REPORT

POTENTIAL AND LIKELY ENVIRONMENTAL AND HUMAN HEALTH RISKS FROM OFF-SITE MOVEMENT OF CHEMICALS FROM THE SIERRA PACIFIC INDUSTRIES SITE AT 2293 SAMOA ROAD ARCATA, CALIFORNIA

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Qualifications

I am the Director of the Center for Ethics and Toxics (CETOS) a not-for-profit organization based in Gualala, California. As shown on the attached curriculum vitae (shown as Exhibit A), I have a doctorate in Experimental Pathology, and have served as head of California's Hazard Evaluation System and Information Service from 1978 through 1980. I have held various positions in state government and universities, most recently as a tenured Professor of Health Policy and Ethics at the University of Illinois College of Medicine.

I am a member of the Society of Toxicology, and was certified as a toxicologist in the State's civil service system after the usual probationary and examination period. I am also Board Certified in ethics and toxicology by the American College of Forensic Examiners. Overall, I have over 25 years as a health policy expert in regulatory toxicology and related fields. I have 131 publications including books and chapters on toxicology, and have taught toxicology to physicians at the School of Public Health at the University of Illinois.

I am familiar with the procedures and methods used in laboratory analytic work, and have supervised such work in my capacity as head of the Hazard Evaluation System for the State. I am also a consultant to the Food and Drug Administration and have evaluated toxicological data submitted to them in 1991-1992 for a medical device issue.

My testimony has been accepted in court proceedings in toxicological issues, following successful rebuttal to Daubert challenges in several cases. In particular, my credentials to give toxicological testimony were upheld by the Ninth Circuit Court of Appeals in 1997.

Specific Expertise

I am expressly familiar with the toxicology of pentachlorophenol and its derivatives, based on work going back to 1979 when the Hazard Evaluation System performed a site specific risk assessment in Northern California. During the same period, our offices were asked to provide guidance to physicians who examined workers with alleged pentachlorophenol poisoning. I have personally performed one such consultation with a treating physician.

Methods and Materials

Pentachlorophenol is routinely contaminated with polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. These polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans are manufacturing impurities that are found in virtually all samples of technical grade pentachlorophenol, which was widely used for treating newly sawn lumber until the mid-nineteen eighties. For example, a study published by the California State Water Resources Control Board analyzed concentrations of several congeners of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans in commercial chlorophenol products. This study found that where pentachlorophenol concentrations where 170,000 parts per million, the penta, hexa, hepta and octa congeners of polychlorinated dibenzo-p-dioxins were found at levels of between 11 and 216,000 parts per million, depending on the congener, and the tetra, penta, hexa, hepta and octa congeners of polychlorinated dibenzofurans were found at levels of between 840 and 18,000, once again, depending on the congener.

Hence, any discharge of pentachlorophenol can reasonably be expected to also include the discharge of its dioxin and dibenzofuran contaminants. The health risk posed from exposure to pentachlorophenol (PCP) is proportionately greatest from these dioxins and chlorinated furans that are typically formed during heating and synthesis. For this reason, I have confined this analysis to dioxin-related compounds that have been associated with PCP use at the SPI site in Humboldt Bay, California.

In performing the analyses included in this report, I have used standard scientific methods and procedures. I have reviewed published, peer-reviewed studies and rely in part on the results of those studies to reach my opinions. I have designed a testing protocol and have evaluated a series of laboratory analyses performed by an EPA certified laboratory, including its quality controls, chain of custody and methods of analysis. True copies of those reports and analyses are attached as Exhibits B and C. A complete bibliography of sources regarding the toxicology of PCP's congeners and contaminants is attached as Exhibit D.

Toxicology Review and Summary

1.0 Cancer Risks

Cancer studies provide adequate evidence that 2,3,7, 8 tetrachlorodibenzo-p-dioxin is a carcinogen in laboratory animals, based on long-term animal exposure test results. Based on extensive animal studies and suggestive evidence from the one documented mass exposure to dioxins at Seveso, Italy in 1976 from which provisional data indicate to OEHHA and others the existence of a human cancer risk, there is virtually universal agreement within the scientific community that dioxins are carcinogenic. All studies evaluated by the EPA and international bodies such as the International Agency for Research on Cancer (IARC) indicate clear evidence of carcinogenicity at extremely low (ppt) dietary values. Because dioxins persist in humans (they have a half life of 7-10 years), their build up in tissues with continuing environmental exposure is a cause for toxicological concern.

The equivalent human risks have been calculated by OEHHA.[1] As a result of these analyses, dioxins are recognized as carcinogens by the State of California. In the most recent Proposition 65 listing dated March 1, 2002 PCP and TCDD are listed by OEHHA as a chemical known to the State of California to cause cancer. At an ingestion level of 5 picograms of TCDD per day (including any dioxins or furans with Toxic Equivalency Factors), the cancer risk for chronic exposure is 1 in 100,000. By comparison, pentachlorophenol carries a NSRL of 40 micrograms.[2]

2.0 Reproductive Toxicity

A wide variety of developmental events, observed in a broad cross-section of test animals, can be perturbed by dioxin and dioxin-like compounds. A recent review concluded that PCDDs are now recognized as potent developmental toxicants, provoking adverse effects in virtually every organ system studied."[3] These observations strongly suggest that dioxin has the ability to disrupt a large number of critical developmental events at specific developmental stages. In mammals, postnatal functional alterations have involved learning behavior and alterations to the developing reproductive system. Alterations in developing systems and diminished prenatal viability and growth have been observed at maternal dioxin body burdens and/or daily dioxin doses during gestation at or above 100 nanograms per kilogram of body weight (parts per trillion) in most species tested.

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[1] OEHHA, Health Assessment Values for Dixons and Dibenzofurans. Prioritization of Toxic Air Contaminatns, October 2001, Table 13 at page 34.

[2] No Significant Risks Levels Adopted in Regulation for Carcinogens. OEHHA Status Report Dated March 2002.

[3] Hojo R, Stern S, Zareba G et al. Sexually dimorphic behavioral responses to prenatal dioxin exposure. Environmental Health Perspectives 2002; 110: 247-254.

Exposure in the uterus to dioxins has been documented to produce significant toxicity in young animals and infants and children. By comparison, pregnant Holtzman rats exposed to a single oral dose of 20 ng/kg of dioxin have shown behavioral deficits in their offspring,[4] a dose comparable to the human background body burden of 13 ng/kg.[5] For this reason, OEHHA has placed dioxins in their highest tier (Tier 1) or risk for reproductive toxicants. Dioxin-exposed children have been reported to have adverse neurobehavioral and immunological effects after intrauterine exposure. Such effects have persisted post-natally in exposed children well into school age.[6]

Recent research has demonstrated a significant association between endometriosis in Rhesus monkeys and dioxin levels, close to or approximating the upper bounds of human exposure.[7] Because virtually all persons in an industrialized country like the U.S. already have substantial body burdens of dioxin at or near levels shown to be toxic, any contribution of extra dioxins can readily push human body burdens above the norm and into the toxic range. The levels of dioxins reported in the present study are sufficient to add materially to the human body burden of anyone ingesting the contaminated foodstuffs studied.

For these reasons, the heightened levels of dioxins in potential human food sources like the crabs and mussels studied in this report pose substantial risks of human toxicity. The immune system is a particularly vulnerable target for the toxicity of dioxin-like compounds, including polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. The ability of an animal to resist and/or control viral, bacterial, parasitic, and neoplastic diseases is determined by both nonspecific and specific immunological functions, which can be adversely affected by very low levels (in the ppt or ppb range) of dioxin-like compounds in body tissues.

Individual species vary in their sensitivity to any particular dioxin effect. However, the evidence available to date indicates that humans most likely fall in the middle of the range of sensitivity for individual effects among animals rather than at either extreme. In dioxin-exposed men, subtle changes in biochemistry and physiology, such as enzyme induction, altered levels of circulating reproductive hormones, or reduced glucose tolerance, have been detected in a limited number of available studies. These findings, coupled with knowledge derived from animal experiments, suggest the potential for adverse impacts on human metabolism and developmental and/or reproductive biology and, perhaps other effects in the range of current human exposures at nanograms per

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[4] See Markowski VP et al. Altered operant responding for motor reinforcement and the determination of benchmark doses following perinatal exposure to low-level 2,3,7, 8 TCDD. Environmental Health Perspectives 2001; 109: 621-627.

[5] DeVito MJ et al. Comparisons of estimated human body burdens of dioxin-like chemicals and tCDD body burdens in experimentally exposed animals. Environmental Health Perspectives 1995; 103: 820-831.

[6] OEHHA, Prioritization of Toxic Air Contaminants-Children's Environmental Health Protection Act, October, 2001, at page 34.

[7] Rier SE et al. Serum levels of tcidd and ioxin-like chemicals in Rhesus monkeys chronically exposed to dioxin: correlation of increased serum PCB levels with endometrioosis. Toxicological Sciences 2001; 59: 147-159.

kilogram (parts per trillion) levels. As body burdens of dioxin-like compounds increase, the probability and the severity, as well as the spectrum of human non-cancer effects most likely increase. Hence, any additional increase in body burden of dioxin-like compounds increases the risk of harmful toxicological effects.

3.0 Ecological Hazards

Polychlorinated dioxins and dibenzofurans, when discharged or present in near-surface sediments or in the water column itself, can be ingested and concentrated in aquatic organisms. After ingestion or absorption, both compounds tend to concentrate in the fatty tissues of the host, where they are relatively stable for protracted periods ranging up to several decades (the half-life of dioxins, the point at which half of an absorbed dose disappears, is commonly measured at 7-10 years).

In typical ecosystems, dioxins have long half-lives measured in decades, and can be expected to bio-concentrate and bio-magnify as a result of this persistence. Because they degrade so slowly, are highly fat soluble, and are metabolized poorly, they will tend to concentrate in organisms, like fish, bears, marine mammals, ospreys and humans, that routinely feed on lower members of the food chain. A further complicating factor is that during biodegradation in the environment, the dioxins with higher chlorine numbers (more chlorines around the two benzene nuclei) will be de-chlorinated to the much more toxic, lower chlorine dioxins and furans, such as tetra (4 chlorine) CDD or CDF.

The high likelihood that the polychlorinated dibenzo-p-dioxins or dibenzofurans will remain in fatty tissues of host aquatic organisms puts any organism which ingests the contaminated organism of a risk of building up or bioaccumulating the chemicals at issue. Because of the fundamental ecologic relationships between organisms at different levels in the food chain (so-called "trophic levels"), it can reasonably be expected that routine ingestion of a given organism by one at a higher trophic level will lead to a biomagnification of the effective tissue concentration by about a factor of 10.

This means if a mussel is filter feeding plankton or micro-invertebrates, it will concentrate their dioxins and/or furans10-fold as reflected in its tissue concentrations; if an organism at a higher trophic level, such as a crab ingests larger macro-invertebrates, it will again concentrate the dioxins by ten-fold. And if rays, sharks or herons that feed on crabs ingest the crabs, they may be expected to have another ten-fold concentration. Finally, if an osprey feeds on a ray or small shark, it will bio-concentrate the dioxin again. By direct analogy, persons who routinely eat contaminated seafood will also bio-concentrate dioxins again at a ten-fold level.

