



Department of Toxic Substances Control

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October 23, 2013

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ESTIMATE OF HUMAN HEALTH RISK AT BUILDINGS IN THE HISTORICAL ARSENAL PARK BY VAPOR INTRUSION FROM GROUNDWATER, FORMER BENICIA ARMY ARSENAL, BENICIA, CALIFORNIA, EPA I.D. CAD009140120

Dear Ms. McLaughlin:

After the installation of Proposition 65 signs at several buildings associated with the Benicia Arsenal Historical Park, there were questions from the tenants about the hazards related to subsurface contamination. Solvents in groundwater can potentially volatilize into soil vapor and intrude into buildings. DTSC performed a risk and hazard analysis using data from the Army Corps of Engineering study in 2005 for Building B-120 at the corner of Jackson and Polk Streets and Building B-57 which is on the west side of the Building 50 Series Complex. The building just west of the Building 50 Series Complex is also discussed below.

Building B-120:

Based on possible exposure to solvents detected in groundwater, the hazard quotient exceeds levels considered protective of human health in Building B-120. The shallow groundwater under B-120 contains the volatile solvents cis-1,2-dichloroethene (1,2-DCE) and a much smaller amount of trichloroethene (TCE). Vapor intrusion into the buildings was modeled and a health hazard quotient for a full time worker of 3.1 was estimated. The hazard quotient is a comparison of the modeled indoor air concentration to an indoor air concentration considered protective. Understand that this quotient is derived from estimating the potential for vapors from the groundwater to enter the building. A hazard quotient of 1 or less is considered protective. The estimate is based on a full-time worker scenario which assumes eight hour work days and working 250 days per year. For exposures of shorter duration and frequency the quotient would be proportionately less. There is limited information on the health effects of long term exposure to high levels of 1,2-DCE in humans. Some humans exposed to large amounts of this chemical over short periods of time have had nervous system effects including weakness, drowsiness, nausea, dizziness and loss of consciousness. Exposure to high concentrations of 1,2-DCE causes adverse effects on the liver, blood and immune system of laboratory animals. Taken

Ms. Heather McLaughlin
October 23, 2013
Page 2

together, the human and animal data suggest that long term human exposure to 1,2-DCE may increase the risk for changes in the blood, and for liver, immune system and nervous system toxicity.

Building 57:

Based on possible exposure to solvents detected in groundwater, the estimated cancer risk and hazard quotient greatly exceed levels considered protective of human health in Building B-57. B-57 has quite high TCE concentrations in the shallow groundwater. Vapor intrusion into the buildings was modeled and a health hazard quotient for a full time worker of 177 and a life time cancer risk of 530 per million was estimated. Potential health effects of long-term exposure to TCE vapors are nerve, kidney, and liver damage. Studies have shown TCE to cause cancer to these organs and non-Hodgkin lymphoma. Recent toxicity studies indicate that exposure may result in cardiac malformations and developmental immunotoxicity in addition to adult immunological effects.

Building west of the Building 50 Series Complex:

The sample points immediately to the east and west of the building have low levels of these solvents. To the southeast is B-57 which has the high concentrations of trichlorethene described above. It is uncertain whether this building is influenced by the 50 Series Complex concentrations or not. If the building is over groundwater characterized by the sample locations to the east and west, there might be no risk associated with the solvents. If the building is over groundwater characterized by the 50 Series Complex concentrations, the health hazard quotient could be as high as 177 and the life time cancer risk of 530 per million. This is a big range and more specific information is needed to determine a risk estimate for this building.

Indoor Air Sampling and Groundwater Clean-up:

DTSC has discussed these risk estimates with the Benicia Arsenal Historical Park owner and suggested collection of indoor air samples to determine actual exposure levels.

These areas have been identified as needing remediation and DTSC is in the process of obtaining agreement with the property owners, City of Benicia and the U.S. Army to clean up groundwater contamination on the site.

If you have any questions, please contact me at (916) 255-3592 or via email at mherrman@dtsc.ca.gov.

Sincerely,



Martin G. Herrmann, P.E.
Brownfields and Environmental Restoration Program
Department of Toxic Substances Control

cc: (By email)

Ms. Heather McLaughlin
October 23, 2013
Page 3

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