Comments from the Expert Panel on the Revised Site-Specific Cleanup Goal Report

Submitted: December 18, 2013

A. Introduction

As requested by the Los Angeles Regional Water Quality Control Board (Regional Board), the Expert Panel has reviewed the Revised Site-specific Cleanup Goal Report (Revised SSCG Report) prepared for the former Kast Property in Carson, California by Geosyntec Consultants for Shell Oil Products US. This builds upon the Panel's review of the previously submitted Site-specific Cleanup Goal Report (SSCG Report), and precedes the release of the Remedial Action Plan.

The Panel's overall charge is to provide its recommendations for the Regional Board to consider in determining whether cleanup goals and remedial actions proposed by the responsible parties named in the Cleanup Order are consistent with applicable legal authorities.

In general, Geosyntec did not make many changes to the overall approach taken in the Revised SSGC Report compared to the original SSCG Report. Text and figures were added to help explain reasoning and inconsistencies while improving transparency. Yet we have concerns with the following issues.

B. Concerns and Recommendations

1. Cumulative risk and/or hazard taken into account in the SSCG calculations
2. Finalizing the COC list
3. Attenuation factor for sub-slab vapor concentrations
4. Chlorinated volatile organic compounds (CVOCs) potentially from onsite sources
5. Remediation options
6. Interpretation of State Board Resolution No. 92-49

B.1. Cumulative risk and/or hazards taken into account in the SSCG calculations

One of the Expert Panel's most significant concerns, still not addressed in the Revised SSCG Report, is with the calculation of the SSCGs. Each COC has a calculated SSCG that is based on a cancer risk of one in a million (10^{-6}) or a hazard index of 1. "The final SSCG values were not adjusted by number of chemicals included in the SSCG derivation process therefore there is no impact on the value calculated." (Response to Expert-3 comment regarding the number of COCs selected) We advise the Regional Board to explicitly task Geosyntec to clearly demonstrate how cumulative risk is assessed and calculated for all of the chemicals of concern (COCs).

In response to OEHHA commenting, "The implication of cumulative risks and/or hazards that exceed target levels needs to be considered." Geosyntec replied, "Agreed. This is consistent

with the approach described in the SSCG report." (Response to OEHHA-32) However, the Panel still does not see how this is consistent with the approach. In general, Geosyntec states,

> *"… we believe dividing the SSCGs by the number of COCs to calculate a lower value to address cumulative risk issues is overly conservative and assumes that the chemicals are equally distributed. For most sites there are a subset of chemicals that contribute the majority to risk and hazard. Rather than assume a certain distribution of risk and hazard among chemicals ahead of time, the site data will be evaluated in the HHRA to identify the final COCs. In addition as presented in the RAOs section, the forthcoming HHRA [Human Health Risk Assessment] will address cumulative risk."* (Responses [whole or in part] to Expert-4, Expert-5, RWQCB-15 and Expert-8)

This comment pushes things to the forthcoming full Human Health Risk Assessment (HHRA), which the Panel believes should logically have been done already. As stated in our Interim Report on the SSCG Report, "the utility of developing this document after the execution and release of the SSCG is potentially problematic for key decision makers at the Water Board. Typically, a human risk assessment should inform cleanup goals rather than be released after the cleanup goals are determined."

The only step where we see cumulative risk assessed is in the selection of the COCs where the risk-based screening level (RBSL) has been divided by 10. Geosyntec's primary argument for not taking cumulative risk into account in the SSCG report appears to be two-fold: 1) chemicals are not necessarily equally distributed and 2) the upcoming HHRA will do it.

> *"When the forthcoming HHRA is conducted cumulative risks and hazards will be calculated and corrective actions will be based on the SSCGs presented in this report and the cumulative HHRA results." (Response to Expert-3)*

While not discussed explicitly, we have to wonder if the way this will be conducted is similar to the HHSRE where the risk index is calculated using the SSCGs rather than the RBSLs and that a risk index greater than 1 would require remedial action rather than an exceedance of SSCG ("bright line" method). That is how the following text could be interpreted.