Background of Site

The site in question was operated in part as a treatment facility to render wood products mold, stain and to a certain extent, insect resistant. The product primarily used to treat lumber at the site was called Noxtane, a pentachloro- and tetrachlorophenolic compound, which was used in a dip tank operation at the Samoa Road facility from

approximately the mid-1960s through June 1985. Operations were reported to have ceased in July, 1985.[8]

The treatment area on the site drains directly into a slough that feeds Humboldt Bay. Three of the drainage ditches, numbers 1, 2 and 4 were tested historically for contaminants.

Testing of storm water runoff in the 1990s and the year 2000 detected approximately 10 micrograms per liter (10 ppb) of pentachlorophenol (PCP) and/or tetrachlorophenol (TCP). Further annual testing, performed by EnviroNet for SPI, continued to find contamination of storm water samples with PCP and TCP, particularly in ditch # 4 through May of 1996, and thereafter through 1999 based on annual surveys cited below.

As discussed above, in part as a consequence of the method of their preparation, chlorinated phenols are commonly contaminated with chlorinated dioxins and furans. Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans are part of a class of compounds that the scientific community identifies as "dioxin-like" compounds. These chemicals are called dioxin-like compounds because they tend to affect organisms in the same way as does as does the most potent toxic chemical of this class, 2,3,7,8 tetrachlorodibienzo-p-dioxin, but have different potencies for causing toxicological effects. It is the generally accepted practice within the scientific community to assess the toxicological effects of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans based on their relative potencies to 2,3,7,8 tetrachlorodibenzo-p-dioxin.

Such dioxins, particularly the most commonly reported contaminant, the octo or 8-chlorinated version, were also detected in soil samples from the site at levels approaching and exceeding 3000 picograms per gram of soil. These levels can be compared with the more toxic compound, 2,3,7, 8 tetrachlorodibenzodioxin (TCDD) by using a Toxic Equivalency Factor: using such a factor for the highest level of octodibenzodioxin found yields an equivalent amount of TCDD of approximately 3 picograms per gram of soil.

In the earlier sampling conducted by EnviroNet, contamination with oil and grease hydrocarbons were uncovered. The resulting values ranged from 110 to 4,600 mg/kg.[9] At lower depths ranging to 5 feet below surface, the amounts of hydrocarbons detected dropped to 300 mg/kg. As a result of these and related sampling surveys, the EnviroNet team concluded that soil contamination was "confined to the upper 5.5 feet.[10] Further analysis, while confirming the presence of diesel, gas and oil contaminants, is reported not to have found PCP and TCP at detectable levels. The EnviroNet team reported no sampling or analytical results for dioxins and furans.

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[8] Report from EnviroNet Consulting dated October 23, 2001 to Mr. Dean Prat at the North Coast Regional Water Quality Control Board, Volume 38 at page 2.
[9] Ibid, at page 7.
[10] Ibid.

Sampling conducted by the North Coast Regional Water Quality Control Board small amounts of dioxins, specifically the octa substituted dioxin ("OCDD") at 120 pg/g were detected at outfall 1, that higher levels of dioxins, including OCDD at 1700 pg/g, and some furans were detected at outfall 4, and that even higher levels of dioxins and furans, ranging to 3,900 pg/g OCDD were detected in soil sediments taken from Ditch 4 on the SPI Mill property.[11] The total dioxins at the latter site were calculated to be 3.7 pg/g.

Comment and Analysis

Based on historical sampling for PCP and TCP, two drainage systems and their outfalls of particular concern are drainage ditch numbers 2 and 4. Sampling results for drainage ditch number 1 also indicate consistent discharges of PCP and TCP. For example, results of storm water sampling by Kevin Coker on November 16, 2001 report 1.4 μg/L PCP at outfall 1, 13 μg/L PCP and 5.7 μg/L TCP at outfall 2, and 7.4 μg/L PCP and 5.4 μg/L TCP at outfall 4. It is critical to observe that discharge is continuing.[12] Such discharges provide a potential ongoing source of contaminants that can bioconcentrate in the food chain in the slough, particularly as ditch 4 continues to have a small, potentially contaminated outflow into the summer months.

In the relative absence of reporting on the more toxic dioxins and furans with lower chlorine numbers, and the impression that the detection of PCP and TCP remains "sporadic," the EnviroNet report provides a potentially false sense of reassurance that any environmental problems related to historic discharges of PCP from the site are minimal and likely to continue to be resolved by natural dilution and dissipation. It is noteworthy that this reassurance is given based on part on the very limited sampling regime (1,3 and 5 feet), and the periphery test borings.

In my professional opinion, these samplings are insufficient to allow the conclusion that the perimeter of contamination is confined to a 40 foot region, or that no contamination will be found at depths below 5.5 feet.

Observations made on site indicate that the critical drainage ditch #4 is served by a seep that replenishes it year-round.[13] If so as indicated above, this ditch may be discharging contaminants into the Mad River slough on a continuing basis, to the extent that contaminated sediments are washed by upwelling ground water. While these concerns were initially hypothetical, they led to direct testing, as described below, to resolve remaining uncertainties.

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[11] See Interoffice Memorandum, dated August 2, 2001 from Dean Prat to Tuck Vath.

[12] Alpha Analytical Laboratories, Inc.; Chemical Examination Reports 12/04/01. See also, 2000-2001 Annual Report for Storm Water Discharges Associated with Industrial Activites, dated June 2001, Pacific Northwest EnviroNet Group, Inc.

[13] See for instance the on site report made from May through June by the EnviroNet team that ditch 4 continued to have a "light flow", "trickle" or "dribble" of water as late as June 20, 2001. 2000-2001 Annual Report, loc cit, "Ditch Observations."

To answer the critical question of environmental and biota contamination with chlorinated dioxins from the PCP/TCP mixture, I designed and had tested contemporaneous soil samples from the two outfall sites of greatest concern as points of entry of contaminants into the slough. I also instructed a sampling team to obtain specific biota (mussels and crabs) from the area of the SPI Mill outfalls to determine if any of the dioxin or furan contaminants were entering or had bioconcentrated in the ecosystem served by the drainage area. As a control, I instructed the sampling team to sample a slough at the southern end of Humboldt Bay, the Hookton Slough, as well as a more proximal northern extension of the Mad River Slough approximately 2.5 miles north of the mill site.

This sampling design allows a simple test of the assertion that any contamination found at the SPI site is either negligible or common to any site along Humboldt Bay; and, further, that no significant concentration of dioxins would be found in the biota sampled at, near or distant from the SPI site. The null hypothesis was that no substantial contamination of sub-soil samples would be uncovered at the SPI site compared to control soil samples; and, that no differences in contamination of organisms with dioxins or furans would be found to differentiate close-in to the SPI site, versus more distantly collected organisms.

Methods and Materials

The specific sites tested and the methodology used to measure their dioxin/furan composition are described in the sampling summary and analytic reports shown in Exhibits B and C. Soil samples were taken under strict laboratory protocol, coded and chain of custody maintained until delivery to the laboratory as indicated in the sampling summary attached as Exhibit B.

The organisms collected at SPI Mill site and the Hookton Slough consisted of mussels, *Mytilis edulis*, oyster (*Ostrea lurida*), and one common species of crab, *Hemigrapsus oregonsis*. Additional crabs of different species, rock crab *Cancer antennarius*, and red crab *Cancer productus* were collected at the mill site.

The live samples were taken, labeled and immediately frozen in dry ice at –20 degrees Centrigrade. (Oyster samples have not yet been analyzed). Tissues from each species analyzed were obtained by maceration and homogenization of the flesh (mussels), or the entire body part (carapace) following shelling and de-legging of the crabs. Analysis was performed using standard EPA methodology. Results are expressed as picograms per gram of wet-weight tissue tested. Lipid content was included in the data for further analysis if needed.

Results

The results of the laboratory sampling and analyses are shown in Exhibit C. All quality controls were within established limits, with the percent recovery in the surrogate samples within the variance of the expected values; internal standards were slightly

lower. The dioxin equivalents are calculated using the Toxic Equivalency Factors used by OEHHA, viz., the 1989 EPA factors.[14] (It should be noted that an alternate TEF based on a 1997 report exists that increases the overall risk from penta-chlorinated dioxin by 2 fold, and diminishes the contribution from octa-chlorinated dioxin by 10; it is not yet the officially used international equivalency rate, hence the older values were employed for this report).

The values for polychlorinated dioxins and furans in sediments are shown in Table 1.

Table 1. **SEDIMENT: Detected Dioxins & Furans at Three Sites at Humboldt Bay**

Site	Congener	Value		Dioxin Equivalent	
		Outfall 2	*Outfall 4*	*#2*	*#4*
Sierra Pacific Mill					
	2,3,7, 8 TCDD	3.3 pg/g	-	3.3	-
	1,2,3,7,8 PeCDD	20	-	2.0	-
	1,2,3,4,7,8 HxCDD	32	6.5	3.2	.65
	1,2,3,6,7,8 HxCDD	240	71	24.0	7.1
	1,2,3,7,8,9 HxCDD	100	28	10.0	2.8
	1,2,3,4,6,7,8 HpCDD	2500	680	25.0	6.8
	OCDD (octa-)	14000	3300	14.0	3.3
	2,3,7,8 TCDF	5.5	2.8	0.55	0.28
	1,2,3,7,8 PeCDF	5.4	-	0.275	-
	2,3,4,7,8 PeCDF	7.8	-	3.9	
	All HxCDF	46.0	-	4.6	
	All HpCDF	356.0	96	35.6	9.6
	OCDF (octa-)	430	110	0.43	0.11
		Total Dioxin Equivalents:		**126.86**	**30.64**
Upper Mad River Slough					
	1,2,3,6,7,8 HxCDD	6.7	.67		
	1,2,3,7,8,9 HxCDD	4.3	.67		
	1,2,3,4,6,7,8 HpCDD	54.0	.54		
	OCDD	560	.56		
	2,3,7,8 TCDF	0.65	.065		
	1,2,3,4,6,7,8,9 HpCDF	15.0	.015		
	OCDF	10.0	.010		
		Total Dioxin Equivalents:		**2.53**	
Hookton Slough	OCDD	25.0	0.025		
		Total Dioxin Equivalents:		**0.025**	

[14] OEHHA, Chronic Toxicity Summary. Chlorinated Dibenzop-dioxins and chlorinated dibenzofurans. A-19. 2002, at page A-19.

The sedimentary testing reveals a substantial amount of dioxin at the two outfalls entering Humboldt Bay from the SPI Mill, with approximately four times as much dioxin equivalents in the sediment at the Outfall from Ditch #2 than from Ditch #4. These levels correspond with the previous dioxin sampling conducted by the NCRWQCB and with historical PCP/TCP detections in storm water. Dioxins are still present in the sediment at the Upper Mad River Slough in the sample examined, at less than one tenth the level of those at the SPI site. Virtually no dioxin was found at the Hookton Slough.

Aquatic life tested at the three sites showed dioxin levels proportionate to the results seen from sedimentary samples, as shown in Table 2.

