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41674 Christy Street
Fremont, CA 94538
Phone: (510) 659-0404
Fax: (510) 651-4677

October 18, 1991

Alameda County Health Agency
Division of Hazardous Materials
80 Swan Way, Room 200
Oakland, California 94621

Attention: Ms. Pamela J. Evans
Hazardous Materials Specialist

Subject: Draft Final Report
Saklan Road Property, Hayward, California
Exceltech Project No. 3-50058-51

Dear Ms. Evans:

Enclosed is a revision of the Draft Final Report that was originally submitted the first week in September. The revisions are a result of the meeting with you and Ravi Arulanantham on September 30. This enclosure does not include all the appendices that were submitted with the original draft. If you wish additional copies of those appendices before this document is finalized, please call.

The third assumption on page 4-7 of the original draft stated that the calculations were based on an ingestion adsorption of 10%. This is inaccurate as Ravi noted. The calculations were in fact based on 100% adsorption (please review the attached calculation sheets).

The calculation were redone using only the analyses from the top 18 inches, and treating all samples as equal (ignoring both stratification and compositing). The calculation sheets are included.

Finally, I would like to inform you that as of October 21, 1991, I will no longer be employed by Exceltech. The Project Manger will be Ms. Nalini Frush, and the staff toxicologist will be Ms. Mahdulla Logan. Please feel free to call either Ms. Frush or Ms. Logan with any questions. Should my personal knowledge be of value, Ms. Frush will be able to contact me.

Sincerely,

Jeff Willett, P.E., Manager
Assessment, Compliance and Training

Enclosure

cc: Mr. Hugh Murphy, City of Hayward Fire Department
Mr. Rob Robles
Mr. John Barbour

EXCELTECH

FINAL REPORT

SAKLAN ROAD PROPERTY
HAYWARD, CALIFORNIA

Project No. 3-50058-52
October 1991

Table of Contents

EXCELTECH

SECTION 1
INTRODUCTION

This report is designed as a comprehensive, fully documented analysis of the risk from identified pesticides and polychlorinated biphenyls (PCBs) on the properties at 23830 and 23836 Saklan Road (also identified in the appendices as Saklan Avenue) in unincorporated Alameda County surrounded by Hayward, California. Briefly, this document includes (1) a chronology of events involved in this analysis, (2) conclusions reached as a result of the analysis, (3) figures, tables and calculations resulting from the analysis and supporting the conclusions, (4) appendices of interim documents produced during the analysis, and (5) appendices of data acquired during the analyses.

Under Section 25321(d) in Chapter 6.8 of the California Health and Safety Code, normal application of pesticides is excluded from the definition of a hazardous substance release. This means that unless the soil is excavated for disposal, the State of California does not consider it a hazardous waste. As the soil on this site is not expected to be excavated for disposal, the basis for this analysis is the health concerns of Alameda County and the City of Hayward. While the site is currently in unincorporated Alameda County, it is surrounded by the City of Hayward and is expected to be annexed. Under these conditions, the analysis was completed at the direction of Ms. Pamela Evans of the Alameda County Health Care Services Agency (County), with the concurrence of Mr. Hugh Murphy of the City of Hayward (City).

EXCELTECH

SECTION 2
CHRONOLOGY

In September of 1989, a preliminary environmental assessment was conducted on the site. As part of that assessment, a review of historical aerial photographs indicated a history of greenhouses on the site. Based on that information, the County and City requested surface soil samples for pesticides. Initial samples were collected in October 1990, and subsequent samples collected in November 1990. The results of the analysis of these samples indicated the presence of Aldrin, Lindane, DDT (and it's daughter products, DDD and DDE, hereinafter identified with the DDT as DDTr), and PCBs. The consultant's reports, with site maps and laboratory analysis sheets are located in Appendix D. The analytical results are found in Table 1.

