Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

May 8, 1997

3042.95-008

Ravi Arulanantham, Ph.D., CHMM
California Regional Water Quality Control Board
2101 Webster Street, Suite 500
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Subject: Addendum to Levine·Fricke·Recon Inc.'s Excavation and Disposal Work Plan for Arsenic-Affected Soils in the Vicinity of the Sherwin-Williams Facility, Emeryville, California, dated April 25, 1997

Dear Ravi:

This letter is an addendum to Levine·Fricke·Recon Inc.'s (LFR's) "Excavation and Disposal Work Plan for Arsenic-Affected Soils in the Vicinity of the Sherwin-Williams Facility, Emeryville, California," dated April 25, 1997 ("the Work Plan"). It addresses specific comments prepared by SECOR International Incorporated (SECOR) on behalf of the City of Emeryville ("the City") in a letter dated May 2, 1997 and Erler & Kalinowski (EKI), Inc. on behalf of Chiron Corporation ("Chiron") in a letter dated May 2, 1997 by relating to soil cleanup criteria proposed in the Work Plan. These issues were also discussed in meetings at the City on May 5, 1997.

The specific comments addressed in this letter relate to issues regarding the criteria used to determine shallow soil depth (i.e., above 1.5 feet below ground surface [bgs]), the proposed soil cleanup levels for arsenic, health concerns regarding elevated levels of lead in soils, and the proposed soil cleanup levels for lead.

Criteria for Determination of Shallow Soil Depth

The determination of shallow soil depth was based on the fact that most of the affected soil (with the exception of the deeper excavation areas) appears to be in the top 6 inches, and on the assumption that an individual engaged in landscaping for sidewalk planters would not dig deeper than 1.5 feet bgs. Based on comments expressed by the agencies and the City, as well as additional landscaping depth information provided by a 45th Street Artists Co-op ("the Co-op") representative, shallow soil depth cutoff level will be increased to 2.0 feet bgs for the section of excavation along Horton Street and 45th Street, directly adjacent to the Co-op.

Proposed Soil Cleanup Levels for Arsenic

The proposed soil cleanup levels for arsenic for shallow depth soils are the arithmetic mean concentration of 13 milligrams per kilogram (mg/kg) and a "not-to-exceed" concentration of

22 mg/kg, which is conservatively based on the average local background concentration for arsenic. The shallow cleanup goal was agreed on at a meeting on April 15, 1997, attended by the Regional Water Quality Control Board (RWQCB), the City, and other interested agencies. Sherwin-Williams accepted these background levels to expedite the removal process. The areas of excavation presented in the Work Plan for shallow soils were developed on the premise that all shallow soils with elevated arsenic levels above 13 mg/kg are intended to be removed.

The proposed soil cleanup level of 160 mg/kg of arsenic in deeper depth soils, which was presented in the Work Plan, has been modified to a 130 mg/kg arithmetic mean concentration with a proposed "not-to-exceed" single-point concentration of 220 mg/kg (this assumes the same distribution of arsenic in deeper soils as assumed in shallow soils).

This revised cleanup level takes into account both the utility worker maintenance scenario and worker exposure during a one-time future installation of new utility lines for the anticipated expansions on the Chiron property.

The proposed modified soil cleanup level for arsenic in deeper soils is based on exposure assumptions for utility maintenance and utility installation workers. The exposure pathways evaluated include incidental ingestion of soils, dermal contact with soils, and inhalation of airborne particulates. The exposure frequency and duration under the utility maintenance worker scenario were conservatively assumed to be 10 days per year every other year for 25 years. This assumption is considered to be conservative, based on telephone conversations with Pacific Gas and Electric Company (PG&E) personnel. The exposure frequency and duration under the utility installation worker scenario were discussed with the City and SECOR and assumed to be 30 days for a single year. The proposed modified soil cleanup level for arsenic was derived using these conservative exposure frequencies and durations along with California Environmental Protection Agency (Cal-EPA) standard default exposure parameters for ingestion, dermal contact, and inhalation rates and a point-of-departure for total excess lifetime cancer risks via all exposure pathways of one-in-one hundred thousand (10^{-5}). Tables A-1 through A-4, attached, present these exposure assumptions and risk calculations.

Health Concerns Regarding Elevated Levels of Lead in Soils

Data collected during recent investigations on Horton Street indicate that the spatial distribution of elevated levels of lead in soils generally corresponds to that of elevated levels of arsenic in soils. Although arsenic appears to be the primary compound of concern and the driver for the extent of soil excavation, soil cleanup levels for lead were also evaluated as requested by SECOR on behalf of the City. In accordance with standard risk assessment protocols, the health risk associated with exposure to lead in soils is evaluated separately from other compounds. The measure of this health risk is determined by the estimated blood lead level in an individual. The blood lead level is estimated using an Uptake Biokinetic Model, which also takes into account contribution to the blood lead level of an individual from other sources of lead such as produce, ambient air, and drinking water. The Uptake Biokinetic Model was used to derive the proposed soil cleanup levels for lead in shallow soils as discussed below.