Table 2. **AQUATIC LIFE: Dioxin and Furans in Mussels & Crabs in Humboldt Bay**

Species	Site	Congener	Value	Dioxin Equivalent
Mussels	**SPI Mill**	HpCDD	4.4	0.44
Mytilus edulis		OCDD	49	0.49
				0.93
	Hookton Slough			**None Detected**
Crabs	**SPI Mill**	All HxCDD	14.9	1.49
Hemigrapsus		HpCDD	71.0	0.71
oregonsis		OCDD	300	0.30
		TCDF	0.83	0.083
		HpCDF	9.8	.098
		OCDF	6.2	.006
				2.687
Red Crab		HpCDD	12.0	.12
		OCDD	99.0	.099
				0.219
Rock Crab		HpCDD	38.0	.38
		OCDD	120.0	.12
				0.500
	Hookton Sough			
Crab		OCDD	12	0.012
Hemigrapsus				**0.012**
oregonsis				

Discussion

These data clearly show the sediments at two sites near the outfall of Ditches 2 and 4 remain heavily contaminated with dioxins. The source of the dioxins is clearly

from the SPI mill site, since distant samples at Hookton Slough are virtually or completely dioxin-free. The Mad River Slough is intermediate in sedimentary contaminants of dioxin origin, but about a tenth that of the SPI site.

This last finding is of substantial concern because of the presence of a significant oyster fishery in the Mad River Slough. It appears that the contamination from the SPI mill or some other more proximal source have contaminated the sediments in the Mad River Slough channel, in which oysters are presently grown (See Exhibit E for maps of Coast Seafood mariculture sites). The dioxin risk from contaminants cannot be known without systematic evaluation of the oysters harvested at the site. However, the dioxin contamination of the mussels at the SPI site is calculable.

Human Health Risks from Consuming Organisms Near SPI Site

1.0 Risk from Mussel Consumption

At approximately 1 picogram of dioxin equivalents per gram of tissue, a meal of 100 grams of SPI site derived mussels (by wet tissue weight) would contribute approximately 100 picograms. (This value is substantially above dietary values which are commonly adjusted and expressed as dioxins per gram of fat.[15] Separate lipid calculations were not performed in the present study). If mussels from the SPI site were a consistent source of dietary protein, say averaging 2 meals a week, the monthly intake would be approximately 200 picograms per week or 28.57 picograms of dioxin equivalent. This value exceeds the Proposition 65 NSRL of 5 picograms by over five fold: a single mussel meal a month of 100 grams of mussels would produce an average daily dose close to the NSRL, of approximately 3.3 picograms per wet tissue weight.

2.0 Risk from Crab Consumption

While the small Hemigrapsis crabs are generally not eaten by humans, the other species of crabs (red and rock crab) are commonly eaten by people. At a concentration of between 0.2 and 0.5 picograms of wet weight not including the shell, a single 1 lb crab with 250 grams of edible tissue would have approximately 50 to 125 picograms of dioxin. A single meal of crab a week during the crab season would contribute approximately 17.85 picograms of dioxin per day. Assuming the crab season and available crab is limited to only one crab a week for four months of the year, the total body burden per day would be 5.95 picograms a day, in excess of the Proposition 65 limit.

3.0 Risk from Oyster Consumption

Compared to shellfish at the SPI site oysters at the Upper Mad River Site would contain approximately one tenth of the available dioxin because only about one tenth the amount of dioxins has been detected in soil samples from the latter site. Assuming oysters

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[15] See Eljarrat et al. Toxic potency of PCDDs, PCDFs and PCBs in food samples from Catalonia (Spain). J of Agicutlural and Food Chemistry 2002; 50: 1161-1167.

bioconcentrate dioxin as efficiently as do mussels (they are more efficient filter feeders, and hence might concentrate more), this would mean Mad River Slough oysters could have approximately 0.1 picogram of dioxin per gram of tissue. However, oysters are consumed at a higher volume per meal, approximating 500 grams.

A sample calculation, assuming approximately 0.1 picograms per gram, or 50 picograms per meal of 500 grams of oysters, shows that one serving of oysters a week would generate 7.1 picograms of dioxin per day. This value is in excess of the NSRL of 5 picograms/day for cancer risk.

3.0 Risk from Fish Consumption

From an ecological standpoint, given the low trophic level of both crabs and mussels, the likelihood of at least a 10 fold magnification of the dioxin level in rays, sharks, herons or rockfish that feed on the crab population raises concern that significant concentrations of dioxin would be found in these species higher up on the food chain. A person eating the flesh of a shark or rockfish that had crabs as a major part of its diet, or a ray that consumed mussels could easily exceed the Proposition 65 level of contaminants, if the species at issue fed at or near the outfalls Nos. 2 & 4 at the SPI Mill.

A sample calculation is given below:

Sample Calculation:

Assuming Crab dioxin level (Hemigrapsus oregonsis): 2.687 pg/g tissue
Rockfish dioxin level (estimated 10 fold increase): 26.87
A meal of 200 grams of fish contains approx. 5,374 picograms of dioxin

One fish meal a week would contain approximately 767.7 picograms
or **109.67** picograms per day.

These values could be off by a factor of 20 and still produce dioxin levels above the NSRL of 5.0 picograms per day, meaning that if a person were to eat fish on a weekly basis from the immediate region of Humboldt Bay contaminated by dioxins, he would ingest enough dioxin over a lifetime to generate a cancer risk of 20 in 100,000 or 1 in 5,000. This is a ultra-high health risk from a public policy perspective, since it indicates that for every 5,000 people in the region, an extra cancer death would be expected. Should the intake of seafood embrace other contaminated species, this risk would be even higher.

Ecological Risks

Recognizing the presence of organisms at one, two or three levels above that of the crabs and mussels studied at the SPI site, substantial tissue levels of dioxin might be expected in eagles, osprey, and other birds feeding on marine organisms at the site, as well as salmon, marine mammals and black bears that might feed along the SPI

contaminated slough and adjacent waters. These risks are presently hypothetical, but given the very high concentrations possible (approximately 100 fold for osprey feeding on rockfish or small shallow water rays that fed on crabs, for instance), the resulting body burden would be in the order of 2,600 picograms per gram of body weight or 2.6 nanograms per gram which translates to 2.6 micrograms per kilogram body weight of dioxin equivalents. At this level of contamination, interference with reproductive success would be likely.

Conclusions

Sediment at the SPI site continues to be a source of dioxin or dioxin-like compounds in the aquatic ecosystem in the immediate and near vicinity of the SPI Mill site. This contamination poses an imminent, significant and substantial risk to any humans who might obtain food from the immediate area and to humans who may ingest water from the affected shallow freshwater aquifer below the millsite. Since the railroad trestle near the SPI site is a frequently used crabbing and fishing point, this risk is more than theoretical. Crabs and fish in the vicinity of the SPI site should be studied more intensively and possibly put off limits for human consumption. A further problem would obtain for any fish that were intended for consumption that fed on the benthic or invertebrate organisms that frequent the site.

Based on my review of recent peer reviewed, published literature, and based on the levels reported in the test animals found near the SPI site, it is my opinion that ingestion of shellfish, crabs, or fish that feed on invertebrates at the SPI Mill site, will increase a person's body burden of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. It is also my opinion that any increase in body burdens of these chemicals increases the human risk of several toxic end points including cancer, developmental toxicity, reproductive toxicity, and possibly immunotoxicity.

Because there is such a wide range of species of animals for which exposure to dioxin-like compounds has been shown to disrupt prenatal development and to cause embryo/fetal mortality, it is my opinion that exposure to polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans is likely to increase the risk of embryo/fetal mortality in both fish and birds. It is also my opinion that exposure to polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans can increase the risk that wildlife, including fish, birds, and mammals will suffer decreased immune system function, and thus bear an increased risk that they will contract, or succumb to viral, bacterial, parasitic, and neoplastic infections and diseases. As body burdens of these chemicals increase, so does the risk that all of the above- mentioned species will suffer the above referenced toxic endpoints. It is therefore my opinion, based on the levels reported in the test animals found near the SPI site, that organisms, including fish, birds, and mammals, that participate in the food chain in the Mad River Slough at the SPI Mill, bear an increased risk of suffering the above toxic endpoints.

Human health risks from consuming oysters or mussels contaminated with dioxins are evident from the risk calculations given above. The present abatement

program, if any, has not led to an appreciable diminution of sediment levels of dioxins compared to previously obtained levels. This is likely to be so because of their long persistence and slow breakdown in the environment and their bio-concentration in aquatic organisms.

At the present time, contaminants at or near the SPI site continue to pose an imminent and substantial endangerment and risk of harm to aquatic life at higher trophic levels, and to any humans who routinely catch and use shellfish, crabs or fish obtained at or near the site in their diet. The apparent distant movement of sedimentary contaminants in the Mad River Slough Channel is of particular concern because of the presence of a significant mariculture program in that area.

Special concern exists for persons who routinely eat oysters from that area, should they prove to have the same level of contamination levels as do mussels from the SPI Mill site. The latter class of shellfish foodstuffs contains sufficient dioxin to warrant a Proposition 65 alert, as do the edible crabs taken from the same vicinity.

Submitted under penalty of perjury, this 12th of April, 2002

Marc Lappé, PhD, DABFE

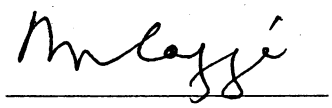

EXHIBIT A

CURRICULUM VITAE
January, 2002

NAME:	Marc Alan Lappé, PhD
ADDRESS:	47910 Signal Port Road, Gualala, California 95445
DATE OF BIRTH:	January 14, 1943
PLACE OF BIRTH:	Irvington, New Jersey
PHONE/FAX:	707 884-1700/1846 EMAIL: mlappe@mcn.org

EDUCATION:	BA, Wesleyan University,	1964 (Biology)
	PhD, University of Pennsylvania,	1968 (Experimental Pathology)

HONORS AND AWARDS:

1960-1964	Warner-Chilcott Scholar
1964-1966	NIH Trainee
1968-1970	Anna Fuller Fund Fellow
1968-1970	Honorary Post-Doctoral Fellow, UC Berkeley
1981-1985	Sustained Development Award, NSF and NEH

BOARDS:

1983-Present	Board of Advisors, Committee for Genetic Responsibility
1988-1991	Board of Directors, Health & Medicine Policy Group, Chicago
1989-Present	Editorial Advisory Board, Citizens Clearing House for Hazardous Waste
1997-1999	Board of Directors, Redwood Coast Medical Services
1998-Present	Board of Advisors, Mendocino Cancer Resource Center
2001-Present	Board of Advisors, Marin Breast Cancer Watch

APPOINTMENTS:

Diplomate American College of Forensic Examiners (Ethics & Toxicology)
Member, Bioethics Advisory Committee, March of Dimes
Fellow, Hastings Center, Briarcliff Manor, New York
Consultant, Medical Devices and Radiological Health, FDA

GRANTS:

1972-1975	Principal Investigator, NIH, "Societal, Legal & Ethical Issues of Genetics"
1986	Principal Investigator, GTE, "Genetics and Society"
1989	Principal Investigator, March of Dimes, "Parental Exposure to Toxic Substances and Birth Outcomes"
1991-1992	Principal Investigator, US DOE, "Justice and the Genome"
1996-1997	Consultant, "Hypermedia Application for Health Promotion in the Workplace", NIH
1999-2001	Principal Investigator, Goldman Fund, "Bioethics and Biotechnology"
2000-2001	Consultant, Forest Stewardship Council, "Definitions of Toxic, Persistent And Bioaccumulative Pesticides"
2001-2002	Principal Investigator, March of Dimes, "Toxic Risks during Pregnancy"

