CITY PLACE SANTA CLARA: ADDRESSING VAPOR INTRUSION IN A MASSIVE LANDFILL REDEVELOPMENT

By Lenny Siegel
December, 2015

Here in Silicon Valley developable land is so precious these days that it's common to build on contaminated land or above sizable plumes of groundwater contamination that contain volatile organic compounds such as trichloroethylene. As a member of the Mountain View City Council, I have reviewed a number of such sites, to ensure that new building occupants will be safe and the groundwater cleanup can continue unimpeded. Nearly all such plumes resulted from leaks in underground storage tanks or buried sewage piping. Characterizing and mitigating such sites are fairly straightforward, though remediation is challenging and is likely to take a very long time.

But in nearby Santa Clara a developer is proposing a massive, nine-million-square-foot commercial and residential project called City Place on 240 acres, most of which—183 acres—is a former landfill. The developer appears willing to spend what it takes to build a project that is not vulnerable either to vapor intrusion or land movement, but at least in this region there is no precedent to determine what it actually will take to make City Place safe.

I have submitted comments on the City Place Draft Environmental Impact Report. The comment letter below contains my analysis verbatim, but I have inserted site photographs to add color to my description.

CENTER FOR PUBLIC ENVIRONMENTAL OVERSIGHT
A project of the Pacific Studies Center
278-A Hope Street, Mountain View, CA 94041
Voice: 650-961-8918 or 650-969-1545 Fax: 650-961-8918 <lsiegel@cpeo.org> http://www.cpeo.org

December 7, 2015

Debby Fernandez
City of Santa Clara Planning Division
1500 Warburton Avenue
Santa Clara, CA 95050

Dear Ms. Fernandez:

I appreciate the opportunity to comment on the October 2015 City Place Santa Clara Draft Environmental Impact Report (DEIR). Because the focus of my comments is on the potential risk to future building occupants from vapor intrusion, I have also reviewed the January 2015 Draft Site Investigation and Environmental Risk Assessment (ERA), the July 2015 Feasibility Study of Groundwater Remediation Alternatives (FS), and the September 2015 Draft Post Closure Land Use Plan (PCLUP).

Please note that although I am an elected member of the Mountain View City Council, I am submitting these comments on behalf of the Center for Public Environmental Oversight, not the City of Mountain View.

At this site, Related Santa LLC proposes to build up to 9.16 million gross square feet of office buildings, retail and entertainment facilities, residential units, hotel rooms and parking structures on 230.5 acres containing the former 183-acre All Purpose Landfill.

In summary, I find:

1. The sources and distribution of chlorinated volatile organic compounds (VOCs), particularly trichloroethylene (TCE), have not been adequately characterized.

2. The documents understate the risk of vapor intrusion in the absence of proposed mitigation.

3. Proposed mitigation may reduce the risk to building occupants to acceptable levels, but only if supported by a robust long-term management plan and continuing oversight by regulatory agencies and the public.

4. If buildings on this property can be made safe for other uses, they can be made safe for multi-family residences. For any use, the physical risks (settling, compaction, liquefaction, etc.) and the risk of fires, within the landfill and from potential methane releases, must be addressed.

The sources and distribution of chlorinated volatile organic compounds, particularly TCE, have not been adequately characterized.

TCE is found at elevated levels in the soil gas in some locations throughout the property, and it is found in the groundwater in portions of Parcel 3/6 and Parcel 4. TCE nationally is perhaps the most common contaminant of concern at vapor intrusion sites, and its seriousness is intensified by U.S. EPA's finding that pregnant women exposed to low levels of TCE have an increased risk of bearing children with cardiac birth defects.

The DEIR (page 3-11-10) notes: "Discarded items such as household cleaning products, materials coated with or containing paints and adhesives, and other items are common sources of VOCs in landfill gas." Yet there is no evidence that such products are the principal sources of TCE in the former landfill.

Golf cart path. Much of the landfill is currently covered by a golf course.

In fact, the San Francisco Bay Regional Water Quality Control Board (Water Board), in its February 2015 comments on the draft ERA (page 1), expressed its "concern about the possible presence of drums of hazardous waste buried in the Santa Clara Landfill." Most of the TCE groundwater plumes in Silicon Valley are known to have resulted from leaking underground storage tanks and piping. As such, characterization is straightforward. However, at this site landfill refuse is believed to be the source of TCE and its breakdown products in groundwater as well as landfill gas. The potential presence of containerized waste, whether it be industrial barrels or household cans and bottles, magnifies the potential for both geospatial and temporal variability typically documented in vapor intrusion investigations. Indeed, it may be that intact containers of TCE and other industrial pollutants will release their contents in the future, raising subsurface concentrations.

