Comments on
Pollution Investigation/Remediation Activities at
SPTCo/Union Pacific Sacramento Railyard Site

Comments provided to DTSC, Sacramento, CA by
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On March 12, 2013 the California Department of Toxic Substances (DTSC) held a "Public Meeting" to review the Final Draft Remedial Action Plan for a portion of the former SPTCo Sacramento Railyard hazardous chemical site. The purpose of that meeting was to enable the DTSC staff to present a proposed remediation plan for the Southern Pacific railyard soil near the Central Shops, and the contaminated groundwater, as described in the document:

> ERM-West, Inc., "Final Draft Remedial Action Plan: Central Shops Study Area – Soil and South Plume Study Area – Groundwater, Sacramento, California," report of ERM-West, Sacramento, CA, January (2013).

That remediation plan is available on the DTSC envirostor website at:
http://www.envirostor.dtsc.ca.gov/public/community_involvement/5739881217/SacRailyardFinalDraftRAPCentralShopsSouthPlume.pdf.

According to the ERM report,

> "*The former SPTCo Sacramento Railyard Property (the Property), located at 501 Jibboom Street, Sacramento, California, encompasses approximately 240 acres north of downtown Sacramento (Figure 1-1) and was used as SPTCo's locomotive maintenance and rebuilding facility, among other functions, from the 1860s to the 1990s.*"

That operation resulted in the contamination of the soil at the site with heavy metals and petroleum hydrocarbons, and the groundwater with VOCs.

There has long been considerable interest in the remediation of this brownfield site to enable it to be redeveloped for commercial and other purposes. Our interest in the approaches adopted for the evaluation and remediation of this site and its redevelopment stems from our review of investigation/remediation activities at the site in the early 1990s, and our more than 30 years of experience in the investigation/remediation hazardous chemical sites such as superfund and brownfield sites. A description of that experience, as well as copies of a variety of our professional papers and reports discussing key common issues concerning environmental and public health impacts of hazardous chemical sites, and pertaining to specific sites in which we have been involved, are available on our website, www.gfredlee.com, in the Hazardous Chemical Sites section at http://www.gfredlee.com/phazchem2.htm. The "Hazardous Chemical Sites" section of our website provides a link to a number of the reports that we developed in our work

on the investigation and remediation of the SPTCo Sacramento Railyard Site for redevelopment (http://www.gfredlee.com/phazchem2.htm#sp-site). Presented below is a summary of our previous experience in reviewing past, current, and future site remediation needs relative to redevelopment of this site.

Early 1990s Activities

In 1990 Sacramento City Council members had questions about the adequacy of DTSC's proposed approach for remediation of lead-contaminated soils at the Sacramento Railyard site in preparation for site redevelopment. That approach involved placing a 1-ft layer of clean soil over soils that contained high concentrations of lead in areas that were proposed for redeveloped as low-income housing that would include children. The city of Sacramento issued a Request for Proposals for a technical review of the adequacy of the DTSC-proposed approach for remediation of lead-polluted soils for the protection of children's health from the toxic effects of lead. We (Drs. G. Fred Lee and Anne Jones-Lee) were awarded the project for technical review. Based on our review of existing site data and our professional experience, we issued several reports that discussed issues of concern and our conclusion, including that the DTSC approach for "remediation" of soil-lead pollution was not adequate to protect children's health from the toxic effects of lead. Our reports included the following:

Lee, G. F., and Jones, R.A., "Preliminary Assessment of 'Superfund' Remedial Investigation/Feasibility Study Activities Completed and Projected and Adequacy of Remediation Program for Clean-Up of Chemical Contamination at SPTC Sacramento Railyard Site: Technical Report," Report to City of Sacramento Department of Planning & Development, by G. Fred Lee & Associates, El Macero, CA, October 7 (1990). http://www.gfredlee.com/HazChemSites/SPSite-PrelimAssess10-7-90.pdf

Lee, G. F. and Jones, R. A., "Review of Southern Pacific Railyard Site Investigation, Remediation, and Redevelopment," Report to City of Sacramento, CA Department of Planning and Development, Sacramento, CA, by G. Fred Lee & Associates, El Macero, CA, October (1990). [23,057 kb] http://www.gfredlee.com/HazChemSites/Review_SP_Site_1990.pdf