POSITIONS

1971-1974	Adjunct Assistant Professor, State University of New York (Purchase)
1971-1976	Associate for the Biological Sciences, Hastings Center, New York
1976-1978	Chief, Office of Health Law and Values, California Dept of Health Services
1978-1978	Chief, Office of Planning and Evaluation, Cal Dept of Health Services
1979-1980	Chief, Hazard Evaluation System, Cal Dept of Health Services
1980-1981	Staff Toxicologist, Hazard Evaluation System, Cal Dept of Health Services
1981-1985	Adjunct Associate Professor, Health Policy, UC Berkeley Sch.Pub.Health
1986-1994	Professor of Health Policy & Ethics, U.of Illinois, Ctr Educ./Coll. of Med.
1987-1994	Professional Affiliate, College of Pharmacy, U. of Illinois at Chicago
1991-Present	Consultant, Division of Radiological Health &Medical Devices, FDA
1997-Present	Instructor in Science and Ethics, College of Marin, Kentfield, California

TESTIMONY: United States House and Senate and Governmental Agencies

1977 September 7	Testimony before House Subcommittee on Science & Technology "Recombinant DNA Research & Public Health"
1977 November 2	Testimony before Senate Commerce Committee "Freedom and Responsibility in Science"
1982 Novebmer 18	Testimony to House Subcommittee on Science & Technology "Ethics of Developing Treatment for Human Genetic Disease"
1985 December 18	Senate Subcommittee on Oversight & Investigations "Biotechnology and Government Policy"
1988 November 22	Food and Drug Administration, Medical Devices Panel Testimony on "Informed Consent"
1991 June 11	House Human Resources & Intergovernmental Relations Subcommittee of the Committee on Governmental Operations "Adequacy of Safety Testing of Injectable Silicone
1992 June 4	House Human Resources & Intergovernmental Relations (as above) "Health Policy Issues Surrounding the Development of Dental Prosthetic Devices"

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Marc Lappé, PhD
Current Case Testimony

1997-present

1. Bressell v Bristol Myers Squib
2. Hook et al v. Motorola
3. In re Burbank Environmental Litigation
4. Woodward v United States
5. Cagler v. Cooper Companies
6. Rink et al v. Cheminova
7. In re Latex Glove Litigation
8. MTBE Products Liability Litigation

EXHIBIT B

HUMBOLDT BAY MARCH SAMPLING SUMMARY
3 APRIL 2002

1 Introduction

Sampling of sediment, water, and biological organisms occurred on 24 March 2002 to evaluate existing dioxin-related contaminant concentrations in the vicinity of the Sierra Pacific Industries Mill site located in Humboldt County, California. A scientific team collected sediment and water samples at four locations: two adjacent to the Mill site on the lower Mad River Slough, one on upper Mad River Slough, and one on Hookton Slough. Biological organisms were also collected at two sites, the Mill site and Hookton Slough, for analysis of dioxin-related contaminant concentrations in organism tissues. Five types of organisms were collected rock crab (*Cancer antennarius*), red crab (*Cancer productus*), yellow shore crab (*Hemigrapsus oregonensis*), mussel (*Mytilus trossulus*), and oyster (*Ostrea lurida*). Three species of organisms were collected from both sites; however, only rock crab and red crab organisms were collected at the Mill site. These two crab species are deep water crabs, but were not captured at Hookton Slough. The individually custody-sealed samples were submitted to Severn Trent Services Laboratory in Sacramento, California on 25 March 2002 under chain of custody, and were received by the Laboratory in good condition, and in accordance with the sample type and method requirements.

The sampling team included experts in the area of hydrologic science, invertebrate zoology, and biological resources:

Mary Elizabeth, hydrologic science (summary report preparer)
Lorrie Bott, invertebrate zoology
Mark Morrissette, biological resources (Mad River Biologists)

Also, present during sampling was Fred Evenson.

The following sections describe the sampling preparation, reconnaissance of sampling locations, sampling procedures, and sample handling activities.

2 Sampling Preparation Activities

Mary Elizabeth contacted the laboratory, Severn Trent Services, on Thursday 21 March 2002 to arrange for the preparation of a bottle set for sample collection. In addition, the laboratory was consulted on the proper preservation for whole biological samples (dry ice to maintain –20°C), and for sediment and water samples (ice to maintain 4°C).

The bottle sets consisting of (10) 1-L amber bottles, (20) 250-mL glass jars, sample custody seals, and sample chain of custody forms were obtained from the laboratory on 22 March 2002 in two insulated and custody sealed ice chests. The custody seals were identified as number 294936 for the amber bottles ice chest; and number 294926 for the glass jars ice chest. The ice chests remained sealed until sampling was initiated on 24 March 2002.

After investigating the availability of dry ice in the Arcata area, it was determined on the afternoon of 22 March 2002 that dry ice would be obtained in Sacramento, since none was available in the Arcata area. Dry ice was located and purchased by Mary Elizabeth in Sacramento on the evening of 22 March 2002 for later transport to the Arcata area on the morning of 23 March 2002. A rental car was used for transportation to and from Arcata, CA and was obtained from Avis in Sacramento, CA on the evening of 22 March 2002 by Mary Elizabeth.

The sampling team was contacted on 22 March 2002 to arrange for a meeting time to conduct reconnaissance of sampling locations: the three established sampling locations and possible additional sites on Saturday 23 March 2002.

Aluminum sampling trowels, aluminum foil, various sizes and weights of ziplock plastic bags to protect aluminum foil wrapped equipment, detergent, distilled water, and gloves were purchased by Mary Elizabeth on 22 and 23 March 2002 for later sample collection. Equipment preparation activities were conducted on Saturday 23 March 2002 by Mary Elizabeth. The decontamination activities and equipment preparation were done while wearing gloves to avoid contamination. The sampling equipment was decontaminated by first washing the sampling trowels in soapy water, rinsing in tap water, followed by final rinsing in distilled water. The decontaminated trowels were individually wrapped in aluminum foil and individually placed in a ziplock plastic bag until used for sampling. Aluminum foil packets were prepared for wrapping the collected biological samples after collection. Each packet consisted of five folded pieces of aluminum foil, then over-wrapped in aluminum foil, and placed in a ziplock plastic bag. Packets of sampling gloves were also prepared by placing 10 pairs of gloves wrapped in aluminum foil and placed in a ziplock plastic bag.

3 Reconnaissance

The sampling team members, Mary Elizabeth, Lorrie Bott, and Mark Morrissette, met at the 4th Street Market in Arcata, CA at 3:00 p.m. on 23 March 2002. Five sites were evaluated for sampling, especially for biological sampling: the lower Mad River Slough near Samoa Bridge (adjacent to the Sierra Pacific Industries Mill site), McNulty Slough, Hookton Slough near the public interpretive center, Fields Landing South in Humboldt Bay, and the upper Mad River Slough near Lanphere Bridge. The heavy rains that occurred earlier in the day of 23 March 2002 had ceased by 3:30 p.m. when reconnaissance was underway. The sky remained partly cloudy with little to no breeze observed during the reconnaissance fieldwork.

The first site visited was the lower Mad River Slough adjacent to the Mill site. The team walked along the banks observing four outfall pipes discharging water to the slough and observing various biological species present in and adjacent to the slough. Two types of crabs were observed ranging in size from 3/4 to 2-1/2 inches (body width): *Hemigrapsus oregonensis* (yellow shore crab) and *Pachygrapsus crassipes* (striped shore crab). Of the approximately 20 crabs observed roughly half were *Hemigrapsis oregonensis* and half were *Pachygrapsis crassipes*. L. Bott stated that the two crab species identified are generally not found in the same locations. The *Pachygrapsis crassipes* crabs prefer areas that 1) are higher up in the tidal zone, 2) are not muddy, and 3) have higher energy wave action than typically found in the slough environment. Two members of the Nereid family of polychaetes (6 to 9 inches long) were observed at the Mill site on 23 March 2002 (Exhibit 1).

The second site visited was the McNulty Slough located outside of Humboldt Bay in the North Bay of the Eel River Estuary. No marine life was observed. On the way to McNulty Slough the sampling team observed an access point to Hookton Slough, the third site visited. The team arrived at Hookton Slough at 4:45 p.m. on 23 March 2002 and observed that marine life in the upper inter tidal zone was sparse. The team continued to review available maps and identified a possible sampling site (later determined to be near a former mill site) Fields Landing South at the end of South Bay Depot Road. The team arrived at the Fields Landing South site at 5:30 p.m. on 23 March 2002, when the tide was coming in; however, many *Pachygrapsus crassipes* were observed in the upper tidal zone. The last site visited was the upper Mad River Slough at Lanphere Bridge. By the time of arrival at 6:00 p.m. on 23 March 2002, the site was inundated and under flood tide conditions. No crabs were observed under these flood tide conditions at this location.

A tentative schedule for sampling on 24 March 2002 was developed to take advantage of the tide table lag time related to the locations selected for sampling. Sampling was to occur during low tide periods to expose tidal sediments and tidal organisms for collection. Mary Elizabeth and Mark Morrissette planned meet at the lower Mad River Slough site at 8:00 a.m. on 24 March 2002 to begin deepwater crab collection activities and Lorrie Bott planned to meet the sampling team at 11:00 a.m. at the Fields Landing South site on 24 March 2002.

4 Sample Collection and Handling

Sediment, water, and biological organisms were collected on 24 March 2002 for dioxin-related contamiantion assessment. Summaries of the 24 March 2002 samples collected and sampling locations are presented in Table 4.1 and 4.2, respectively. The weather was partly cloudy with air temperatures generally in the 50's°F during sampling activities, which occurred from 8 a.m. to 6 p.m. on 24 March 2002. The tide at the mouth of Humboldt Bay was high at 7:20 a.m. (6.7 ft.) and low at 2:39 p.m. (-0.3 ft.) on 24 March 2002.

4.1 Sampling Procedures

In this section, an overview is presented of the sampling procedures used when water, sediment, and biological samples were collected on Sunday, 24 March 2002. Clean sampling techniques were used for all sampling procedures including the use of gloves, clean and lab certified sample containers, decontaminated sampling equipment, aluminum foil wrappers contained in aluminum foil and ziplock plastic bags, and a foil lined collection pan for the collection of biological samples.

Water samples were collected as grab samples from each site. While freshly gloved, two clean 1-L amber bottles were removed from the ice chest containing amber bottles by a sampling team member and taken to the sampling site. When necessary to maintain clean conditions, gloves were replaced. Once at the site, the lid of the bottle was opened being careful to keep the inner side of the lid facing down while placing the bottle carefully into the flowing stream of water to collect the sample. Care was taken to avoid disturbing sediments while collecting water samples. Also, water samples were collected upstream of any sediment sampling location. The sample bottles were topped off, if necessary, with a small amount of sample collected in the lid prior to the lid being closed. After the sample bottle was closed, an identifying number was written on the lid while at the site, prior to the bottle being placed in the ice chest to chill the sample temperature down to 4°C. Two water samples were collected from each site within two minutes of each other.