In light of these results, the County requested a health risk assessment to evaluate the health risk of the compounds identified. The health risk assessment was completed in April 1991 and submitted to the County. The health risk assessment is located in Appendix A, and the resume of the preparer is in Appendix B. The health risk assessment identified needs for further sampling to fully define the levels and extent of compound concentrations in the soil.

In May 1991, additional soil sampling was conducted, and water from the three on site wells was also sampled. No compounds were identified in the groundwater. The soil sampling indicated that the pesticides were confined to the top two and one half feet of the soil, and that the concentrations decreased rapidly beneath the surface. The sampling plan and laboratory analytical sheets are located in Appendix E, and the associated report, issued as a revision to the health risk assessment, is in Appendix C.

PCBs were identified only in one original sample taken in October 1990. As subsequent sampling through May 1991 found no other PCB concentrations, additional sampling was undertaken in an attempt to confirm any presence of PCBs. This sampling occurred in August 1991. One surface sample was taken at the site of the original positive sample (as indicated by measurements in the original report, Appendix D), and four additional samples were taken to the East, West, South, and North (as noted in Appendix F, with the laboratory analyses). No PCBs were detected in any of these samples, and no indication of oil staining was found.

EXCELTECH

SECTION 3
CONCLUSIONS

Based on the evaluations of the analytical results, the following increased cancer risks were identified:

Aldrin:	0.83 in one million
Lindane:	0.004 in one million
DDTr:	1.5 in one million

As no cancer risks were identified as equal to or greater than one-in-one million, no further investigation nor any remediation relative to pesticide concentrations is indicated.

Resampling and analysis of the area where PCBs were initially detected did not detect any presence of PCBs. Consequently, it is assumed that the original identification was either a false positive, or indicated such a limited areal extent that reidentification was not possible. Therefore, no further investigation nor any remediation relative to possible PCB presence is indicated.

EXCELTECH

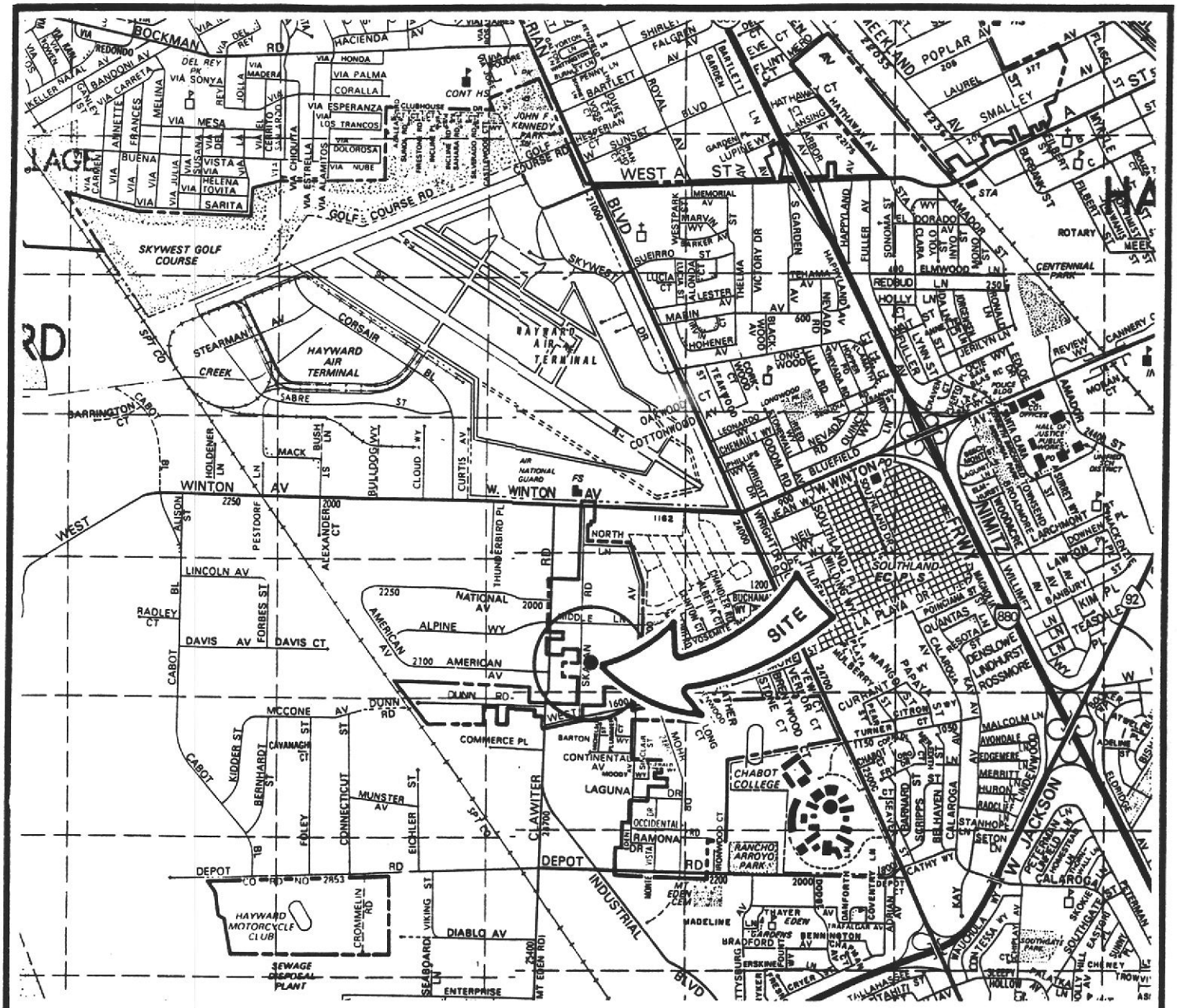
SECTION 4
FIGURES, TABLES, AND CALCULATIONS