We also made a presentation to the City of Sacramento Department of Planning & Developing to discuss our findings and to report our conclusions; presentation slides included:

Lee, G. F., and Jones-Lee, A., "Redevelopment of Remediated Superfund Sites: Problems with Current Approaches in Providing Long-Term Public Health Protection," PowerPoint Slides of Presentation to City of Sacramento Department of Planning & Development, G. Fred Lee & Associates, El Macero, CA, October (1990). http://www.gfredlee.com/HazChemSites/SP-Slides1.pdf

Lee, G. F., and Jones, A., "Review of Southern Pacific Railyard Site Investigation, Remediation, and Redevelopment," Slides for presentation to City of Sacramento Department of Planning & Development, Report of G. Fred Lee & Associates, El Macero, CA (1990). http://www.gfredlee.com/HazChemSites/SSPslicleanup2.pdf

Lee, G. F., and Jones, A., “Evaluation of the Adequacy of "Superfund" Site Investigation & Remediation Relative to Site Redevelopment Southern Pacific Sacramento Railyard Site Issues of Soil-Lead Residues in Property Transfer,” Slides for presentation to City of Sacramento Department of Planning & Development, Report of G. Fred Lee & Associates, El Macero, CA (1990).
http://www.gfredlee.com/HazChemSites/SSPslicleanup1.pdf

We also developed professional papers to discuss these issues in the professional community, including:

Lee, G. F. and Jones, R. A., "Redevelopment of Remediated Superfund Sites: Problems with Current Approaches in Providing Long-Term Public Health Protection," Proc. Environmental Engineering 1991 Specialty Conference, ASCE, New York, pp. 505-510, July (1991). http://www.gfredlee.com/HazChemSites/ASCE-SP-Redevelop.pdf

Lee, G. F. and Jones-Lee, A., "Importance of Considering Soil-Lead in Property Site Assessments," Presented at National Ground Water Association Conference, "Environmental Site Assessments: Case Studies and Strategies," Orlando, FL, August (1992). http://www.gfredlee.com/HazChemSites/lead.pdf

The major issue was that the placement of only 1 ft of clean soil was inadequate to prevent the underlying lead-polluted soil from being brought to the surface and provide the potential for children to be exposed to hazardous concentrations of lead. Among other measures, we recommended that at least 5 ft of clean soil be used to cover all lead-polluted soils at the site.

Our findings and recommendations were met with considerable opposition by the city of Sacramento mayor, staff, and others because of the increased cost of remediation of the site that would have to be incurred and the perceived hindrance to site redevelopment. It has been our experience that it is not uncommon for there to be significant pressure placed on regulatory agencies to minimize the costs of remediation of inner-city “brownfield” hazardous chemical sites in order to facilitate redevelopment at the least cost. Succumbing to such pressure often leads to short-term “fixes” that can give a trusting public the impression of protection but without provisions necessary for providing technically reliable, long-term protection of public health and the environment. This was the situation that was developing at the SPTCo Sacramento Railyard site in the early 1990s.

Subsequent to our work with the city, we obtained support from Northern California Legal Services that enabled us to continue to be active in SPTCo Sacramento Railyard site review with emphasis on issues of concern relative to the development of low-income housing on the site and soil-lead remediation. We developed the following report and comments on the Draft and Final EIR for the site:

Lee, G. F., and Jones-Lee, A., “Comments on Draft EIR for the Southern Pacific Railyard Site Sacramento, California Redevelopment Project,” Submitted by G. Fred Lee & Associates, El Macero, CA, September (1992). [2,572 kb]
http://www.gfredlee.com/HazChemSites/SP_Site_RPT_IMM.pdf

Lee, G. F., "Comments on Final EIR for the Southern Pacific Railyard Superfund Site Redevelopment Project," Submitted to Sacramento City Council, 6pp, November (1994).