Sediment samples were collected as grab samples from depths ranging from approximately 3 to 7 inches below ground surface. The three criteria for determining the depth at which a sediment sample was taken were 1) the sediment sample depth had to be taken below a depth of approximately one inch to avoid near-term surface sediment disturbance, 2) the sediment sample layer had to be free of standing or obviously draining water at the time of sampling, and 3) the sediment sample layer had to consist primarily of silt, or finer sediment particles, as determined by manual field texture techniques. Care was taken to collect sediment samples with similar physical characteristics to allow for better comparison of detectable concentraions of dioxin-like contamination between sampling locations.

The foregoing criteria were used to identify a sediment sampling depth at each site using data obtained from test excavations into sediment of various depths. Once the sampling depth was identified, a sampling site was located in an undisturbed area in the immediate vicinity of the test excavations. The actual sample site was excavated and the sediment sample collected using a clean aluminum sampling trowel. While freshly gloved and prior to use for sample collection, the clean aluminum sampling trowel was unwrapped by first removing the wrapped trowel from the ziplock plastic bag and then removing the aluminum foil wrap. The entire sediment sampling procedure was done using clean gloved hands.

The sampling trowel was used to expose the targeted sediment depth and was then used to transfer sediment into a sampling jar. A second gloved sampling team member held the sample jar. After one sample jar was completely filled, the lid was screwed on, and a second sediment sample was collected from this sample site. For all but one sampling site, two sediment samples were collected within 10 minutes of each other for dioxin-related analysis. Difficulties were experienced when attempting to collect a depth discrete samples from near the Mill site outfall #4 on lower Mad River Slough, and consequently, only one sample was submitted for laboratory analyses for this sampling site. After the sediment samples were collected from each site, an identifying number was written on each lid of the sample jars while at the site, and the jars were then placed in a ziplock plastic bag. The bagged and labeled sediment samples were then placed as quickly as feasible into the ice chest containing ice to chill the sample temperature down to 4°C and to remain in the dark.

Biological samples were collected from the lower Mad River Slough and Hookton Slough sites using multiple person sample teams. For the deep water crab collection activities, the crab trap was dropped from the Samoa Bridge walkway into the lower Mad River Slough at a location where the water was approximately 8-12 feet deep at the time of sampling. Periodically, the trap was removed from the water and if crabs were present, the crabs were removed by sampling

personnel wearing gloves, and were placed into aluminum foil held by a second gloved sampling team member and wrapped. Each aluminum wrapped sample was placed within a ziplock plastic freezer bag, which was labeled immediately following collection with the crab species name, sex, size, and date and time of collection. Each labeled sample was then immediately placed into an ice chest containing dry ice for rapid deep freezing. The other biological samples were collected from the upper and lower tidal zone using multiple team members for lifting rocks to locate and collect organisms that were expected in all three sampling locations. A second gloved sampling team member removed the located organisms and placed the organisms into the foil-lined sample collection pan. Sampling team members wore clean gloves while handling organisms before the organisms were wrapped in aluminum foil and placed within a ziplock plastic bag. After these other biological samples were collected at each site, slough water from that site was used to rinse any extraneous matter from the organisms. The rinsed organisms were counted and grouped by species prior to placing each group of organisms in a clean aluminum foil wrap. As before, the foil wrapped samples were placed in ziplock plastic freezer bags. The bags were labeled with the sample location, number of organisms in the sample group, time and date of collection, and species comprising the sampling group. The bags were then placed into an ice chest containing dry ice.

4.2 Sample Collection Summaries by Site

Samples were collected in the following order: deep water crabs from the lower Mad River Slough during ebbing tide; biological, sediment, and water from the Hookton Slough at low tide; biological, sediment, and water from the lower Mad River Slough during early flooding tide; and water and sediment from the upper Mad River Slough at the Lanphere Bridge during late flooding tide. All sites sampled were located in Humboldt County and in and adjacent to waterways interconnected with Humboldt Bay. The conditions encountered and samples collected will be briefly presented next.

4.2.1 Deep Water Sampling – Lower Mad River Slough at the Samoa Bridge

Mark Morrissette supplied a crab trap, which was placed in the middle of the slough by hanging the trap from a walkway railing, at 8:00 a.m. on Sunday, 24 March 2002. The crab trap was checked by Mary Elizabeth and Mark Morrissette on three occasions between 8:00 a.m. and 12:45 p.m. and three types of crabs were collected: red crab (*Cancer productus)*, rock crab (*Cancer antennarius*), and dungeness crab (*Cancer magister*). Since this was the first site sampled for deepwater crabs, all sampled organisms collected were retained and preserved by freezing. The crabs were collected, as previously described, and then placed in an ice chest on and surrounded by dry ice (30 lbs.). The attempt to collect these species of crab nearer to the

shore proved unsuccessful, possibly due to insufficient water depth. Fred Evenson arrived at the lower Mad River Slough site at approximately 10:30 a.m. on 24 March 2002 and he accompanied the sampling team throughout the remainder of the sampling activities.

A total of nine deep water crabs were collected from the lower Mad River Slough; however, after sampling was completed for the day and the distribution of the crab types (i.e., the sex, age, and species) was evaluated, it was determined that only four adult organisms would be submitted for dioxin-related analysis. The one rock crab collected and submitted to the Laboratory for analysis and collected at 10:15 a.m. on 24 March 2002 was a female having a body width of 4-1/4 inches. The three red crabs submitted for analysis were collected at 9:30 a.m. (male with body width of 5-1/4 inches); at 12:30 p.m. (male with body width of 6 inches, see Exhibit 2); and at 12:40 p.m. (male with body width of 5 inches) on 24 March 2002.

4.2.2 Hookton Slough

Lorrie Bott met Mary Elizabeth and Fred Evenson at the Fields Landing South site at 11:30 a.m. on 24 March 2002. The decision was made to sample the Hookton Slough site instead of Fields Landing South. Information became known about possible historic activities in the immediate vicinity of the Fields Landing South site that may have resulted in contamination (former mill site), thereby disqualifying the site for use as a reference site. Hookton Slough, which is located in South Humboldt Bay, was selected for sampling instead. The available information indicated that no industrial activities occurred nearby, thereby qualifying the site as a reference site that would allow evaluation of the levels of background dioxin-related contamination, which may be expected in the area.

The team including Lorrie Bott, Mark Morrissette, and Mary Elizabeth, and Fred Evenson met at Hookton Slough at 1:45 p.m. on 24 March 2002 to begin sampling.

Two sediment locations were logged prior to selecting a sediment sampling site. These locations were separated by approximately 4 feet and both were non-vegetated mud flats that are tidal influenced.

<u>Site 03 (A) 12 feet from bank</u>
0 - 1/2 inch: tan/light brown, fine sand (70%) and silt (30%).
1/2 - 1 inch: light gray, fine sand (70%), silt (25%), and fine organic (5%).
1- 5 inch: dark gray, silt (80 %), fine sand (15%), and clay (5%).
Rock surface encountered. Within 30 minutes, this hole was filled with water.

Site 03(B) 16 feet from bank (lower elevation than Site 03(A))
0 - 1/2 inch: light brown, fine sand (60%) and silt (40%)
1/2 - 2 inch: light gray, fine sand (50%), silt (45%), and fine organic (5%)
2 - 3-1/2 inch: darker gray, medium to coarse sand (85%) and silt (15%)
3-1/2 - 8 inch: dark gray, silt (80 %), fine sand (15%), and clay (5%)
Water encountered.

Sediment samples collected at 2:45 p.m. (1445) on 24 March 2002 from this site were obtained approximately 14 feet from the bank. The sample was collected at a horizon depth characterized by silt (80%), fine sand (15%), and clay (5%) which was dark gray.

Three types of organisms were collected between 1:45 p.m. and 2:45 p.m. (1415) from this on 24 March 2002 using procedures described previously. The biological samples collected included 14 yellow shore crabs (*Hemigrapsis oregonensis*), 12 mussels (*Mytilus trossulus*), and 30 oysters (*Ostrea lurida*). As stated previously, no deepwater crabs were collected from this site. Also, two water samples were collected from off the Hookton Slough dock at 3:00 p.m. (1500) on 24 March 2002.

4.2.3 Lower Mad River Slough near Samoa Bridge (Sierra Pacific Industries Mill)

The sampling team including Lorrie Bott, Mark Morrissette, and Mary Elizabeth, and Fred Evenson, met at the Mill site (lower Mad River Slough) at 3:30 p.m. on 24 March 2002 to begin sampling the area for biological organisms and near outfalls #2 and #4 for sediment and water.

Mill Site Outfall #4 Sediment and Water Sampling

Two sediment locations were logged before selecting a sampling site near each outfall, first outfall #4 and then outfall #2. Hydrocarbon-like sheens were observed on the water after sediment from these two locations were disturbed.

The outfall #4 sediment excavations for logging were characterized by the large quantities of undecomposed woody fibers that were observed at various depths in the test holes. The three logged locations associated with outfall #4 were separated by approximately 10 feet and all were non-vegetated mud flats that are tidal influenced. Dead shore crabs were observed near this outfall and while on site for sampling, the discharge of the water (8 sq.in. area) remained constant.

The first sediment test excavation location was approximately 6 feet from the outfall and 10 feet from the bank. It was not possible to sample closer to the outfall because overlying rip-rap prevented access to underlying sediment. Three horizons were distinguishable: a gray fine sand with visible pieces of wood fiber, a dark gray sandy silt, and a reddish woody horizon consisting

predominately of undecomposed wood fibers and pieces. A hydrocarbon-like sheen was observed on the outfall channel water when the adjacent sediments were disturbed and in the test holes after logging. Also, hydrocarbon-like odors were observed while sampling in the area of outfall #4 as when sampling in the area of outfall #2.

Note: two water samples (1-L amber bottles) were collected upstream of any disturbed sediment directly from the outfall #4 discharge pipe at 4:50 p.m. (1650) on 24 March 2002.

Site 01 Outfall 4 (A) 10 feet from bank
0-1 inch: dark gray, fine organic wood fibers up to 1mm long (55%), silt (35%), and fine sand (10 %).
1-5 inch: black, fine organic particles (75%), silt (15%), and fine sand (10 %).
5 inch: reddish woody debris (90 %), fine sand (5%), and clay (5%).
Water encountered.

Site 01 Outfall 4 (B) 11 feet from bank
0-1 inch: dark gray, silt (60%), fine sand (20%), organic fine fibers (20%),
1-4 inch: dark gray, silt (65%), fine organic particles (25%), and fine sand (10 %).
5-8 inch: brownish-red, silt (45%), woody debris (35 %), and fine sand (15%).
Water encountered.

Site 01 Outfall 4 (C) 19 feet from bank
0-5 inch: dark gray, silt (60%), fine sand (30%), organic fine fibers (10%),
5-6 inch: brownish-red, silt (60%), woody debris (25 %), and fine sand (15%).
6-7 inch: dark gray, silt (65%), fine sand (10 %), clay (20%), and organic particles (5%)
7-13 inch: reddish woody debris (90 %), fine sand (5%), and clay (5%).
Water encountered.

Sediment samples collected from the Mill site near outfall #4 at 5:35 p.m. (1735) on 24 March 2002 were obtained approximately 15 feet from the bank. The samples were collected at a horizon depth characterized by silt (65%), fine sand (10 %), clay (20%), and organic matter (5%). This horizon was very narrow and due to difficulties with obtaining sediment from that specific layer approximately 15 % of the sediment contained overlying sediment characterized by silt (60%), fine sand (30%), organic fine fibers (10%). One of the two samples contained a higher mixed proportion and was not submitted for analyses, although it was custody sealed and retained by the sampler.