> *"The chemical-specific SSCGs will be used in the HHRA along with the exposure point concentration for each property and depth interval being evaluated to estimate chemical-specific risks and noncancer hazards. … Cumulative estimates of cancer risk and noncancer hazard will be calculated by summing the chemical-specific estimates presented in the HHRA*." (Pages 44-45 of the SSCG Report)

If SSCGs will be used to calculate a "risk index" that will trigger action rather than using the SSCGs as "bright line" remediation cleanup values for determining whether an action is required, then our concern with cumulative risk/hazard has probably been addressed, and we

can see how the Site's RAOs for soil[1], in particular, can be met/addressed. However, if the SSCGs are actually used as "bright line" cleanup concentrations, we are concerned that once the board approves of this report, there is no modification possible. Geosyntec uses the "they have approved it so it is good" argument several times in their comment responses. Therefore, the Board should be very clear about how these SSCGs are going to be used for making decisions in the RAP.

We would advise the Water Board to clearly and explicitly hold Geosyntec to a work plan that explicitly addresses the key issues and lays out methodology; otherwise this will recycle. And again, we are concerned with how key decisions are continuously pushed forward onto the HHRA, when it is unclear that Geosyntec will perform the calculations in a total manner that is reflected in the cleanup that the Water Board will find acceptable.

B.2. Finalizing the COC list

Geosyntec indicates that the SSGCs are final, but they describe the COC list as preliminary. The Panel agrees with the OEHHA and recommends that the COC list should be presented as the final list; otherwise it will be difficult to argue that the SSCG list is final.

While we did previously point out that HERO HHRA Note 4 (Expert-15 comment) is inconsistent with the COC approach in the SSGC report, we will agree with Geosyntec that "[T]he screening approach used in the SSCG report to select COCs is considered appropriate for this site …" (Response to Expert-15). However Geosyntec appears to indicate that this COC list is not considered "final" by stating, "The Revised SSCG Report presents the **preliminary** [emphasis added] list of COCs for evaluation in the RAP. The forthcoming HHRA will provide the **final** [emphasis added] analysis following the approached presented in Appendix A" (Response to OEHHA-23). It is unclear why then the COC list is preliminary if it follows the same approach. However, note the COC selection process is in the SSCG report and only summarized in Appendix A. Appendix A states, "Tables 4.5 and 4.6 of the main report present the COCs that have been identified for each media to be carried forward into the RAP" (page A-2).

We recommend that the COC list should be presented as the final list.

B.3. Attenuation factor for sub-slab vapor concentrations

The Revised SSCG Report proposes an attenuation factor (AF) of 0.001 when sub-slab vapor concentrations are greater than 100 ug/m^3 (a high concentration for this site). However, this AF is very low. We recommend using a home-specific attenuation factor rather than a generic AF, to ensure that each individual home is protected.

[1] "The RAOs for soil are to prevent human exposures to concentrations of COCs in soil such that total (i.e., cumulative) lifetime incremental carcinogenic risks are within the NCP risk range of 1×10^{-6} to 1×10^{-4} and noncancer hazard indices are less than 1 or concentrations are below background, whichever is higher." (page 39)

In the analysis presented by Geosyntec (Appendix B), the argument is made that a generic attenuation factor of 0.01 for consideration the pathway from sub-slab to indoor air is in fact conservative. While this may be valid for a large number of the homes, Figures B-10 and B-11 suggest that this is NOT the case for a number of individual homes, when paired data for specific compounds is evaluated. The empirical data does not support using a "generic" attenuation factor for determining the risk, which is consistent with the notion that conditions may be different in each home, and that for a given home owner it is important to reduce her/his individual risk, not the generic risk. In fact, Figure B-10 suggests that the number of cases where the empirical attenuation factor is > 0.01 is large, although mostly at low sub-slab concentrations. Nevertheless, there are a significant number of cases where the empirical attenuation factor is > 0.01 and sub-slab concentrations are > 100 ug/m3.

The recommendation is to not use a generic attenuation factor, but rather a home-specific attenuation factor, to ensure that each individual home is protected.

In addition, it would have been useful for Geosyntec to have provided the spatial distribution of the CVOCs in the sub-slab vapor as it would have likely followed the CVOC groundwater distribution and not the CVOC soil distribution, providing more evidence of a trespassing CVOC plume. This would provide a link between the risk assessment and subsurface evaluation.

B.4. Chlorinated volatile organic compounds potentially from onsite sources

Geosyntec provided in Appendix E the distribution maps of PCE and TCE in both shallow soil and in groundwater. These maps make the best case for the conclusion that the CVOCs in both shallow soil and groundwater are from neighboring source, but the evidence could be presented more clearly and transparently. The "evidence" of "[T]he lack of detections of PCE and TCE in Site soils between 10 feet below ground surface and groundwater (>400 samples)" [Response to comment RSQCB-2] does not "rule out" that CVOCs in shallow soil are sourced from the Site rather only rules out that the Site probably did not source the groundwater plume under the site. We advise the Regional Board to focus attention on this area.

