels derived according to equations provided in USEPA, 2002a. Attenuation factors span the range of groundwater-to-indoor-air attenuation factors (α) presented in EPA's vapor intrusion database (USEPA, 2008b). The attenuation factor of 0.001 represents an upper-bound value (i.e, 95% percentile).
[2] *trans*-1,2-dichloroethylene is used a surrogate chemical (toxicity value only) for *cis*-1,2,-dichloroethylene's screening level.
3 n-Propylbenzene is used a surrogate chemical (toxicity value only) for n-butylbenzene, sec-butylbenzene, and ter-butylbenzene's screening levels.
[4] 1,2,4-trimethylbenzene is used a surrogate chemical (toxicity value only) for 1,3,5-trimethylbenzene's screening level.

References

ATSDR. 2009. Agency for Toxic Substances and Disease Registry. Minimal Risk Levels. Available on-line at: http://www.atsdr.cdc.gov/mrls.html.

CalEPA. 2011. Toxicity Criteria Database. Office of Environmental Health Hazard Assessment. Available on-line at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp.

Interstate Technology & Regulatory Council (ITRC). 2007. *Vapor Intrusion Pathway: A Practical Guideline.* Vapor Intrusion Team, Washington, D.C.

National Cancer Institute (NCI). 2010. SEER Stat Fact Sheets: All Sites. Available on-line at: http://seer.cancer.gov/statfacts/html/all.html.

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

U.S. EPA. 1991a. *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors."* Office of Emergency and Remedial Response, Washington, D.C. OSWER Directive 9285.6-03

U.S. EPA. 1991b. *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions.* Office of Solid Waste and Emergency Response, Washington, DC. OSWER Directive 9355.0-30.

U.S. EPA. 1992. *Guidance for Data Useability in Risk Assessment (Part A).* Office of Emergency and Remedial Response, Washington, D.C. 9285.7-09A.

U.S. EPA. 2001. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments).* Office of Emergency and Remedial Response, Washington, D.C. OSWER Directive 9285.7-01D

U.S. EPA, 2002a. *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance).* Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. EPA. 2002b. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Office of Solid Waste and Emergency Response, Washington, D.C. 9355.4-2.

U.S. EPA. 2003. *Human Health Toxicity Values in Superfund Risk Assessments.* Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-53.

U.S. EPA. 2004. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim.* Office of Emergency and Remedial Response, Washington, D.C. OSWER Directive 9285.7-02EP.

U.S.EPA. 2005b. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens.* Risk Assessment Forum, Washington, D.C. EPA/630/R-03/003F.

U.S. EPA. 2007. ProUCL Version 4.0. Office of Research and Development, National Exposure Research Laboratory, Las Vegas, NV. Available online at http://www.epa.gov/nerlesd1/tsc/form.htm.

U.S. EPA. 2008a. *Child-Specific Exposure Factors Handbook*. National Center for Environmental Assessment, Office of Research and Development, Washington, D.C. EPA/600/R-06/096F.

U.S.EPA. 2008b. *U.S. EPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors.* Office of Solid Waste, Washington, D.C.

U.S. EPA. 2009. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)*. Office of Superfund Remediation and Technology Innovation, Washington, D.C. EPA-540-R-070-002.

U.S. EPA. 2010. Regional Screening Levels. November, 2010. Available on-line at: http://www.epa.gov/region9/superfund/prg/.

U.S. EPA. 2011a. Integrated Risk Information System (IRIS). Office of Research and Development, National Center for Environmental Assessment, Washington, D.C. Available on-line at http://www.EPA.gov/iris.

U.S. EPA. 2011b. Provisional Peer Reviewed Toxicity Value (PPRTV) Database. Office of Superfund Remediation and Technology Innovation, Office of Solid Waste and Emergency Response, Washington, D.C. Available on-line at: http://hhpprtv.ornl.gov/index.shtml.

Attachment 2

EPA Letter to City of Wildwood

Summarizing EPA Comments on

Human Health Risk Assessment

Prepared by

Environmental Stewardship Concepts, LLC

and

Henshel Envirocomm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

FEB 07 2011

The Honorable Timothy Woerther
Mayor of Wildwood
183 Plaza Drive
Wildwood, Missouri 63040

Dear Mayor Woerther:

The Environmental Protection Agency (EPA) has completed a review of the Phase II Environmental Site Assessment (ESA) report prepared by Mundell & Associates (Mundell Report) and the draft Human Health Risk Assessment (HHRA) prepared by Environmental Stewardship Concepts and Henshel Envirocomm (ESC/HE) for the proposed Strecker Forest residential development. The EPA commends the city of Wildwood for its continuing efforts to characterize conditions in the area of the proposed development and to protect present and future residents from potential health risks. EPA appreciates the opportunity to work with the city and community to help characterize conditions at the site of the proposed development and to participate in future actions to address concerns regarding this parcel and other properties in the area.