Mill Site Outfall #2 Sediment and Water Sampling

The first sediment logging location was approximately 3 feet from the outfall and 5 feet from the bank. The second sediment logging location was approximately 18 feet from the outfall and 20 feet from the bank. The sediment location where samples were collected for laboratory analyses

was approximately 10 feet from the bank as indicated in Exhibit 3. Three horizons were distinguishable: two dark gray - silty sandy gravel and sandy silt, and a reddish black woody horizon consisting predominately of partially decomposed wood fibers and silt. Similar to the outfall #4, a hydrocarbon-like sheen was observed on the outfall channel water when the adjacent sediments were disturbed and in the test holes after logging. Also, hydrocarbon-like odors were observed while sampling. Outfall #2 included a green tidal gate (preventing the outfall to become a conduct of flooding seawater) and a small effluent discharge.

Note: Two water samples (1-L amber bottles) were collected upstream of any disturbed sediment directly from water adjacent to the outfall #2 discharge pipe at 5:45 p.m. (1745) on 24 March 2002.

Site 01 Outfall 2 (A) 5 feet from bank
0-5 inch: black, coarse sand-gravel loosely packed (65%), fine sand (15%), silt (10 %), and fine organic particles and fibers (10 %).
Water encountered.

Site 01 Outfall 2 (B) 20 feet from bank
0-1 inch: dark gray, silt (70%), coarse sand-gravel (15%), and fine sand (15%)
1-6 inch: dark gray, silt (75%), fine sand (10%), clay (5%), medium sand (5 %), and fine organic particles (5%)
6-9 inch: brownish-black, woody debris (60%), silt (30%), and fine sand (10%).
Water encountered.
Note: The sediments encountered at this location were laminated in sheets of depths approximately 1-2 mm.

Sediment samples were collected from the Mill site near outfall #2 at 6:00 p.m. (1800) on 24 March 2002 and were obtained approximately 10 feet from the bank (2S011800032402, 1 of 2 and 2 of 2). The samples were collected at a horizon depth characterized by silt (75%), fine sand (10%), clay (5%), medium sand (5 %), and fine organic particles (5%).

Mill Site Biological Sampling

Three types of organisms were collected between 3:30 and 6:15 p.m. (1700) on 24 March 2002 from this site using procedures described previously and included 41 yellow shore crabs (*Hemigrapsus oregonensis*), 31 mussels (*Mytilus trossulus*), and 45 oysters (*Ostrea lurida*). Examples of collected mussel and oyster organisms are shown in Exhibits 4 and 5, respectively.

4.2.4 Upper Mad River Slough near Lanphere Bridge

The sampling team including Lorrie Bott, Mark Morrissette, and Mary Elizabeth, and Fred Evenson, met at the upper Mad River Slough near Lanphere Bridge site at approximately 6:25 p.m. on 24 March 2002 to begin sampling.

Two water samples (1-L amber bottles) were collected at 6:35 p.m. (1835) on 24 March 2002. Two possible sediment locations were quickly logged to identify suitable sampling locations, i.e., similar sediment grain size proportions. The two logged locations were located within 8 feet of each other

Site 03 (A) 15 feet from bank (closest to bridge overhang)
0-1/2 inch: tan, sandy silt
1/2-3 inch: dark gray, sandy gravel
3-4 inch: dark gray, clayey sand (plastic cohesive)
4-6 inch: dark gray, gravelly (65%) silty (25%), and fine sand (10%)

Site 03 (B) 15 feet from bank
0-1/2 inch: tan, silt (75%) and fine sand (25%)
1/2-3 inch: dark gray, sandy gravel, (50%) fine sand (25%), and silt (25%)
3-4 inch: dark gray, silt (55%), fine sand (25%), and clay (20%).

Sediment samples collected from the upper Mad River Slough near Lanphere Bridge at 6:50 p.m. (1850) from this site were obtained approximately 15 feet from the bank. The samples were collected at a horizon depth characterized by silt (55%), fine sand (25%), and clay (20%).

The crab trap was dropped into the upper Mad River Slough to collected deep water crab. While on site (approximately 45 minutes) no crabs were caught.

4.3 Sample Inventory and Laboratory Receipt

After a brief break, Mark Morrissette and Mary Elizabeth of the sampling team, and Fred Evenson met in Arcata, CA to inventory samples, select biological samples for analysis, prepare chain of custodies, and custody seal samples. The sample had remained in the locked rental car in closed ice chests while sampling. The car keys in the possession of Mary Elizabeth or another sampling team member. These inventory activities were completed at approximately 11:30 p.m. on 24 March 2002 and Mary Elizabeth left Humboldt County to return to Sacramento, CA. The samples were inventoried by the laboratory, Severn Trent Services, between 8:15 a.m. and 8:35 a.m. on 25 March 2002. The laboratory was to contact Fred Evenson to discuss the analytical methods that would be used.

Table 4-1. Samples and Custody Seal Summary

Location	Sample Type	Sample ID	Date of Collection	Time of Collection	Temperature[1] °F	Number and Type of Organism Collected	Custody Seal ID	Lab Receipt Condition
Mad River Slough at Samoa Bridge (Mill Site) Outfall #2	water	2W011745032402 (1 of 2)	3/24/02	1745	52	-	294856	3°C
Mad River Slough at Samoa Bridge (Mill Site) Outfall #2	water	2W011745032402 (2 of 2)	3/24/02	1745	-	-	294866	3°C
Mad River Slough at Samoa Bridge (Mill Site) Outfall #2	sediment	2S01800032402 (1 of 2)	3/24/02	1800	56	-	294709	3°C
Mad River Slough at Samoa Bridge (Mill Site) Outfall #2	sediment	2S011800032402 (2 of 2)	3/24/02	1800	-	-	294719	3°C
Mad River Slough at Samoa Bridge (Mill Site) Outfall #4	water	4W011650032402 (1 of 2)	3/24/02	1650	56	-	294876	3°C
Mad River Slough at Samoa Bridge (Mill Site) Outfall #4	water	4W011650032402 (2 of 2)	3/24/02	1650	-	-	294886	3°C
Mad River Slough at Samoa Bridge (Mill Site) Outfall #4	sediment	4S01735032402 (1 of 1)	3/24/02	1735	54	-	294836	3°C
Mad River Slough at Samoa Bridge (Mill Site)	biological	31M011700032402	3/24/02	1700	-	(31) *Mytilus trossulus (mussel)*	292626	Frozen[2] (-20°C)
Mad River Slough at Samoa Bridge (Mill Site)	biological	41H0011700032402	3/24/02	1700	-	(41) *Hemigrapsus oregonensis (yellow shore crab)*	292616	Frozen[2] (-20°C)
Mad River Slough at Samoa Bridge (Mill Site)	biological	450L011700032402	3/24/02	1700	-	(45) *Ostrea lurida (oyster)*	294996	Frozen[2] (-20°C)
Mad River Slough at Samoa Bridge (Mill Site)	biological	1R011015032402	3/24/02	1015	-	(1) *Cancer antennarius (rock crab)*	294736	Frozen[2] (-20°C)
Mad River Slough at Samoa Bridge (Mill Site)	biological	3RC011230032402	3/24/02	1230	-	(3) *Cancer productus (red crab)*	294986	Frozen[2] (-20°C)
Mad River Slough at Lanphere Bridge	water	W021835032402 (1 of 2)	3/24/02	1835	52	-	294916	3°C
Mad River Slough at Lanphere Bridge	water	W021835032402 (2 of 2)	3/24/02	1835	-	-	294966	3°C
Mad River Slough at Lanphere Bridge	sediment	S021850032402 (1 of 2)	3/24/02	1850	56	-	292836	3°C
Mad River Slough at Lanphere Bridge	sediment	S021850032402 (2 of 2)	3/24/02	1850	-	-	294946	3°C

Location	Sample Type	Sample ID	Date of Collection	Time of Collection	Temperature[1] °F	Number and Type of Organism Collected	Custody Seal ID	Lab Receipt Condition
Hookton Slough (near interpretive center)	water	W031500032402 (1 of 2)	3/24/02	1500	51[3]	-	294896	3°C
Hookton Slough (near interpretive center)	water	W031500032402 (2 of 2)	3/24/02	1500	-	-	294906	3°C
Hookton Slough (near interpretive center)	sediment	S031445032402 (1 of 2)	3/24/02	1445	53[3]	-	294729	3°C
Hookton Slough (near interpretive center)	sediment	S031445032402 (2 of 2)	3/24/02	1445	-	-	294739	3°C
Hookton Slough (near interpretive center)	biological	12M031415032402	3/24/02	1415	-	(12) *Mytilus trossulus (mussel)*	292636	Frozen[2] (-20°C)
Hookton Slough (near interpretive center)	biological	14H0031415032402	3/24/02	1415	-	(14) *Hemigrapsis oregonensis (yellow shore crab)*	294976	Frozen[2] (-20°C)
Hookton Slough (near interpretive center)	biological	300L031415032402	3/24/02	1415	-	(30) *Ostrea lurida (oyster)*	294136	Frozen[2] (-20°C)

(1) Field temperature measurements were collected on 24 March 2002 by Mark Morrissette and reported to Mary Elizabeth by email on 26 March 2002, unless otherwise noted.
(2) STL Laboratory did not note the temperature upon receipt, given dry ice was present in ice chest and samples frozen solid temperature noted is an estimate
(3) Temperature measured on 25 March 2002 by Mark Morrissette and reported to Mary Elizabeth by email on 26 March 2002.

Table 4-2. Sampling Locations: Global Positioning System Coordinates (North American Datum, 1927)

Sample Site	Description	Site ID	GPS ID	UTM		FOM
Mad River Slough at Samoa Bridge (Mill Site)	Eastern limit of biological sampling area	01	MS1B	10T 0403140	4524236	3.9m
Mad River Slough at Samoa Bridge (Mill Site)	Western limit of biological sampling area	01	MS4S	10T 0402984	4524402	5.9m
Mad River Slough at Samoa Bridge (Mill Site)	Outflow #2 (water/sediment sampling site)	2*01	MS2OF	10T 0403045	4524312	5.3m
Mad River Slough at Samoa Bridge (Mill Site)	Outflow #3	-	MS3OF	10T 0403011	4524354	4.3m
Mad River Slough at Samoa Bridge (Mill Site)	Outflow #4 (water/sediment sampling site)	4*01	MS4S	10T 0402984	4524402	5.9m
Mad River Slough at Lanphere Bridge	Sediment/water sampling site	*02	LR1	10T 0404456	4527837	7.4m
Hookton Slough (Control)	Eastern limit of biological sampling area	03	HS2B	10T 0396904	4503453	3.3m
Hookton Slough (Control)	Western limit of biological sampling area	03	HS1B	10T 0396792	4503483	3.4m
Hookton Slough (Control)	Sediment/water sampling site	*03	HS1S	10T 0396862	4503458	3.6m

Note: (*) refers to either to the letter S used to indicate that a sediment sample was collected or the letter W to indicate that a water sample was collected for inorganic samples. Biological samples were identified similarly by abbreviations: red crab (RC), rock crab(R), yellow shore crab (HO), mussel (M), and oyster (OL).
Source: Data collected by Mark Morrissette on 24 March 2002 and reported to Mary Elizabeth by email 26 March 2002

EXHIBIT C

SEVERN TRENT SERVICES

STL Sacramento
880 Riverside Parkway
West Sacramento, CA 95605-1500

Tel: 916 373 5600
Fax: 916 371 8420
www.stl-inc.com

March 28, 2002

STL SACRAMENTO PROJECT NUMBER: **G2C250134**
PO/CONTRACT:

Frederic Evenson
Ecological Rights Foundation
c/o Law Office of Sharon Duggan
2070 Allston Way, Suite 300
Berkeley, CA 94704

Dear Mr. Evenson,

This report contains the analytical results for the samples received under chain of custody by STL Sacramento on March 25, 2002. These samples are associated with your ERFSP-032402 project.