The January 2013 ERM-West report discusses the investigation/remediation activities at the site, focusing on the Central Shops area and the investigation and remediation of the groundwater pollution plume. Issues associated with remediation of the other areas of the site, such as those where low-income housing could be located, were not addressed in that report.

The ERM-West (2013) report stated,

> "*In 1996, UPRR* (Union Pacific Railroad Company) *entered into a merger with SPTCo and acquired the Property as a result of the merger in 1998. By that time, all of the original operations at the Property had been discontinued, and cleanup of the Property was proceeding as per the Enforceable Agreement.*"

Comments on Proposed Remediation of the Central Shops Area and Groundwater Pollution Plume

Based on the representations made in the ERM-West (2013) report and the DTSC summary of the proposed remediation approach for the Central Shops and polluted groundwater plume, and our professional experience, we support the planned approaches as a starting point for remediating that area. There are, however, a number of issues that will need to be addressed in the beginning of this remediation and, most importantly, in the long-term implementation of the approaches proposed. There will need to be independent, on-going, detailed review of the status, efficacy, and needed revisions of the remediation to reliably protect public health, groundwater quality, and the environment. Examples of these types of issues based on our experience in working on other hazardous chemical sites are presented below.

It is important to recognize that the Central Shops area redevelopment plan does not include low-income housing. The initial proposed approach indicated the removal of contaminated surface and near-surface soils, the backfill of excavated areas with clean soil, vapor extraction under buildings to protect users of buildings from VOCs that can migrate into the buildings, and pump-and-treat remediation of the polluted groundwater plume. While if properly executed, this appears to be an appropriate approach for the Central Shops area, there are several longer-term issues that will also need to be addressed to provide more reliable assurance of public health and environmental protection for as long as there are hazardous chemicals present at the site. Those issues will need to be addressed in finalizing the long-term implementation of the proposed remediation of the Central Shops area and the groundwater pollution plume.

Brisbane Baylands Brownfield Site

In 2010, on behalf of the Brisbane Baylands Community Advisory Group, we conducted an evaluation of the current and anticipated remediation activities at the Brisbane Baylands "brownfield" site relative to long-term protection of public health and environmental quality appropriate for the planned redevelopment for commercial use and possibly residential housing. The Brisbane Baylands site, located in Brisbane, just south of San Francisco, CA, was a former Southern Specific Railyard site and has many of the same soil and groundwater pollution issues found at the SPTCo Sacramento Railyard site; there is extensive pollution of soil with hazardous chemicals including heavy metals and petroleum hydrocarbons, and there are several

groundwater pollution plumes. There is considerable interest in remediating the site so that it could be redeveloped.

We discussed near-term and long-term issues that need to be reviewed and adequately considered in remediating the Brisbane Baylands site for the purpose of redevelopment for commercial, residential, and public park areas in the following report and presentation:

> Lee, G. F., and Jones-Lee, A., "Report on the Adequacy of the Investigation/Remediation of the Brisbane Baylands UPC Property Contamination Relative to Development of That Property," Prepared for Brisbane Baylands Community Advisory Group (BBCAG), Brisbane, CA, Report of G. Fred Lee & Associates, El Macero, CA, October 19 (2010). http://www.gfredlee.com/Landfills/BrisbaneBaylands.pdf
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> Lee, G. F., and Jones-Lee, A., "Report on the Adequacy of the Investigation/Remediation of the Brisbane Baylands UPC Property Contamination Relative to Development of That Property," PowerPoint Slides for Presentation prepared for Brisbane Baylands Community Advisory Group (BBCAG), Brisbane, CA, November 1 (2010). http://www.gfredlee.com/Landfills/BrisbaneBaylandsSlides.pdf

Based on our review of the Brisbane Baylands site and our related experience, we developed the following generic discussion of issues that need to be considered in remediating brownfield sites.

> Lee, G. F., and Jones-Lee, A., "Issues in Providing Long Term Public Health and Environmental Protection from Redeveloped Brownfield Properties," Report of G. Fred Lee & Associates, El Macero, CA, Nov. 1 (2010). http://www.gfredlee.com/HazChemSites/Brownfield-Issues.pdf

Because of the similarities between the Brisbane Baylands site and the SPTCo Sacramento Railyard site, many of the issues that we discussed concerning the Brisbane Baylands site will need to be considered in remediating the SPTCo Sacramento Railyard site.