Proposed Soil Cleanup Levels for Lead

The proposed cleanup levels for lead in shallow soils (up to 2.0 feet bgs) are the arithmetic mean concentration of 400 mg/kg and the "not-to-exceed" concentration of 840 mg/kg. The proposed soil cleanup level for lead of 400 mg/kg arithmetic mean concentration is based on the U.S. Environmental Protection Agency (U.S. EPA), Region 9 Preliminary Remediation Goal established for lead using the Uptake Biokinetic Model under a residential exposure setting. The "not-to-exceed" concentration for lead of 840 mg/kg is based on the Food and Drug Administration (FDA) standard for potting soil and was provided by the agencies in the April 15, 1997 meeting. Although the U.S. EPA Region 9 Preliminary Remediation Goal established for lead under an industrial exposure setting is 1000 mg/kg, the proposed cleanup levels for lead for deeper soils will conservatively be set at the same levels as for the shallow soils.

Review of the data shows two outlying areas where lead concentrations are above this lead cleanup criteria; at the same locations, arsenic is near or below background levels. These locations are South Horton Street (near Park Boulevard) and Hubbard Street (the street perpendicular to and south of Sherwin Avenue). Because these areas are significantly distant from the original lead/arsenate manufacturing area and because lead soil concentrations closer to the original manufacturing area are significantly lower, the agencies have agreed that cleanups in these outlying areas with elevated lead are not Sherwin-Williams' responsibility.

Summary of Proposed Soil Cleanup Levels for Arsenic and Lead

The proposed soil cleanup levels for arsenic and lead are summarized below.

Summary of Proposed Soil Cleanup Levels

Depth	Arsenic	Lead
Shallow Soils (0-2 feet bgs)	13 mg/kg arithmetic mean concentration and "not-to-exceed" concentration of 22 mg/kg	400 mg/kg arithmetic mean concentration and "not-to-exceed" concentration of 840 mg/kg
Deeper Soils (>2 feet bgs)	130 mg/kg arithmetic mean concentration and "not-to-exceed" concentration of 220 mg/kg	400 mg/kg arithmetic mean concentration and "not-to-exceed" concentration of 840 mg/kg

Confirmation Soil Sampling

Confirmation soil samples will be collected during excavation at intervals of 25 feet, running along the sidewalk areas. Within each 25-foot interval, four subset samples will be collected and composited into a discrete sample for analysis. The results of the four confirmation soil samples

collected within each 100 feet of excavation will be averaged to compare to the arithmetic mean soil cleanup level to assess the need for additional excavation. In addition, if any of the four confirmation soil sample results exceed the "not-to-exceed" concentration, additional excavation will be performed. All confirmation soil sampling will be based on bottom samples except at the endpoints of the outlying excavations, where an additional sidewall sample will be taken for comparison to the cleanup criteria.

Impact of Arsenic-Affected Soils on Groundwater

Chiron and SECOR representatives have also requested that the potential impact of arsenic-affected soils on groundwater be evaluated. The impact of arsenic-affected soil on groundwater at this time does not appear to be significant, because the historical concentrations of arsenic in well LF-12 (located on Horton Street, just downgradient from the highest arsenic elevations in the eastern sidewalk) have been only slightly above detection limits and well below drinking water Maximum Contaminant Levels (MCLs) for arsenic. Nevertheless, to evaluate the potential mobility of arsenic, additional analysis will be conducted by running a Waste Extraction Test (WET) leaching procedure using deionized water. This data will be distributed to all interested parties after receipt from the laboratory.

If you have any comments or questions, please call Larry Mencin of Sherwin-Williams at (216) 566-1768 or the undersigned.

Sincerely,

Mark D. Knox

Mark D. Knox
Principal Engineer

cc: Distribution List

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ATTACHMENT 1

Risk Assessment Calculations

Table A-1

Utility Maintenance and Installation Worker Scenario: Summary of Excess Lifetime Cancer Risks

Sherwin-Williams Facility, Emeryville, California

Risk via Incidental Ingestion	Risk via Dermal Contact	Risk via Inhalation	Total Risk *	Target Risk
8E-06	2E-06	1E-07	1E-05	1E-05

* Based on a soil cleanup level for arsenic of 130 mg/kg weighted average concentration.