The test results in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (916) 374-4384.

Sincerely,

Karen M. Dahl
Project Manager

TABLE OF CONTENTS

STL SACRAMENTO PROJECT NUMBER G2C250134

CASE NARRATIVE

STL SACRAMENTO PROJECT NUMBER G2C250134

General Comments

As requested by the client, the samples were homogenized in the following fashion:
31M011700032402 – All of the mussels had their shells removed and the contents were mixed in a blender.
41HO011700032402 – All of the crabs had their shells and legs removed and the contents were mixed in a blender.
1R011015032402 – The crab had its shells and legs removed and the contents were mixed in a blender.
3RC011230032402 - All of the crabs had their shells and legs removed and the contents were mixed in a blender.
14HO031415032402 - All of the crabs had their shells and legs removed and the contents were mixed in a blender. Note: We did not receive 10 grams of sample so we processed 4.31 grams of sample.
12M031415032402 – As many mussels as were needed had their shells removed and the contents were mixed in a blender.

There were no anomalies associated with this project.

STL Sacramento

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: STL Sacramento Laboratory Quality Manual

STL Sacramento Certifications:
Alaska (UST-055), Arizona (#AZ00616), Arkansas, California (NELAP # 01119CA) (ELAP #I-2439), Connecticut (#PH-0691), Florida (E87570), Hawaii, Louisiana (AI # 30612), New Jersey (Lab ID 44005), Nevada (#CA 044), New York (LAB ID 11666 serial # 107407), Oregon (LAB ID CA 044), South Carolina (LAB ID 87014, Cert. # 870140), Utah (E-168), Virginia (#00178), Washington (# C087), West Virginia (# 9930C), Wisconsin (Lab 998204680), USNAVY, USACE, USDA Foreign Plant (Permit # 37-82605), USDA Foreign Soil (Permit # S-46613)..

Sample Summary
G2C250134

WO#	Sample #	Client Sample ID	Sampling Date	Received Date
EWWN6	1	31M011700032402	3/24/02 05:00 PM	3/25/02 08:20 AM
EWWN9	2	41HO011700032402	3/24/02 05:00 PM	3/25/02 08:20 AM
EWWPE	4	1R011015032402	3/24/02 10:15 AM	3/25/02 08:20 AM
EWWPH	5	3RC011230032402	3/24/02 12:30 PM	3/25/02 08:20 AM
EWWPK	7	14HO031415032402	3/24/02 02:15 PM	3/25/02 08:20 AM
EWWPL	8	12M031415032402	3/24/02 02:15 PM	3/25/02 08:20 AM

Notes(s):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity, pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weigh

G2C250134

[redacted]

Chain of Custody Record

SEVERN TRENT SERVICES — Severn Trent Laboratories, Inc

STL-4124 (1200)

Client: ERF/Law Office Sharon Duggan	Project Manager: Fred Evenson	Date: 3.24.02	Chain of Custody Number: 101729
Address: 2070 Allston Way Suite 300	Telephone Number (Area Code)/Fax Number: (510) 647-1900 / (510) 647-1905	Lab Number:	Page ____ of ____
City: Berkeley / State: CA / Zip Code: 94704	Site Contact: —	Lab Contact:	
Project Name and Location (State): ERFSP-032402 California	Carrier/Waybill Number: Mary Elizabeth		
Contract/Purchase Order/Quote No.			

Analysis (Attach list if more space is needed)

PRESERVED GOOD CONDITION UNDER COC

MAR 25 2002

INI: GC

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Biologic	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Full Sandoz 8h	96 Lipid	Halo	Special Instructions/ Conditions of Receipt
31M011700032402	03.24.02	1700					X							X	X		* RECD ON DRY
41H011700032402	03.2402	1700					X							X	X		ICE, SAMPLES W
450L011700 032402	03.24.02	1700					X								X	X	FROZEN UPON
1R011015 032402	03.24.02	1015					X							X	X		RECEIPT.
3RC011230032402	032402	1230					X							X	X		GC 3-25-0
300L031415032402	032402	1415					X									X	FROZEN WHEN
4H003141503 2402	032402	1415					X							X	X		RECEIVED.
12M031415032402	032402	1415					X							X	X		GC 3-25-02
																	CUSTODY SEALS
																	INTACT.
																	GC 3-25-0

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☒ Archive For 3 Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other 72 hrs

QC Requirements (Specify): Method Specific

	Date	Time		Date	Time
1. Relinquished By: [signature]	3.25.02	8:20	1. Received By: [signature]		
2. Relinquished By			2. Received By	3-25-02	0820
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report

STL Sacramento 916-373-5600

TRENT SERVICES

LOT RECEIPT CHECKLIST

STL Sacramento

CLIENT ERF PM KD LOG # 14717

LOT# (QUANTIMS ID) G2C250134 QUOTE# 46874 LOCATION CART / F2C

	Initials	Date
	GC	3-25-02

DATE RECEIVED 3-25-02 TIME RECEIVED 0820

DELIVERED BY
- ☐ FEDEX ☐ CA OVERNIGHT ☒ CLIENT
- ☐ AIRBORNE ☐ GOLDENSTATE ☐ DHL
- ☐ UPS ☐ BAX GLOBAL ☐ GO-GETTERS
- ☐ STL COURIER ☐ B & B ☐ OTHER _____

CUSTODY SEAL STATUS ☒ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S) _____

SHIPPPING CONTAINER(S) ☒ STL ☐ CLIENT ☐ N/A

TEMPERTURE RECORD (IN °C) IR 1☐ 2☒ ☐ OTHER _____

COC #(S) 101729

TEMPERATURE BLANK _____

AMBIENT TEMPERATURE 0°

COLLECTOR'S NAME: ☐ Verified from COC ☒ Not on COC

pH MEASURED ☐ YES ☐ ANOMALY ☒ N/A

LABELED BY.....

LABELS CHECKED BY.....

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING
WETCHEM ☒ N/A

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☒ N/A

☒ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A

☐ Clouseau ☐ TEMPERATURE EXCEEDED (2 °-6 °C) ☒ N/A

☐ WET ICE ☐ BLUE ICE ☐ GEL PACK

☐ PM NOTIFIED ☐ NO COOLING AGENTS USED

Notes: _____

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES. QA185 8/00 NEK

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	2
VOA *																				
VOAh *																				
____AGB																				
AGBs																				
250AGB																				
250AGBs																				
250AGBn																				
250AGBna																				
____AGJ																				
500AGJ																				
250AGJ																				
125AGJ																				
____CGJ																				
500CGJ																				
250CGJ																				
125CGJ																				
____PB/PJ																				
____PBn/PJn																				
500PB/PJ																				
500PBn/PJn																				
500PBna																				
500PBzn/na																				
250PB																				
250PBn																				
250PBna																				
250PBzn/na																				
____*CT																				
Encore																				
Folder/Filter																				
PUF																				
Petri/Filter																				
XAD Trap																				
Ziploc																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	2

h = hydrochloric acid s = sulfuric acid na = sodium hydroxide n = nitric acid zn = zinc acetate

* Number of VOA's with air bubbles present / total number of VOA's

BIOLOGIC, 8290, Lipids, Percent

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 31M011700032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-001 Work Order #...: EWWN61AA Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/28/02
Prep Batch #...: 2084547
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
Percent Lipids	1.9	0.10	%	SW846 8290

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 41HO011700032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-002 Work Order #...: EWWN91AA Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/28/02
Prep Batch #...: 2084547
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
Percent Lipids	6.1	0.10	%	SW846 8290

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 1R011015032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-004 Work Order #...: EWWPE1AA Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/28/02
Prep Batch #...: 2084547
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
Percent Lipids	5.6	0.10	%	SW846 8290

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 3RC011230032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-005 Work Order #...: EWWPH1AA Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/28/02
Prep Batch #...: 2084547
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
Percent Lipids	2.4	0.10	%	SW846 8290

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 14HO031415032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-007 Work Order #...: EWWPK1AA Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/28/02
Prep Batch #...: 2084547
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
Percent Lipids	5.1	0.10	%	SW846 8290

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 12M031415032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-008 Work Order #...: EWWPL1AA Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/28/02
Prep Batch #...: 2084547
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
Percent Lipids	0.90	0.10	%	SW846 8290

BIOLOGIC, 8290, Dioxins/Furans, HRGC/HRMS

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 31M011700032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-001 Work Order #...: EWWN61AC Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/26/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.21	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.49	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.54	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	0.89	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.48	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	4.4 J		pg/g	SW846 8290
OCDD	49		pg/g	SW846 8290
2,3,7,8-TCDF	ND	0.20	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.37	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.38	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.34	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.30	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.38	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.41	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	0.40	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.19	pg/g	SW846 8290
OCDF	ND	0.68	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	(40 - 135)
13C-1,2,3,7,8-PeCDD	88	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	86	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	74	(40 - 135)
13C-OCDD	75	(40 - 135)
13C-2,3,7,8-TCDF	78	(40 - 135)
13C-1,2,3,7,8-PeCDF	80	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	79	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	78	(40 - 135)

NOTE(S):

J Estimated result. Result is less than the reporting limit.

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 41HO011700032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-002 Work Order #...: EWWN91AC Matrix.....: BIOLOGI(
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/26/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.28	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	2.0	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	1.4	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	12		pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	2.9 J		pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	71		pg/g	SW846 8290
OCDD	300		pg/g	SW846 8290
2,3,7,8-TCDF	0.83 CON,J		pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.43	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.76	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	1.5	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	1.2	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.68	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.68	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	9.8		pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.32	pg/g	SW846 8290
OCDF	6.2 J		pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	(40 - 135)
13C-1,2,3,7,8-PeCDD	79	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	79	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	78	(40 - 135)
13C-OCDD	82	(40 - 135)
13C-2,3,7,8-TCDF	70	(40 - 135)
13C-1,2,3,7,8-PeCDF	78	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	77	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	81	(40 - 135)

NOTE(S):

J Estimated result. Result is less than the reporting limit.

CON Confirmation analysis.