Evaluation/Remediation of Brownfield Sites

Capping Soils/Wastes

One of the most common methods for remediation of brownfield/Superfund sites is to cap waste and contaminated soils with clean soil. We have had considerable experience in the evaluation of the ability of landfill caps to contain the hazardous chemicals for as long as the chemicals represent a threat to public health and the environment. We have discussed many of these issues in numerous publications including:

> Lee, G.F. and Jones-Lee, A., "Evaluation of the Adequacy of Hazardous Chemical Site Remediation by Landfilling," IN: Remediation of Hazardous Waste Contaminated Soils, Marcel Dekker, Inc., NY pp 193-215 (2000). http://www.gfredlee.com/HazChemSites/chem_remed.pdf
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> Lee, G. F., and Jones-Lee, A., "Hazardous Chemical Site Remediation through Capping: Problems with Long Term Protection," *Remediation* **7(4)**:51-57 (1997). http://www.gfredlee.com/HazChemSites/pbrwnfld.pdf

Lee, G. F., and Jones-Lee, A., "Superfund Site Remediation by On- Site RCRA Landfills: Inadequacies in Providing Groundwater Quality Protection," Proc. Environmental Industry Association's Superfund/Hazwaste Management West Conference, Las Vegas, NV, pp. 311-329, May (1996). http://www.gfredlee.com/HazChemSites/eia.pdf

As an outgrowth of our years of work on evaluating impacts of landfills and remediation of waste piles/polluted soils, we developed a review discussion of a plethora of issues influencing and affecting the protection of public health and environmental quality from impacts of buried wastes. Among topics addressed are issues affecting the ability of a landfill cap to prevent water from entering the covered materials and enabling the leaching of pollutants into groundwater That review, which is periodically updated with new information and current experience, is available as:

Lee, G. F., and Jones-Lee, A., "Flawed Technology of Subtitle D Landfilling of Municipal Solid Waste," Report of G. Fred Lee & Associates, El Macero, CA, December (2004). Last updated October (2012). http://www.gfredlee.com/Landfills/SubtitleDFlawedTechnPap.pdf

In the permitting of landfill covers or waste pile caps, the HELP model is a typical approach accepted by regulators for predicting the rate of infiltration of water through the cap that can leach waste components and lead to groundwater pollution. However, as discussed in our "Flawed Technology" review, while that model may be useful for predicting the rate of water infiltration through a newly placed, well-constructed cap, it cannot be relied upon for assessing the cover/cap performance over the extended period of time during which the buried wastes pose a threat. A properly constructed cap can initially be effective in reducing the rate of water infiltration through the cap, and may perform as anticipated based on HELP model output. However, as its low-permeability characteristics deteriorate over time, it will allow much greater amounts of water to enter the landfill/waste pile/contaminated soil, which is not revealed with such modeling. As we discuss in our "Flawed Technology" review, as part of cap permitting there needs to be documented assurance of the availability of adequate funds for the proper inspection and repair the cap for as long as the wastes beneath the cap are a threat, which is essentially forever.

Lava Cap Superfund Site

Adequate consideration of issues associated with long-term cap inspection and repair cannot be presumed to occur as part of permitting and remediation of a hazardous chemical site; this is exemplified by experience with the Lava Cap Superfund site. That US EPA NPL site, with the US EPA Region 9 as the lead on site investigation/remediation, is a former gold mine located near Nevada City, CA. It contains large amounts of mine tailings that contain high concentrations of arsenic. We were appointed as US EPA Technical Assistance Grant (TAG) technical advisors to review the adequacy of the site investigation/remediation relative to protection of public health and the environment. Our reports covering our review of US EPA documents on these issues are available on our website, www.gfredlee.com, in the Hazardous Chemical Site – Lava Cap Superfund Site subsection at http://www.gfredlee.com/phazchem2.htm#lava.

