

Office of Environmental Health Hazard Assessment



Matthew Rodriguez
Secretary for
Environmental Protection

Lauren Zeise, Ph.D., Director
Headquarters • 1001 I Street • Sacramento, California 95814
Mailing Address: P.O. Box 4010 • Sacramento, California 95812-4010
Oakland Office • Mailing Address: 1515 Clay Street, 16th Floor • Oakland, California 94612



Edmund G. Brown Jr.
Governor

DRAFT M E M O R A N D U M

TO: Elise McCaleb
City of Signal Hill
2175 Cherry Avenue
Signal Hill, CA 90755

FROM: James C. Carlisle, D.V.M., M.Sc., *J.C.*
Staff Toxicologist
Air and Site Assessment and Climate Indicator Branch

DATE: July 26, 2018

SUBJECT: HUMAN HEALTH RISK ASSESSMENT, FORMER CHEMOIL REFINERY,
SIGNAL HILL, CALIFORNIA OEHHA #830142-00

Document reviewed

- Human Health Risk Assessment, Former Chemoil Refinery, 2020 Walnut Ave., Signal Hill, California, 90755, dated May 31, 2018, by Mearns Consulting LLC (Mearns)

Site characterization

- An accurate health assessment depends on adequate site characterization:
 - The sampling plan must be adequate to capture all significant contamination and yield representative results. Samples must be handled in a manner that prevents loss of chemicals prior to analysis, and they must be analyzed by an appropriate method for toxic chemicals that are likely to be at the site. These conditions appear to have been met.

Potential exposure pathways

- Future onsite commercial worker
 - Ingestion/dermal contact with surface soil
 - Inhalation of dust from soil in outdoor air
 - Inhalation of VOCs from soil vapor or ground water in indoor air
- Future construction worker
 - Ingestion/dermal contact with surface and subsurface soil
 - Inhalation of dust from soil in outdoor air
- Future onsite resident
 - Ingestion/dermal contact with surface and subsurface soil
 - Inhalation of dust that has migrated to indoor air.
 - Inhalation of VOCs from soil vapor or ground water in indoor air

California Environmental Protection Agency

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption.

Chemicals of potential concern (COPCs)

- All constituents detected at least one time in ground water and in soil vapor underlying the site were quantitatively assessed using the appropriate exposure pathway in this risk assessment. Inorganics deemed to be present at concentrations exceeding background were quantitatively assessed.

Exposure point concentrations (EPC)

- The maximum detected concentration of soil contaminants or the 95% upper confidence limit on the mean (UCL₉₅), whichever was lower, was used as the exposure point concentration for the residential, commercial worker, and construction worker scenarios.
- The maximum detected concentration of soil vapor contaminants was used as the exposure point concentration for the residential and indoor commercial worker scenarios.

Western Parcel

Estimated risks and hazards – construction workers

- Mearns estimated the combined commercial hazard index and risk from vapor intrusion and soil exposure as 14 and 6×10^{-8} , respectively.
- OEHHA's risk estimate for construction workers exceeded Mearns' estimate by 78-fold. However, both estimates are below the workplace benchmark of 10^{-5} .
- OEHHA's hazard quotients for construction workers exceeded Mearns' estimates by 2.3-fold. Both estimates exceed the workplace benchmark of 1.
- The difference between the two estimates is largely due to OEHHA's incorporation of a volatilization factor, where available, for soil contaminants. (Basing inhalation risk and hazard only on a particulate emission factor (PEF), OEHHA's hazard quotients were generally less than Mearns' estimates.)
- OEHHA is concerned that the list of soil COPCs in Table 14 is abbreviated compared to Table 11.
- OEHHA is concerned that no inhalation risk is estimated for benzene and ethylbenzene and no oral risk is estimated for naphthalene.
- VOC concentrations in trenches, if any, are likely to be higher than those calculated for outdoor air.

Estimated risks and hazards – commercial workers

- Mearns estimated the combined commercial hazard index and risk from vapor intrusion and soil exposure as 51 and 1.3×10^{-3} , respectively.
- OEHHA did not attempt to verify these numbers as they are driven largely by vapor intrusion and OEHHA understands that a vapor barrier and passive vent system will be required for methane mitigation.

Estimated risks and hazards – residents

- Mearns estimated the combined residential hazard index and risk from vapor intrusion and soil exposure as 427 and 1.1×10^{-2} , respectively.
- OEHHA did not attempt to verify these numbers as they are driven largely by vapor intrusion and OEHHA understands that a vapor barrier and passive vent system will be required for methane mitigation.

Eastern Parcel

Estimated risks and hazards – construction workers

- Mearns estimated the combined commercial hazard index and risk from vapor intrusion and soil exposure as 43 and 1.6×10^{-9} , respectively.
- OEHHA's risk estimate for construction workers exceeded Mearns' estimate by 330-fold. However, both estimates are below the workplace benchmark of 10^{-5} .
- OEHHA's hazard quotients for construction workers exceeded Mearns' estimates by 1.9-fold. Both estimates exceed the workplace benchmark of 1.
- The difference between the two estimates is largely due to OEHHA's incorporation of a volatilization factor, where available, for soil contaminants.
- OEHHA is concerned that the list of soil COPCs in Table 24 is abbreviated compared to table 26.
- OEHHA is concerned that no inhalation risk is estimated for ethylbenzene and no oral risk is estimated for naphthalene.
- VOC concentrations in trenches, if any, are likely to be higher than those calculated for outdoor air.

Estimated risks and hazards – commercial workers

- Mearns estimated the combined commercial hazard index and risk from vapor intrusion and soil exposure as 9 and 7.8×10^{-7} , respectively.
- OEHHA did not attempt to verify these numbers. The risk is driven largely by vapor intrusion.

Estimated risks and hazards – residents

- Mearns estimated the combined residential hazard index and risk from vapor intrusion and soil exposure as 85 and 1.8×10^{-5} , respectively.
- OEHHA did not attempt to verify these numbers. However, for a residential scenario, OEHHA typically recommends using the maximum or point-by-point concentrations rather than the UCL as the EPC.

Summary and Conclusions

The following table summarizes the HHRA results:

	Mearns						OEHHA	
	residential		Commercial		Construction		Construction	
	Risk	HI	Risk	HI	Risk	HI	Risk	HI
Eastern	1.8×10^{-5}	85	7.8×10^{-7}	9	1.6×10^{-9}	43	5.3×10^{-6}	80
Western	1.1×10^{-2}	427	1.3×10^{-3}	51	6.0×10^{-8}	14	4.7×10^{-6}	32

- Mearns estimated residential risk and hazard index exceed the typically applied thresholds for residents.
- Mearns estimated commercial risk exceeds the typically applied thresholds for workers in the Western parcel but not in the Eastern parcel. Hazard indices (HI) exceed the target value of ≤ 1 for workers in both parcels.
- Although OEHHA's construction worker risk estimates were higher than Mearns' estimates, both estimates were below the typically applied threshold for workers. Both hazard index (HI) estimates exceed the target value of 1.

Peer reviewed by:

Amanda Palumbo

Amanda Palumbo, PhD
Staff Toxicologist