Table A-2
Utility Maintenance and Installation Worker Scenario – Incidental Ingestion Exposure Pathway – Carcinogens
Sherwin-Williams Facility, Emeryville, California

Exposure Input Variables	Acronym	Units	Utility Maintenance Worker	Utility Installation Worker	Arsenic
Chemical concentration in soil	C	mg/kg			130
Soil consumption rate (1)	CR	mg/day	480	480	
Mass conversion factor	MCF	kg/mg	1.0E-06	1.0E-06	
Bioavailability factor	BF	unitless			1.0
Exposure frequency (2)	EF	days/yr	5	30	
Exposure duration (1)	ED	yr	25	1	
Body weight (1)	BW	kg	70	70	
Exposure extrapolation factor (1)	EEF	yr	70	70	
Time conversion factor	CF	days/yr	365	365	
CHRONIC DAILY INTAKE	CDI	mg/kg/day			
Utility Maintenance Worker					4.4E-06
Utility Installation Worker					1.0E-06
Total	CDI	mg/kg/day			5.4E-06
Cancer Slope Factor	SF	1/mg/kg/day			1.5
EPA Carcinogenic Classification					A
Risk - Utility Worker	RISK				8.1E-06
TOTAL RISK		**8E-06**			

(1) - DTSC, 1995.

(2) - For utility maintenance worker, the exposure frequency was assumed to be 10 days per year every other year.

$$CDI = \frac{(C)\,(CR)\,(MCF)\,(BF)\,(EF)\,(ED)}{(BW)\,(EEF)\,(CF)}$$

$$RISK = (CDI)\,(SF)$$

Table A-3
Utility Maintenance and Installation Worker Scenario – Dermal Contact Exposure Pathway – Carcinogens
Sherwin-Williams Facility, Emeryville, California

Exposure Input Variables	Acronym	Units	Utility Maintenance Worker	Utility Installation Worker	Arsenic
Chemical concentration in soil	C	mg/kg			130
Skin surface area (1)	SA	cm2/day	3160	3160	
Mass conversion factor	MCF	kg/mg	1.0E-06	1.0E-06	
Soil to skin adherence factor (2)	AD	mg/cm2	1.0	1.0	
Bioavailability factor	BF	unitless			0.03
Exposure frequency (3)	EF	days/yr	5	30	
Exposure duration (2)	ED	yr	25	1	
Body weight (2)	BW	kg	70	70	
Exposure extrapolation factor (2)	EEF	yr	70	70	
Time conversion factor	CF	days/yr	365	365	
CHRONIC DAILY INTAKE	CDI	mg/kg/day			
Utility Maintenance Worker					8.6E-07
Utility Installation Worker					2.1E-07
Total	CDI	mg/kg/day			1.1E-06
Cancer Slope Factor (4)	SF	1/mg/kg/day			1.5
EPA Carcinogenic Classification					A
Risk - Utility Worker	RISK				1.6E-06
TOTAL RISK		**2E-06**			

(1) - Skin surface area average for male and female for forearms, hands, and head for utility worker (U.S. EPA, 1996).

(2) - DTSC, 1995.

(3) - For utility maintenance worker, the exposure frequency was assumed to be 10 days per year every other year.

(4) - Oral SF used as surrogate for dermal exposure.

$$CDI = \frac{(C)\,(SA)\,(MCF)\,(AD)\,(BF)\,(EF)\,(ED)}{(BW)\,(EEF)\,(CF)}$$

Table A-4
Utility Maintenance and Installation Worker Scenario -- Inhalation Exposure Pathway – Carcinogens
Sherwin-Williams Facility, Emeryville, California

Exposure Input Variables	Acronym	Units	Utility Maintenance Worker	Utility Installation Worker	Arsenic
Inhalation rate (1)	IR	m3/hr	2.5	2.5	
Chemical concentration in air (2)	C	mg/m3			6.5E-06
Respirable fraction (3)	RF	unitless			1.0
Bioavailability factor	BF	unitless			1.0
Exposure time	ET	hr/day	8	8	
Exposure frequency (4)	EF	days/yr	5	30	
Exposure duration (1)	ED	yr	25	1	
Body weight (1)	BW	kg	70	70	
Exposure extrapolation factor (1)	EEF	yr	70	70	
Time conversion factor	CF	days/yr	365	365	
CHRONIC DAILY INTAKE	CDI	mg/kg/day			
Utility Maintenance Worker					9.1E-09
Utility Installation Worker					2.2E-09
Total	CDI	mg/kg/day			1.1E-08
Cancer Slope Factor	SF	1/mg/kg/day			12
EPA Carcinogenic Classification					A
Risk - Utility Worker	RISK				1.4E-07
TOTAL RISK		**1E-07**			

(1) - DTSC, 1995.

(2) - Assumed ambient air particulates are equal to the National Ambient Air Quality Standard for the annual average respirable portion (PM_{10}) of suspended particulate matter of 0.05 mg/m^3 (DTSC, 1994)

(3) - Respirable fraction for particulates was assumed to be 100%.

(4) - For utility maintenance worker, the exposure frequency was assumed to be 10 days per year every other year.

$$CDI = \frac{(IR)\,(C)\,(RF)\,(BF)\,(ET)\,(EF)\,(ED)}{(BW)\,(EEF)\,(CF)}$$

$$RISK = (CDI)\,(SF)$$