EPA has prepared detailed comments regarding the Mundell Report, draft HHRA, and other relevant reports, which have been provided to ESC/HE. Overall, EPA found that site conditions and associated risk levels are not properly characterized in the Mundell Report and the draft HHRA. In addition to review of these documents, EPA performed a screening level assessment which compared data presented in the Mundell Report to existing EPA screening criteria and to criteria that were derived to evaluate potential vapor intrusion. The EPA screening level assessment concluded that reported conditions at the proposed development site are generally not above a level of concern for residential use. A copy of the detailed EPA comments is enclosed with this letter.

Based on review of soil and groundwater data presented in the Phase II ESA, EPA does not believe that source removal or access restrictions are warranted for the investigated areas at this time. EPA recognizes, however, that concerns exist about the suitability of the property for residential development and potential risks to neighboring residents. EPA is prepared to work with the city, community members, and other interested parties to develop a course of action that will address these concerns, and assure that conditions are protective of human health for current and future residents. EPA proposes to assist with further investigation to provide a comprehensive characterization of conditions across the property that can be used to assess potential risk levels. The EPA would work with the city, local community and other interested parties in the development of the study design to help ensure that these efforts address existing concerns. The proposed EPA investigation would be intended to complement the work that has been commissioned by the city, and the ongoing state investigation at the adjacent Bliss property to provide data and/or identify additional actions that are necessary to assure protection of human

health in the area of the proposed development. EPA will coordinate with the city and community as preparations are made to provide this assistance. A discussion of the key findings from the EPA review is provided below.

EPA recognizes that the scope and approach of the Mundell Report is consistent with a Phase II ESA, but this level of investigation does not provide sufficient characterization of conditions at the site of the proposed development to support a valid human health risk assessment. There are also a number of inaccurate assumptions regarding site history that affect the validity of the conceptual site model used for the Mundell investigation and the draft HHRA. For example, the Mundell Report linked suspected dioxin contamination to buried metal that was detected during the geophysical survey. Dioxin contamination which historically impacted the adjacent Bliss and contiguous properties resulted from spraying of contaminated waste oil to control dust and is not associated with drummed wastes. The association of dioxin contamination with buried metal led to a mischaracterization of past waste handling activities on the property. The presence of trace contaminant levels in soil or groundwater is not evidence of past waste dumping activities or source areas that could affect neighboring properties.

The assessment of soil and groundwater data presented in the Mundell Report and HHRA is in many cases misleading. Both reports compare analytical results from current and past investigations to outdated or inappropriate soil and groundwater criteria. Screening level criteria were often presented as action levels or cleanup goals instead of using site-specific conditions to determine acceptable levels at the proposed development site. For example, in some instances the reports compare contaminant levels detected in shallow groundwater to drinking water standards, when there is no evidence that the shallow groundwater represents a potential potable water source. Also, Federal Preliminary Remediation Goals (PRGs) cited in the reports are misapplied and outdated. PRGs are used by EPA as a starting point to derive site-specific cleanup goals once a determination has been made that cleanup is required due to unacceptable health risks. EPA has developed Regional Screening Levels (RSLs) for determining if conditions warrant further assessment or investigation. The EPA RSL table was referenced at one point in the draft HHRA, but the associated RSL values were not utilized in the ESC/HE assessment.

Of critical concern in the assessment of health risks presented in the HHRA are mathematical errors which apparently occurred in the conversion of units from parts per trillion (ppt) to parts per billion (ppb). These and other errant factors resulted in overestimation of risk levels associated with reported dioxin concentrations by more than three orders of magnitude. Correction of the conversion errors in the HHRA risk calculations would lower the estimates of cancer risks and non-cancer health effects associated with reported dioxin concentrations in soil to acceptable levels.

The quality of the underlying analytical data that forms the basis for the draft HHRA is highly suspect due to data qualifiers attached to analytical results presented in the Mundell Report. These data qualifiers indicate a number of data quality concerns that limit reliability. These concerns include the presence of contaminants detected in blank samples and instrument calibration problems. Much of the reported data are presented as estimated values due to quality concerns. A proper data validation study was not conducted to evaluate the quality of the underlying data in either the Mundell Report or the draft HHRA. Due to the identified errors in

the draft HHRA associated with incorrect risk calculations, data quality issues, and other considerations presented in EPA's detailed comments, the ESC/HE findings and recommendations presented in the draft HHRA cannot be relied upon for risk characterization or remedial decision-making.