B.5. Remediation options

We recommend not eliminating remediation options at this point in the analysis. Section 9 of the Revised SSCG includes a preliminary evaluation of remedial alternatives, also called a Screening Feasibility Study, and then based on this preliminary evaluation excludes certain technologies and remedial alternatives while prioritizing only certain remaining ones for further evaluation. Geosyntec envisions that later a "detailed evaluation of the recommended remedial alternative will be conducted and presented in the forthcoming Remedial Action Plan." The Expert Panel is concerned that it may be premature to eliminate many remediation technologies and alternatives now and thus exclude these options from further evaluation in the forthcoming RAP.

For instance, Geosyntec indicates that bioventing "would not be technologically and economically feasible to implement and is therefore eliminated from consideration for inclusion

in remedial alternatives". This is based on the presumption that "based on the average rate of biodegradation (of petroleum hydrocarbons), the systems would have to be in place for several decades," as well as the significant number (15 to 20) of extraction points that would have to be installed on each property.

While the pilot scale studies did reflect low biodegradation rates, this technology should be kept in consideration, since it may be a cost-effective approach for significantly reducing the risk in those areas where there are elevated concentrations of hydrocarbons within the first 5-20 feet below ground surface. Naturally, the recommended approach would be to first apply soil vapor extraction (which will be considered further in the next phase) to remove the more volatile compounds. But as pointed out by Geosyntec, diesel components and other heavy hydrocarbons will not be removed significantly by soil vapor extraction. The bioventing pilot test results indicated that relatively low flow rates were necessary to deliver sufficient oxygen to the subsurface to meet the bioventing oxygen demand. Geosyntec calculated that "the time frame for bioventing system operations ranged from approximately 1 to 4 years, assuming the higher initial biodegradation rate, to several decades assuming the average biodegradation rate." Thus, for some locations it may be possible to remove a significant mass in a few years. The extraction wells used for soil vapor extraction (SVE) could be used for subsequent bioventing as needed. Key is to determine the conditions that result in the higher biodegradation rate at the site.

Although this technology will not be applicable for all hot spots, it seems premature to dismiss it, without a real economic feasibility analysis. It will certainly be technologically feasible if done correctly, as was done in some of the pilot scale studies. Bioventing would be additive to Alternative 7, and would be considered on a hot spot by hot spot basis. The marginal costs are small (given that SVE would be used first), and there could be considerable savings over the project life, as well as faster risk reduction, if a significant mass of hydrocarbons is removed.

B.6. Interpretation of Resolution No. 92-49

Geosyntec proposes a narrow interpretation of State Water Board Resolution No. 92-49. The Revised SSCG asserts that Resolution No. 92-49 applies only to groundwater quality and excludes soil and soil vapor. We are concerned that the Board's approval of the Revised SSCG would be taken as approval of this narrow interpretation of Resolution in a way that would affect actions for relevant non-water media. We recommend that the Board clarify their scope of authority and respond to the assertion that:

> *Waste in non-water media (such as soil) should be addressed through remediation to promote the attainment of background water quality (not, for example, background levels in soil) or the best water quality that is reasonable feasible given the considerations listed." (Revised SSCG Report, page 78)*

C. Relatively Minor, Miscellaneous Comments Relevant to Application of the Technical Review Principles

- The table of Potentially Complete Exposure Pathways in the report and in Appendix A does not match (e.g., Indoor Air is missing from the version in Appendix A, as well as just matching modifiers). This has to do basically with consistency.

- Table A-3a, second half appears to be missing naphthalene (the volatile PAH).

- Table A-3b appears to be missing $VF_{soil\text{-}OA}$ values for some of the selected COPCs in soil.

- Concentration units should be included on the on the soil figures in Appendix E.

- The use of light pink/pink to represent the >25th to 50th percentile in the indoor vapor figures is unfortunate as it tends to "blend" with the purple used to represent the >90th Percentile and thus upon first glance this reviewer had the "pink houses" with much higher indoor air concentrations than the legend indicates. This reviewer would recommend using a gradual color scheme so colors intensify to the higher concentrations or go from the cool colors to the warm (blue, green, yellow, orange, red). We make this recommendation in the belief that at some point these figures will be presented in a public forum and we have found that the use of this color scheme strategy allows the reader/viewer to make first glance conclusions that match the map interpretation.