In its remediation approach for part of the Lava Cap site, the US EPA incorporated the capping of a tailings pile. The interstitial water in the tailing pile had high concentrations of arsenic indicating that the tailings leach arsenic when contacted by water. Capping of that area will not be reliable for preventing future pollution of the environment by the capped tailings since the cap will not prevent water from entering the tailings pile; water that is allowed to enter through the cap will carry arsenic-containing seepage from the pile and pollute a nearby stream that is tributary to a domestic water supply.

While the capping of the tailing pile enabled the US EPA to claim that the tailing pile had been "remediated," ultimately DTSC will inherit the responsibility for long-term maintenance of the tailing pile. Long-term maintenance will likely include the installation and maintenance of a more effective cap to try to keep the wastes dry, as well as the construction and maintenance of infiltration trenches to intercept and treat the tailings pile seepage to reduce its entrance into the stream. It is not certain the DTSC will have adequate funding to address these issues for as long as the capped tailings pile remain a threat.

Brown & Bryant Superfund Site

The adequacy of the permitted cap on a hazardous chemical site is also an issue at the Brown and Bryant (B&B) Superfund site in Arvin, CA. A former pesticide formulator caused extensive soil and groundwater pollution at that site; that pollution is a threat to the domestic groundwater supply of the city of Arvin. We are currently US EPA-supported TAG technical advisors to the Committee for Better Arvin, the public group concerned about the adequacy of site investigation/remediation. Our reports on our ongoing review of the investigation and remediation at that work are available on our website in the Brown and Bryant Superfund Site section: http://www.gfredlee.com/CBA_BBSite/CBA_BBSite.htm.

Early in the investigation of the B&B site, the US EPA adopted the approach of covering the site with an asphaltic cap. However, in each of several three-year reviews of the site undertaken as part of implementing Superfund requirements, it was found that cracks had developed in the cap. Those cracks were allowing water that falls on the cap to enter the underlying polluted soils and transport pesticide pollutants to the underlying groundwater aquifer that is hydraulically connected to the Arvin domestic groundwater supply.

It has become evident that the annual inspection and repair schedule for the site cap is not adequate to detect cracks in the site cap when they first occur and to make repairs before water can penetrate the cap. Based on our review, we recommended that the frequency of site cap inspection be increased to at least quarterly and that needed repairs be made whenever found. DTSC, which is the agency responsible for providing postclosure funding for the cap maintenance and repair, reported that it does not have adequate funds to conduct the more frequent site cap inspection and repair. The issue of the ability of DTSC to carry out its mandated requirements for the state and federal Superfund and brownfield sites has implications for the remediation of the SPTCo Sacramento Railyard site. The potential of the regulatory agency to conduct postclosure activities at "remediated" sites that are needed to fully protect public health, groundwater quality, and the environment must be considered in adopting a remediation approach and in declaring a site to be "remediated."

Surface Water Monitoring

In our "Flawed Technology" review we also discussed key characteristics of surface water monitoring programs that should be conducted at hazardous chemical sites, and the adequacy of regulatory agency requirements for monitoring stormwater runoff from Superfund,/brownfield site in a variety of publications including:

> Lee, G. F., and Jones-Lee, A., "Monitoring Pollutants in Stormwater Runoff from Superfund Sites and Other Locations," Report of G. Fred Lee & Associates, El Macero, CA, November 5 (2009).
> http://www.gfredlee.com/HazChemSites/MonitorRunoffSuperfund.pdf
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> Lee, G. F., and Jones-Lee, A., "Issues in Monitoring Hazardous Chemicals in Stormwater Runoff/Discharges from Superfund and Other Hazardous Chemical Sites," Journ. *Remediation* 20(2):115-127 spring (2010).
> http://www.gfredlee.com/HazChemSites/MonitoringHazChemSW.pdf
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> Lee, G.F., and Jones-Lee, A., "Evaluation of Surface Water Quality Impacts of Hazardous Chemical Sites," *Remediation* **9**:87-118 (1999).
> http://www.gfredlee.com/HazChemSites/eval_sfcwaters.pdf

LEHR Superfund Site

We frequently find that regulatory agencies allow monitoring and remediation of stormwater runoff from hazardous chemical that is inadequate to protect public health and the environment. The University of California Davis Superfund site on the UCD Davis campus provides an example of this problem. For 15 years we served as US EPA-supported TAG technical advisors to the Davis South Campus Oversight Committee, the public group concerned about the investigation and remediation of the LEHR site. Our reports and professional papers associated with our TAG activities at the site are available on our website at http://www.gfredlee.com/dscsoc/doc.htm.