The FS (page 6) asserts, "there has been a significant decrease of COPC [chemicals of potential concern] concentrations since groundwater data collection began in 2005 in the majority of monitoring wells (Table 1)." Yet of the six wells where TCE readings exceed the five parts per billion (ppb) drinking water standard, two actually had

higher levels in 2014 than in 2005, and one of the others registered a higher level in 2014 than in 2011. Since high levels of TCE breakdown products demonstrate the dechlorination (degradation) of the TCE, there should be an explanation of why, at half the wells with TCE, concentrations are actually rising.

Furthermore, the documents (for example, Figure 3 in the FS) show an outline of the Approximate Extent of VOC Plume that is not supported by the associated tables. One-time grab sample B-18-GW, at the southern end of the portrayed plume, registered 15 ppb in late 2014. Monitoring well G-13, on the western edge of the "plume," was measured at 30 ppb in 2014, down from repeatedly sampled levels over 100 ppb from 2005 to 2008. Those levels are too high to mark the plume boundary. Furthermore, since all monitoring wells were placed on what appears to be a roadway dividing Parcel 1/3 and Parcel 4, there are actually very few sampling points properly positioned to delineate the plume.

For all their hard work, the investigators do not know where the TCE is coming from nor what future levels will be.

The documents understate the risk of vapor intrusion in the absence of proposed mitigation.

The risk posed by TCE is that future buildings will suck up the TCE soil gas contamination and expose building occupants. Exposure standards for residential use are more protective than workplace standards—the commercial scenario—because residents may spend more hours per week, year, and lifetime inside.

The ERA (page 26) concludes, "TCE and [sic] was not detected in soil and was detected below residential and commercial ESLs [Environmental Screening Levels] for chronic exposure to soil gas, indicating limited flux of TCE from the aquifer toward the ground surface." While I understand why the consultants continue to use the Water Board's ESLs, I believe those thresholds are unprotective and out of date.

The Water Board, in its October 2014 Interim Framework for Assessment of Vapor Intrusion at TCE-Contaminated Sites in the San Francisco Bay Region, has accepted U.S. EPA Region 9's July 2014 Accelerated Response Action Levels of 2 micrograms per cubic meter ($\mu g/m^3$) for residential exposures and 8 $\mu g/m^3$ for commercial (eight hours a day) scenarios. This is based upon the short-term exposure risk of birth defects.

In its December 2013 Lookup Tables, the Water Board actually recognizes a lower (more protective) exposure threshold for chronic (cancer) risk. For residential exposure, it's .59 $\mu g/m^3$. For commercial/industrial exposure, it's 3 $\mu g/m^3$.

But in the same document the Water Board keeps the soil gas ESLs at 300 $\mu g/m^3$ for residential and 3,000 $\mu g/m^3$ for workplaces, based on California's default attenuation factor, the ratio of indoor air concentrations for a substance to its level in soil gas.

I believe the proper soil gas screening levels should apply the default attenuation factor of .03 from U.S. EPA's June 2015 Vapor Intrusion Technical Guide. This number is based upon real world data collected across the country, including sites not too far from Santa Clara. Using this factor, the non-cancer soil gas screening levels would be 67 $\mu g/m^3$ for residential and 267 $\mu g/m^3$ for workplaces. The cancer-based soil gas screening levels would be 19.7 $\mu g/m^3$ for residential exposures and 100 $\mu g/m^3$ for commercial scenarios.

In 2014 TCE was measured in landfill (soil) gas as high as 170 $\mu g/m^3$ in Parcel 1, 99 $\mu g/m^3$ in Parcel 2, 230 $\mu g/m^3$ in Parcel 3, and 160 $\mu g/m^3$ in Parcel 4. Since all those levels are below the 300 $\mu g/m^3$ ESL, the consultants wrote them off, in my opinion unjustifiably.

Proposed mitigation may reduce the risk to building occupants to acceptable levels, but only if supported by a robust long-term management plan and continuing oversight by regulatory agencies and the public.

The numbers above don't mean that every exceedance will necessarily cause indoor air contamination above the indoor air exposure standards, but they should be used to guide risk management decisions. Fortunately, that's what the consultants are recommending. They plan to install an improved landfill gas collection system, and they have proposed landfill gas mitigation systems (LFGMS). The FS states (Page 15):

> The purpose of the LFGMS is to mitigate the potential building occupants' exposure to compounds that may be present in the shallow subsurface. Although the LFGMS is primarily designed to address high concentrations of methane in landfill gas, it would also serve to mitigate VOCs that may be present from underlying groundwater impacts.
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> The LFGMS will consist of a (i) a VBM [vapor barrier membrane], and (ii) a horizontal vapor collection and venting system installed below the VBM so that accumulated sub-slab vapors can migrate, and vent, to the atmosphere, outside the building. The horizontal vapor collection system will be primarily passively-driven, but will include a contingency active extraction component that may supplement the passive system based on automated methane monitoring.…
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> Each of the two components of the LFGMS, the VBM and the horizontal vapor collection and venting system will serve to reduce potential vapor intrusion risk. Langan [the consultant] has designed and monitored vapor mitigation systems within the San Francisco Bay Area, with oversight and approval from the Water Board, that have effectively mitigated vapor intrusion risk at properties overlying similar groundwater impacts as present within the VOC Plume.