This section is divided in to four parts. Immediately following this page are Figures 1 and 2. Figure 1 is an area map showing the location of the site. Figure 2 is a site map showing the site layout in conjunction with Saklan Road.

Following Figure 2 are Tables 1 through 4. Table 1 is a summary of the soil analytical data (laboratory sheets provided in the appendices). Table 2 includes actual data from Table 1 and entries for one-half of the detection limit in place of non-detect notation for the compounds of concern. The data from this table was used to carry out the calculations. Table 3 summarizes the results of statistical calculations based on Table 2. Note that Table 3 includes both current upper confidence limits (UCLs) and UCL used for 70 year calculations. Finally, Table 4 (1) summarizes the short term emissions and compares them to the U.S. Occupational Health and Safety Administration Permissible Exposure Limits, (2) summarizes the long term exposure rates, and (3) compares the one-in-one million cancer risk concentrations with actual concentrations.

Following these summary tables is a complete discussion and presentation of the equations used to complete the tables. Included are tables of intermediate data derived from the equations. Finally, the actual calcuations are shown including units.

FIGURES



BASE MAP: THOMAS BROS. GUIDE, ALAMEDA CO. 1991

LEGEND

SITE LOCATION

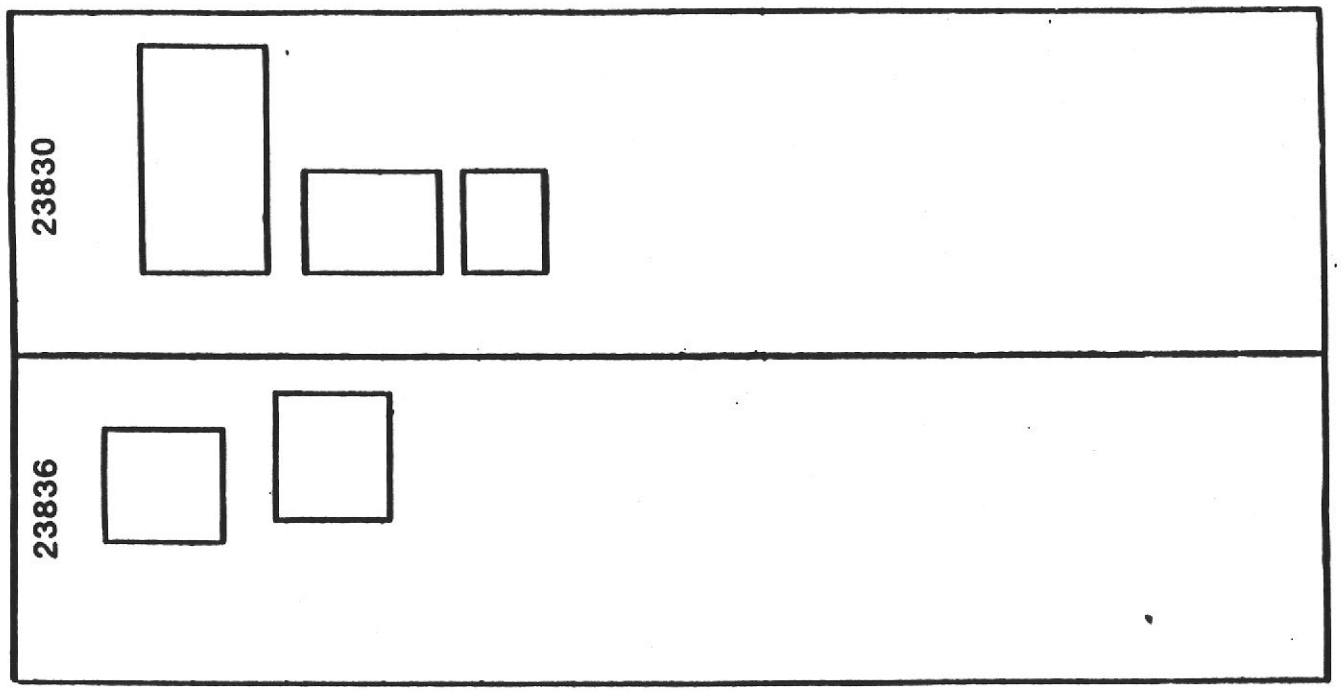
0 1100 2200

SCALE IN FEET

N

AREA MAP		
ROBLES PROPERTY	REVIEWED BY:	APPROVED BY:
23836 SAKLAN AVENUE	JOB #: 3-50058-51	DRAWN BY: J.D.S.
HAYWARD, CALIFORNIA	DATE: 9/5/91	DRAWING #: 1

EXCELTECH



SCALE

0 50' 100'

BASE MAP: CHIPS ENVIRONMENTAL CONSULTANTS 3/19/91

EXCELTECH

SITE MAP

ROBLES PROPERTY

23836 SAKLAN AVENUE

HAYWARD, CALIFORNIA

REVIEWED BY:	APPROVED BY:
JOB #: 3-50058-51	DRAWN BY: J.D.S.
DATE: 9/5/91	DRAWING #: 2

TABLES

Community West
Project No. 3-50058-51

October 22, 1991

TABLE 1

SUMMARY OF ANALYTICAL RESULTS
Sample concentrations in parts per billion

Compound	d1	d2	d3	d4	c1	c2	c3	c4	c5	c6	G-12	G-18	G-27	G-42	G-45	G-70	G-18A	G-27A	G-70A
Aldrin	ND	ND	ND	ND	ND	34	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
a-BHC	31	17	ND	25	ND	ND	ND	ND	ND	ND	ND	5.2	16	ND	ND	ND	ND	ND	ND
d-BHC	590	49	ND	610	14	210	54	ND	ND	ND	ND	ND	18	ND	ND	ND	ND	ND	ND
g-BHC	120	17	ND	24	13	79	33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DDT	2100	1400	5700	3100	550	6500	1400	5600	110	640	ND	ND	160	ND	ND	220	ND	ND	14
DDD	250	240	840	460	57	300	120	590	ND	220	ND	33	52	ND	ND	72	ND	ND	3.3
DDE	1100	1300	1500	1500	230	1900	630	830	120	740	ND	70	59	ND	ND	130	ND	ND	12
PCBs	ND	ND	1900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