The UCD LEHR Superfund site soils and groundwater have been polluted by UCD waste disposal activities. One of the issues of concern is the greatly elevated concentrations of mercury in stormwater runoff from the site compared to US EPA Clean Water Act regulatory requirements. Runoff from the LEHR site enters Putah Creek; some of the fish in that waterbody contain concentrations of mercury that are a threat to the health of people who eat them. The US EPA allowed UCD to place straw rolls in the path of stormwater runoff from the LEHR site as the control measure for mercury in the runoff. As should have been foreseen, it was found that the stormwater runoff that passed through the straw rolls contained concentrations of mercury well-above the California Toxic Rule allowed concentrations. However, it was claimed that the mercury was not derived from UCD waste disposal activities even though it was derived in part from areas of the site on which UCD has conducted activities that would impact stormwater runoff from the site. The US EPA staff responsible for the LEHR site investigation/remediation allows this situation to continue even though it violates regulatory requirements and contributes to additional health hazards to those who eat Putah Creek fish. Further information on this and other LEHR Superfund site investigation/remediation issues is available in our reports on our website site.

Remediation Levels An issue that often receives inadequately consideration in the remediation of a site is the fact that remediation levels that are considered appropriate or applicable at one time may prove to not be adequate in the future as more information is developed concerning new hazardous chemicals and impacts of presently recognized hazardous chemicals. We discussed these issues in:

> Lee, G. F. and Jones-Lee, A., "Does Meeting Cleanup Standards Mean Protection of Public Health and the Environment?," IN: Superfund XV Conference Proc., Hazardous Materials Control Resources Institute, Rockville, MD, pp. 531-540 (1994). http://www.gfredlee.com/HazChemSites/hmcrstd.pdf

Brown and Bryant Superfund Site

An example of the incorporation of inappropriate water quality standards in the remediation of hazardous chemical sites is found with the chloroform standards applied to the evaluation of groundwater associated with the B&B Superfund site in Arvin. The US EPA continues to allow a B&B Superfund site contractor to report the "clean-up" standard (MCL) for chloroform to be 100 ug/L. However, as discussed in our reports available on the B&B Superfund site section of our website, not only was the 100 ug/L MCL updated several years ago to 80 ug/L, the MCL is only applicable to waters used for domestic waters that have been chlorinated for disinfection. The drinking water MCL is not applicable to groundwaters that have been polluted with waste chloroform; the appropriate "clean-up" level to use for waters polluted with waste-derived chloroform is a few ug/L.

Conclusion

Overall, as discussed in the following paper, current brownfield site investigation/redevelopment approaches and requirements are not necessarily adequate to provide reliable long-term protection of public health and environmental quality.

> Lee, G. F., "Redevelopment of Brownfield Properties: Future Property Owners/Users Proceed with Your Eyes Open," *Environmental Progress* **16(4)**:W3 (1997). http://www.gfredlee.com/HazChemSites/brownfield.pdf

As mentioned above and in the cited references, there is a wide variety of issues that must be properly considered and addressed in selecting and executing site remediation approaches to provide public health and environmental quality protection for wastes left at the site, both in the near-term, and especially in the long-range period over which the wastes will be a threat. One of the most important issues that will need to be addressed is the establishment of appropriate and reliable land-use restrictions – "institutional controls" – and how those controls will be implemented to protect public health and the environment for as long as there are hazardous chemicals present in the site soils and groundwater. Since some the hazardous chemicals will be present at the site forever, a highly effective, independently monitored program will need to be instituted to ensure public health and environmental protection. These issues will need to adequately considered and at the SPTCo Sacramento Railyard site.