Indeed, this strategy has proven effective at conventional vapor intrusion sites, but City Place will require extra care for two reasons. First, it's huge project entirely dependent upon successful mitigation of potentially intruding gases. If mistakes are made during construction—for example, if workers damage vapor membranes—it may be difficult to recover.

Methane collected from the landfill is and will be used to generate electricity at this on-site facility.

Second, this is a landfill, not a release from an underground storage tank. The texture and toxicity of the refuse is heterogeneous, creating a great deal of uncertainty about potential exposures. To avoid the disastrous impacts of likely settlement and other land movement, the buildings will be constructed on piles drive through the refuse. Though project designers have proposed innovative technologies to prevent the opening of preferential vapor pathways, that risk remains. And if there are buried barrels containing toxic compounds, there is a risk of puncture.

Thus, this project is unusually challenging. It will take a robust long-term management program that includes inspection of passive systems, operation and maintenance of active mitigation systems, institutional controls, and monitoring.

The consultants propose a continuous methane monitoring systems to warn of the buildup of combustible gases. That's a good thing, but the monitoring system could be improved with the use of innovative, commercially available software for managing real-time data. Such software can identify trends, instead of simply sending out alarms when methane concentrations exceed identified thresholds.

Furthermore, given the heterogeneity of the landfill, I am not convinced that methane monitoring will adequately indicate, as the consultant suggests, the movement of volatile organic compounds such as TCE and vinyl chloride. Remember, even a short-term intrusion of TCE into any of the buildings poses a serious risk to the offspring of pregnant women inside.

To ensure that long-term management is effective, there needs to be a guarantee that funds will remain available to support the program as long as the landfill contains methane and VOCs. Furthermore, the Water Board will need robust, continuing funding to remain constantly and indefinitely vigilant.

Looking across the All Purpose Landfill at Levi's Stadium
home of the San Francisco Forty-Niners and site of the February 2016 Superbowl 50

And the buildings' occupants will need to know what is supposed to be happening, not just because they have a right to know, but because they may spot problems first. To its credit, the DEIR proposes (page 3.11-33), "Information about the existing subsurface hazardous materials conditions and the ongoing mitigation and monitoring requirements described in the PCLUP shall be included in all ground leases and space leases for space located over the Landfill." That disclosure should be extended to all building occupants, including employees and visitors, with references to hardcopy or on-line information and explanations.

If buildings on this property can be made safe for other uses, they can be made safe for multi-family residences. For any use, the physical risks (settling, compaction, liquefaction, etc.) and the risk of fires, within the landfill and from potential methane releases, must be addressed.

The Water Board has repeatedly made it clear that residential development on a landfill is unprecedented—that is, historically unacceptable—within its jurisdiction. I personally have written that landfills are not a suitable place for residences and other sensitive uses. But this is an unusual situation. Developable land in Silicon Valley is today so valuable, particularly at the proposed density, that Related is willing to spend the money on massive podium construction and the landfill gas systems. It has proposed (page 4 of the PCLUP), "all residential apartments would be constructed above a podium garage structure or above at least one floor of retail space." If they follow the California Department of Toxic Substances Control's advisory on podium construction, including the sealing of elevators, utility lines, and ventilation systems, this may well turn out to be protective.

Thus, the landfill gas mitigation systems—assuming they work well enough to protect office and retail workers—and podium design should protect residents from TCE and other VOC vapor intrusion. Indeed, the relatively small amount of housing (540,000 square feet vs. more than 9 million square feet total) is planned to be built above or near the TCE groundwater plume

Engineering the buildings and other surfaces to remain intact and level in the face of land movement is a more daunting challenge than vapor mitigation. Preventing methane buildup and fires will also be difficult. But fires and partial collapse are unacceptable in all buildings, not just apartments.

Meanwhile, the project is under criticism as likely to exacerbate Silicon Valley's already devastating jobs-housing imbalance. The City of San Jose, just across the Guadalupe River, says it will result in 24,760 "net" new jobs, creating a demand of 15,408 residential units outside of Santa Clara. Since the Water Board has questioned residential development on site, many have concluded that balancing housing has to be built elsewhere.

However, as I have suggested above, if the project can be made safe enough for other uses, it can be made safe for housing. And building more housing will go a long way toward addressing the worsening of the regional housing shortage and consequent rent/price crisis, the further jamming of traffic, the fiscal impact on San Jose as the region's biggest bedroom community, and the greenhouse gas emissions generated by massive increases in commuting.

I look forward to hearing the responses to my concerns as well as to learning if I have misinterpreted the data in the multifarious lengthy documents.

Sincerely,

Lenny Siegel
Executive Director