1. d = discrete sample, c = composite sample
2. ND = analytical results below detection limit
3. d1-c6 were surface samples, G-12 - G-70 were at 12 to 18 inches deep, G-18A - G-70A were at 24 to 30 inches deep.

Community West
Project No. 3-50058-51

October 22, 1991

TABLE 2

SUMMARY OF ANALYTICAL RESULTS USED IN CALCULATIONS
Sample concentrations in parts per billion

Compound	d1	d2	d3	d4	c1	c2	c3	c4	c5	c6	G-12	G-18	G-27	G-42	G-45	G-70
Aldrin	2.5	2.5	25	2.5	2.5	34	15	10	10	10	0.5	2.5	2.5	2.5	0.5	2.5
Lindane	120	17	25	24	13	79	33	10	10	10	0.5	2.5	2.5	2.5	0.5	2.5
DDTr	3450	2940	8040	5060	837	8700	2150	7020	255	1600	7	118	271	35	7	422

1. d = discrete sample, c = composite sample
2. Underlined values are or include one-half of the detection limit in place of an "ND."
3. d1-c6 were surface samples, G-12 - G-70 were at 12 to 18 inches deep.

Community West
Project No. 3-50058-51

October 22, 1991

TABLE 3

STATISTICAL RESULTS OF DATA
All concentrations shown in parts per billion

Compound	Mean	Variance	Std. Dev.	Std. Err.	UCL [1, 2]	UCL [3]
Aldrin	7.8	92.0	9.6	2.4	12.0	-
Lindane	22.0	1060	32.6	8.2	36.4	0.77
DDTr	2557	9.29×10^6	3048	762	3878	1152

1. UCL = Upper confidence limit.
2. Based on a 95% confidence that actual value will be lower.
3. For Lindane and DDTr, UCL includes half life calculations.

Community West
Project No. 3-50058-51

October 22, 1991

TABLE 4

RISK DATA

Compound	Emmissions [1]	OSHA PEL [2]	Exposure Rate [3]	Actual Concentration	10^6 Cancer Concentration [4]
Aldrin	1.6×10^{-7} mg/m^3	0.25 mg/m^3	3.43×10^{-6}	12.0 ppb	14 ppb
Lindane	4.9×10^{-7} mg/m^3	0.5 mg/m^3	2.2×10^{-7}	36.1 ppb	180 ppb
DDTr	5.2×10^{-5} mg/m^3	1.0 mg/m^3	3.02×10^{-4}	1152 ppb	783 ppb

1. Worst case air emmissions (short term exposure)
2. Occupational Health and Safety Administration limits (short term air exposure)
3. Exposure rate is in milligrams per day (mg/day) (total adsorbed compound - long term exposure)
4. Compound concentrations resulting in one additional cancer per one million people

CALCULATIONS

This section describes and illustrates the equations used to develop the previous tables. The basic statistical equations are taken from SW-846[1] (except for the half-life equation, which was from a calculus text[2]). The equation for the inhalation exposure rate is taken from the EPA document as footnoted below the equation, and the equations for oral and dermal exposure are taken EPA Superfund Public Health Evaluation Manual, EPA/540/1-86/060, October 1986.