Dioxin concentrations in soil reported in the Mundell Report and further assessed in the draft HHRA are not indicative of conditions that pose a concern for protection of human health. All surface and subsurface dioxin levels in soil in the area of the proposed development were below the current EPA interim PRG of 1,000 ppt for dioxin in residential soils, and also less than the potential revised PRG level of 72 ppt that has been proposed by EPA for residential soils. The Phase II ESA reported maximum dioxin concentrations in the area of the proposed development of 6.96 ppt in surface soils and 23.32 ppt in subsurface soils. The detected dioxin levels reported in the area of proposed development were based in large part on qualified data for dioxin species that differed from the type of dioxin identified and addressed at the adjacent Bliss and Contiguous Properties. Dioxin species associated with the adjacent Bliss and Contiguous properties were reported in subsurface soils in the northeast portion of the parcel at levels exceeding the current or proposed PRG levels, but these isolated subsurface dioxin levels do not represent a direct contact threat, and the methods used to collect these samples are not consistent with EPA procedures for assessing dioxin health risks. Dioxin soil levels reported in the proposed development area represented species and levels that are considered ubiquitous in developed areas, and are not indicative of hazardous waste activities. Dioxin data presented in the Mundell Report indicates some level of impact from the adjacent properties in the northeast portion of the parcel, but additional characterization beyond the scope of the Mundell investigation would be required to properly assess risk levels in this isolated area.

EPA performed a comparison of all non-dioxin soil data presented in the Mundell Report to applicable EPA RSLs for soil and groundwater. In addition to their own data, the Mundell Report presents data collected during past investigations of both the area proposed for residential development and the northeast portion of the parcel. EPA RSLs for residential soils were exceeded for seven compounds. Six of these RSL exceedances were in samples collected in the northeast portion of the parcel in an area that is not included in the planned residential development. The single exceedances of a soil RSL in the area proposed for development was from a subsurface sample collected in 2004 by Brucker Engineering. Arochlor 1254 was detected in this sample at a concentration of 1.1 parts per million (ppm) near the western pond area, which marginally exceeded the corresponding soil RSL of 0.22 ppm. This compound was not detected in any of the eight surface or subsurface samples collected in this area by Mundell. On the basis of this assessment, EPA determined that the detected soil concentrations, including the RSL exceedances, do not exceed a level of concern for residential soils.

Contaminant levels in shallow groundwater reported in the Mundell Report were conservatively compared to the most current screening levels for drinking water, although these screening levels are not directly applicable to the shallow groundwater at the site. Drinking water RSLs were exceeded for six compounds, five of which were confined to samples located in the northeast portion of the parcel. The single RSL exceedances in the proposed development area was for bis(2-ethylhexyl)phthalate (DEHP) collected from soil boring B-33 in the western pond area. DEHP is commonly used as a plasticizer, and its presence is often related to materials used in sampling and analysis. EPA does not consider the single RSL exceedances for DEHP in

the proposed development area to be significant or an indicator of source material or drinking water concerns since shallow groundwater is not useable as a drinking water source. Currently, EPA RSLs are not available for screening groundwater for potential vapor intrusion. EPA therefore derived screening level criteria for potential vapor intrusion using conservative attenuation factors applied to volatile compounds detected in groundwater. This EPA vapor intrusion screening level assessment indicated that the detected volatile compounds from all monitoring wells and soil borings do not represent a vapor intrusion concern for existing or proposed residences constructed in the area. EPA's screening level assessment of shallow groundwater is presented in the EPA detailed comments and concludes that the reported compounds do not represent a concern for residential development.

The draft HHRA identified conditions near the western pond area as a primary concern affecting the proposed residential development, and also posing a potential risk to nearby residents. The draft HHRA identified the western pond area as a known source of dioxin and non-dioxin contaminants, but provided no basis for this assertion. Contaminant levels reported from analysis of soil and groundwater samples in this area are generally below EPA RSLs for residential use (with the two exceptions noted above). Anecdotal information gathered by EPA subsequent to release of the draft HHRA indicates that buried metal detected in the western pond area is most likely associated with the use of 5-gallon buckets by a former resident to water and protect fruit trees as part of a small orchard operation. The pond served as a water source for the fruit trees and was reportedly drained by a subsequent property owner to eliminate potential liability associated with the physical hazard posed to trespassers swimming in the pond. EPA could not discover any accounts of historic waste handling activities near the western pond area, and the soil and groundwater data presented in the Mundell Report do not indicate a potential source of contamination that could affect surrounding areas.

Please contact Robert Feild of my staff at (913) 551-7697 to arrange for an opportunity to discuss the next steps in developing an approach for further investigation of environmental conditions in the area of the proposed development. Thank you very much for your continued interest and participation in this very important matter.

Sincerely,

Gene Gunn
Chief
Special Emphasis Remedial Branch

Enclosure

cc: Robert Stout, MDNR
Dennis Stinson
Cherri Baysinger