The assumptions used in the calculations (taken from the Health Risk Assessment, Appendix A) include:

1.	Receptor:	Adult, 70 kg body weight
2.	Daily soil ingestion:	50 milligrams
3.	Adsorption of ingested/inhalation:	100%
4.	Daily skin loading rate:	450 milligrams
5.	Dermal adsorption:	10% (5% for DDTr)
6.	DDT half life in soil:	15 years
7.	Lindane half life in soil:	378 days

Statistical Calculations

The simple mean, $\bar{x}$, is defined as the sum of the concentrations divided by the number of samples:

$$\bar{x} = \sum_{n=1}^{n} \frac{X_n}{n}$$

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1 Test Methods for Evaluating Solid Waste, Third Edition, 1986. United State Environmental Protection Agency, Office of Solid Waste and Emergency Response. Washington, D.C.

2 Bittinger, Marvin, L., 1988. Calculus, Forth Edition. Addison-Wesley Publishing Company. Reading, Massachusetts.

Table 5

Simple Means

The variance of the sample, s^2, is defined as:

$$s^2 = \frac{\sum_{n=1}^{n} x_i^2 - \frac{\left(\sum_{n=1}^{n} x_i\right)^2}{n}}{n-1}$$

The standard deviation, **s**, is defined as the square root of the sample variance:

$$s = \sqrt{s^2}$$

The standard error, $s_{\bar{x}}$, is defined as the standard deviation divided by the square root of the total number of samples:

$$s_{\bar{x}} = \frac{s}{\sqrt{n}}$$

The upper limit of the confidence interval, **UCL**, is defined as the mean plus the product of the Student t value and the standard error. SW-846 provides Student t values for a 90% upper limit confidence interval (that is to say that 90% of the values will fall below this limit). However, Ms. Evans indicated that the County requires a 95% confidence interval.

$$UCL = \bar{x} + \left(t_{value} \times s_{\bar{x}}\right)$$

For a one-tailed 95% confidence interval, the t_{value} is 1.734.

The calculation for cancer risk is based on a 70 year exposure. Consequently, the concentration of the pesticide over the entire 70 years must be determined, based on the current concentration and the half life of the pesticide. The following calculations are based on the most conservative half life values given in the Health Risk Assessment (Appendix A) for Lindane and DDT.

The following equation yields the average value over a specified period from the half life equation.

$$\text{Average value} = \frac{1}{b\text{-}a}\int_{a}^{b} x_0 e^{-ct}$$

In the above equation, "a" is the starting time, "b" is the ending time, "x_0" is the initial value, "c" is a rate constant equal to the natural log of 2 divided by the half life in years, and "t" is the total time period. For a 70 year period, and an initial concentration of 3878 ppb (the 95% UCL for DDTr),

$$\frac{1}{70\text{-}0}\int_{0}^{70} 3878 \text{ ppb } e^{-0.0462t} = \underline{1152 \text{ ppb DDTr}}$$

For a 70 year period, and an initial concentration of 22.0 ppb (the 95% UCL for Lindane),

$$\frac{1}{70\text{-}0}\int_{0}^{70} 22.0 \text{ ppb } e^{-0.669t} = \underline{0.771 \text{ ppb Lindane}}$$

Exposure Calculations

Short-Term Exposure

The following equations and methodology used to determine the short-term inhalation exposure is taken from the Health Risk Assessment (Appendix A, pages 16 and 17). The exposure rates are compared to the U.S. Occupational Health and Safety Administration Permissible Exposure Limits in Table 4 for comparison purposes. The line item numbers correspond to those in the Health Risk Assessment.

11. A worst case, 24-hour, PM_{10} emission factor of 12 grams/hour/meter^2

12. Worst case contaminant emission rate (based on mean concentrations in Table 1 of the assessment, Appendix A, Table 2, page 6):

    Aldrin:
    Current UCL concentration - 0.012 milligrams per kilogram
    (0.012mg/kg) X (12 g/hr/m^2) X (8093 m^2) = 0.00032 mg/sec

    Lindane:
    Current UCL concentration - 0.036 milligrams per kilogram
    (0.036 mg/kg) X (12 g/hr/m^2) X (8093 m^2) = 0.0097 mg/sec

DDTr:
Current UCL concentration - 3.87 milligrams per kilogram
(3.87 mg/kg) X (12 g/hr/m^2) X (8093 m^2) =0.104 mg/sec

14. Worst case contaminant emission factors at a distance of 0 kilometers (this calculation utilizes a number of 500 microseconds/$meter^3$, taken from an isopleth summing the worst-case mechanical and erosion emission rates, found on Figure 4-12, page 57, Cowherd, et al (1985) referenced in the health risk assessment, Appendix A):

Aldrin: (0.00026 mg/s) X (500 us/m^3) = 1.6×10^{-7} mg/m^3

Lindane: (0.00079 mg/s) X (500 us/m^3) = 4.9×10^{-7} mg/m^3

DDTr: (0.0891 mg/s) X (500 us/m^3) = 5.2×10^{-5} mg/m^3

Long-Term Exposure

The calculations for cancer risk are based on the Superfund Public Health Evaluation Manual Worksheet 7-3. The cancer risk is the sum of the risks from the various routes of exposure, and each route of exposure risk is the multiple of the concentration, the human intake factor and the carcinogenic potency factor (q_1*), a value that describes the degree of cancer-causing potential for the chemical.

Specifically, the carcinogenic potency is the upper-bound 95% confidence limit of the slope of the extrapolated cancer dose response curve. The carcinogenic potency factors are taken from a series of chemical-specific documents describing the toxicological profile of the chemical, produced by the U.S. Public Health Agency in collaboration with the U.S. EPA.[3]

Table 6

Carcinogenic Potency Factors

Compound	q_1*
Aldrin	17 $(mg/kg\text{-}day)^{-1}$
Lindane	1.3 $(mg/kg\text{-}day)^{-1}$
DDTr	0.34 $(mg/kg\text{-}day)^{-1}$

[3] "Toxicological Profile for a-, b-, g-, and d-Hexachlorocyclohexane," Clement Associates, U.S. Public Health Service, December 1989.
"Toxicological Profile for Aldrin/Dieldrin," Dynamac Corporation, U.S. Public Health Service, May 1989.
"Toxicological Profile for p,p'-DDT, p,p'-DDE, and p,p'-DDD," U.S. Public Health Agency, 1989.

For consistency, the one-in-one-million cancer risk for DDTr is recalculated using these procedures. The original Health Risk Assessment used a value given in a 1991 publication by F. Martz.

In the original Health Risk Assessment, on page 16, it was noted that due to the clay content of the native soil, the area wind speed, and the predicted presence of pavement, structures, and vegetation, "inhalation exposure should not be a significant concern for the residents in the area." However, the County has requested that an inhalation exposure be calculated and included in the cumulative cancer risk. For purposes of this calculation, it is assumed that a 70 kg adult will be in the immediate vicinity of active soil disturbance 8 hours per day, every day for 70 years. An inhalation rate of 20 cubic meters per day is taken from the Superfund Public Health Evaluation Manual.

To determine the concentration of the compound (in this soil and based on these site specific conditions) that results in a one-in-one-million cancer risk, this risk is divided by the carcinogenic potency factor, and equated to a combined oral, dermal and inhalation exposure.

Exposure in mg/kg-day for a given soil concentration "C" in mg/kg:

Inhalation Exposure[4]

$$(C) \times (12\ gr/hr/m^2) \times (809.3\ m^{2)} \times (500\ us/m^3) \times (6.7\ m^3/day)$$

In this calculation, "C" is the compound concentration, "12 grams per hour per square meter of surface area" is taken from line 11, page 17 of the Health Risk Assessment (Appendix A), "809.3 square meters of surface" is assumed to be exposed, "500 microseconds per cubic meter" is identified in the footnote, "6.7 cubic meters per day" in the inhalation for 8 hours. This calculation assumes that 100% of the inhaled compound is adsorbed.

Oral Exposure

$$(C) \times (0.15 \times 10^{-3}\ kg/day)$$

In this calculation, "0.15×10^{-3} kilograms per day" is the soil ingestion rate.[5] This calculation also assumes that 100% of the ingested compound is adsorbed.

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4 This calculation utilizes a number of 500 microseconds per cubic meter, taken from an isopleth summing the worst-case mechanical and erosion emission rates, found of Figure 4-12, page 57, Cowhead, et al, 1984. Rapid Assessment of Exposure to Particulate Emissions from surface Contamination Site. EPA/600/8-85-002. Inhalation exposure also uses a worst case PM_{10} emission factor of 12 grams/hour/square meter and assumes that the site will be actively disturbed during 8 hours per day over 70 years.

5 Sedman, R.M. (California Department of Health Services, Toxics Substances Control Division), 1989. The Development of Applied Action Levels for Soil Contact: A Scenario for the Exposure of Humans to Soil in a Residential Setting. Environmental Health Perspectives, Vol. 79, pp 291-313.

Dermal Exposure[6]

$$(C) \times (0.450 \times 10^{-3} \text{ kg/day}) \times (10\%)$$

In this calculation, "0.450×10^{-3} kilograms per day" is the dermal exposure rate (see footnote 5), and 10% of the Aldrin and Lindane are adsorbed (5% of the DDTr), as noted in the Table 5 of the Health Risk Assessment (Appendix A).

The following table was calculated by dividing the one-in-one million cancer risk by the appropriate carcinogenic potency factors, and back calculating from the above exposure route equations.

Table 7

One in One Million Cancer Risk
(Site Specific for Saklan Road Project, Hayward, California)

Compound	Concentration
Aldrin	0.014 mg/kg
Lindane	0.18 mg/kg
DDTr	0.78 mg/kg

The following table lists the calculated individual and total exposure rates based on the above equations and the concentrations listed in Table 3.

Table 8

Exposure Rates
Rates are in milligrams per day

Compound	Inhalation Rate	Ingestion Rate	Dermal Rate	Total Rate
Aldrin	1.09×10^{-6}	1.8×10^{-6}	5.4×10^{-7}	3.43×10^{-6}
Lindane	6.96×10^{-8}	1.16×10^{-7}	3.47×10^{-8}	2.2×10^{-7}
DDTr	1.04×10^{-4}	1.73×10^{-4}	2.59×10^{-5}	3.02×10^{-4}

6 Assumes dermal adsorption of 10% and 5% for DDTr, as noted in original Health Risk Assessment.

The following table lists the calculated individual and total exposure route cancer risks based on the concentrations listed in Table 3. Each exposure rate from Table 8 is divided by body weight of 70 kg and multiplied times the carinogenic potency factor from Table 6.

Table 9

Actual Cancer Risks
Risks are given in additional cancers per person

Compound	Inhalation Risk	Ingestion Risk	Dermal Risk	Total Risk
Aldrin	2.6×10^{-7}	4.4×10^{-7}	1.3×10^{-7}	8.3×10^{-7}
Lindane	1.3×10^{-9}	2.2×10^{-9}	6.4×10^{-10}	4.1×10^{-9}
DDTr	5.1×10^{-7}	8.4×10^{-7}	1.3×10^{-7}	1.5×10^{-6}

APPENDIX A

HEALTH RISK ASSESSMENT
April 22, 1991

APPENDIX B

NORMAN E. RILEY RESUME

APPENDIX C

REVISED HEALTH RISK ASSESSMENT
May 20, 1991

APPENDIX D

CHIPS ENVIRONMENTAL CONSULTANTS' REPORTS
October 30, 1990
November 28, 1991

APPENDIX E

EXCELTECH
SOIL AND GROUNDWATER SAMPLING PROTOCOL
AND
LABORATORY ANALYTICAL RESULTS

APPENDIX F

EXCELTECH
PCB SOIL SAMPLING PLAN
AND
LABORATORY ANALYTICAL RESULTS