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 1R011015032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-004 Work Order #...: EWWPE1AC Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.32	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.57	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.62	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	1.3	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.62	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	38		pg/g	SW846 8290
OCDD	120		pg/g	SW846 8290
2,3,7,8-TCDF	ND	0.27	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.29	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.30	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.33	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.30	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.37	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.40	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	1.5	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.23	pg/g	SW846 8290
OCDF	ND	1.6	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	82	(40 - 135)
13C-1,2,3,7,8-PeCDD	91	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	86	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	83	(40 - 135)
13C-OCDD	83	(40 - 135)
13C-2,3,7,8-TCDF	72	(40 - 135)
13C-1,2,3,7,8-PeCDF	81	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	84	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	88	(40 - 135)

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 3RC011230032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-005 Work Order #...: EWWPH1AC Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.17	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.34	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.47	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	0.89	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.41	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	**12**		**pg/g**	**SW846 8290**
OCDD	**99**		**pg/g**	**SW846 8290**
2,3,7,8-TCDF	ND	0.32	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.28	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.29	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.40	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.20	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.26	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.28	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	1.5	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.19	pg/g	SW846 8290
OCDF	ND	2.5	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	75	(40 - 135)
13C-1,2,3,7,8-PeCDD	75	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	81	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	80	(40 - 135)
13C-OCDD	80	(40 - 135)
13C-2,3,7,8-TCDF	68	(40 - 135)
13C-1,2,3,7,8-PeCDF	73	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	82	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	80	(40 - 135)

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Client Sample ID: 14HO031415032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-007 Work Order #...: EWWPK1AC Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.38	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.96	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	1.5	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	1.3	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	1.3	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	ND	1.8	pg/g	SW846 8290
OCDD	**12 J**		**pg/g**	**SW846 8290**
2,3,7,8-TCDF	ND	0.42	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.64	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.67	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.73	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.65	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.81	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.88	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	0.74	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.81	pg/g	SW846 8290
OCDF	ND	1.0	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	89	(40 - 135)
13C-1,2,3,7,8-PeCDD	78	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	76	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	81	(40 - 135)
13C-OCDD	76	(40 - 135)
13C-2,3,7,8-TCDF	73	(40 - 135)
13C-1,2,3,7,8-PeCDF	68	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	78	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	85	(40 - 135)

NOTE(S):

J Estimated result. Result is less than the reporting limit.

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 12M031415032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250134-008 Work Order #...: EWWPL1AC Matrix.....: BIOLOGI
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.13	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.33	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.43	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	0.38	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.38	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	ND	0.20	pg/g	SW846 8290
OCDD	ND	1.8	pg/g	SW846 8290
2,3,7,8-TCDF	ND	0.15	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.18	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.18	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.19	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.17	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.21	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.22	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	0.19	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.14	pg/g	SW846 8290
OCDF	ND	0.34	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	80	(40 - 135)
13C-1,2,3,7,8-PeCDD	73	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	82	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	85	(40 - 135)
13C-OCDD	86	(40 - 135)
13C-2,3,7,8-TCDF	69	(40 - 135)
13C-1,2,3,7,8-PeCDF	71	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	85	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	87	(40 - 135)

QC DATA ASSOCIATION SUMMARY

G2C250134

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	BIOLOGIC	SW846 8290		2084546	
	BIOLOGIC	SW846 8290		2084547	
002	BIOLOGIC	SW846 8290		2084546	
	BIOLOGIC	SW846 8290		2084547	
004	BIOLOGIC	SW846 8290		2084546	
	BIOLOGIC	SW846 8290		2084547	
005	BIOLOGIC	SW846 8290		2084546	
	BIOLOGIC	SW846 8290		2084547	
007	BIOLOGIC	SW846 8290		2084546	
	BIOLOGIC	SW846 8290		2084547	
008	BIOLOGIC	SW846 8290		2084546	
	BIOLOGIC	SW846 8290		2084547	

METHOD BLANK REPORT

Trace Level Organic Compounds

Client Lot #...: G2C250134 Work Order #...: EWXEK1AA Matrix.....: BIOLOGIC
MB Lot-Sample #: G2C250000-546

Prep Date.....: 03/25/02
Analysis Date..: 03/26/02 Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.23	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.63	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.71	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	0.63	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.63	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	ND	0.36	pg/g	SW846 8290
OCDD	ND	0.40	pg/g	SW846 8290
2,3,7,8-TCDF	ND	0.22	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.30	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.31	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.32	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.28	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.35	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.38	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	0.23	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.25	pg/g	SW846 8290
OCDF	ND	0.71	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	78	(40 - 135)
13C-1,2,3,7,8-PeCDD	75	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	82	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	78	(40 - 135)
13C-OCDD	77	(40 - 135)
13C-2,3,7,8-TCDF	76	(40 - 135)
13C-1,2,3,7,8-PeCDF	73	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	74	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	78	(40 - 135)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

Trace Level Organic Compounds

Client Lot #...: G2C250134 Work Order #...: EWXEK1AC Matrix.....: BIOLOGIC
LCS Lot-Sample#: G2C250000-546
Prep Date.....: 03/25/02 Analysis Date..: 03/26/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD
2,3,7,8-TCDD	**20.0**	**19.6**	pg/g	**98**	SW846 829(
1,2,3,7,8-PeCDD	**100**	**95.8**	pg/g	**96**	SW846 829(
1,2,3,4,7,8-HxCDD	**100**	**88.7**	pg/g	**89**	SW846 829(
1,2,3,6,7,8-HxCDD	**100**	**89.2**	pg/g	**89**	SW846 829(
1,2,3,7,8,9-HxCDD	**100**	**92.8**	pg/g	**93**	SW846 829(
1,2,3,4,6,7,8-HpCDD	**100**	**97.0**	pg/g	**97**	SW846 829(
OCDD	**200**	**193**	pg/g	**96**	SW846 829(
2,3,7,8-TCDF	**20.0**	**19.2**	pg/g	**96**	SW846 829(
1,2,3,7,8-PeCDF	**100**	**95.2**	pg/g	**95**	SW846 829(
2,3,4,7,8-PeCDF	**100**	**97.4**	pg/g	**97**	SW846 829(
1,2,3,4,7,8-HxCDF	**100**	**90.8**	pg/g	**91**	SW846 829(
1,2,3,6,7,8-HxCDF	**100**	**93.0**	pg/g	**93**	SW846 829(
2,3,4,6,7,8-HxCDF	**100**	**108**	pg/g	**108**	SW846 829(
1,2,3,7,8,9-HxCDF	**100**	**92.9**	pg/g	**93**	SW846 829(
1,2,3,4,6,7,8-HpCDF	**100**	**95.4**	pg/g	**95**	SW846 829(
1,2,3,4,7,8,9-HpCDF	**100**	**91.6**	pg/g	**92**	SW846 829(
OCDF	**200**	**176**	pg/g	**88**	SW846 829(

INTERNAL STANDARD	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	83	(40 - 135)
13C-1,2,3,7,8-PeCDD	93	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	88	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	77	(40 - 135)
13C-OCDD	78	(40 - 135)
13C-2,3,7,8-TCDF	72	(40 - 135)
13C-1,2,3,7,8-PeCDF	83	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	82	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	80	(40 - 135)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

Trace Level Organic Compounds

Client Lot #...: G2C250134 Work Order #...: EWXEK1AC Matrix.....: BIOLOGIC
LCS Lot-Sample#: G2C250000-546
Prep Date.....: 03/25/02 Analysis Date..: 03/26/02
Prep Batch #...: 2084546
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
2,3,7,8-TCDD	**98**	**(50 - 150)**	**SW846 8290**
1,2,3,7,8-PeCDD	**96**	**(50 - 150)**	**SW846 8290**
1,2,3,4,7,8-HxCDD	**89**	**(50 - 150)**	**SW846 8290**
1,2,3,6,7,8-HxCDD	**89**	**(50 - 150)**	**SW846 8290**
1,2,3,7,8,9-HxCDD	**93**	**(50 - 150)**	**SW846 8290**
1,2,3,4,6,7,8-HpCDD	**97**	**(50 - 150)**	**SW846 8290**
OCDD	**96**	**(50 - 150)**	**SW846 8290**
2,3,7,8-TCDF	**96**	**(50 - 150)**	**SW846 8290**
1,2,3,7,8-PeCDF	**95**	**(50 - 150)**	**SW846 8290**
2,3,4,7,8-PeCDF	**97**	**(50 - 150)**	**SW846 8290**
1,2,3,4,7,8-HxCDF	**91**	**(50 - 150)**	**SW846 8290**
1,2,3,6,7,8-HxCDF	**93**	**(50 - 150)**	**SW846 8290**
2,3,4,6,7,8-HxCDF	**108**	**(50 - 150)**	**SW846 8290**
1,2,3,7,8,9-HxCDF	**93**	**(50 - 150)**	**SW846 8290**
1,2,3,4,6,7,8-HpCDF	**95**	**(50 - 150)**	**SW846 8290**
1,2,3,4,7,8,9-HpCDF	**92**	**(50 - 150)**	**SW846 8290**
OCDF	**88**	**(50 - 150)**	**SW846 8290**

INTERNAL STANDARD	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	83	(40 - 135)
13C-1,2,3,7,8-PeCDD	93	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	88	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	77	(40 - 135)
13C-OCDD	78	(40 - 135)
13C-2,3,7,8-TCDF	72	(40 - 135)
13C-1,2,3,7,8-PeCDF	83	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	82	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	80	(40 - 135)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

SEVERN TRENT SERVICES

STL Sacramento
880 Riverside Parkway
West Sacramento, CA 95605-1500

Tel: 916 373 5600
Fax: 916 371 8420
www.stl-inc.com

March 28, 2002

STL SACRAMENTO PROJECT NUMBER: **G2C250135**
PO/CONTRACT:

Frederic Evenson
Ecological Rights Foundation
c/o Law Office of Sharon Duggan
2070 Allston Way, Suite 300
Berkeley, CA 94704

Dear Mr. Evenson,

This report contains the analytical results for the samples received under chain of custody by STL Sacramento on March 25, 2002. These samples are associated with your ERFSP-032402 project.

The test results in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (916) 374-4384.

Sincerely,

Karen M. Dahl
Project Manager

TABLE OF CONTENTS

STL SACRAMENTO PROJECT NUMBER G2C250135

CASE NARRATIVE

STL SACRAMENTO PROJECT NUMBER G2C250135

SOLID, 8290, Dioxins/Furans, HRGC/HRMS

The concentration of OCDD in sample 2S011800032402 exceeded the upper calibration level but it did not saturate the detector. The result has been flagged with an 'E' qualifier. This method of quantitation is generally linear above the upper calibration level as long as the detector has not been saturated. Historical data indicates that for this method of quantitation, reanalysis of the sample at a dilution will not produce significantly different results from those reported with the 'E' qualifier. No further corrective action was performed.

There were no other anomalies associated with this project.

STL Sacramento

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: STL Sacramento Laboratory Quality Manual

STL Sacramento Certifications:
Alaska (UST-055), Arizona (#AZ00616), Arkansas, California (NELAP # 01119CA) (ELAP #I-2439), Connecticut (#PH-0691), Florida (E87570), Hawaii, Louisiana (AI # 30612), New Jersey (Lab ID 44005), Nevada (#CA 044), New York (LAB ID 11666 serial # 107407), Oregon (LAB ID CA 044), South Carolina (LAB ID 87014, Cert. # 870140), Utah (E-168), Virginia (#00178), Washington (# C087), West Virginia (# 9930C), Wisconsin (Lab 998204680), USNAVY, USACE, USDA Foreign Plant (Permit # 37-82605), USDA Foreign Soil (Permit # S-46613)..

Sample Summary
G2C250135

WO#	Sample #	Client Sample ID	Sampling Date	Received Date
EWWPQ	1	S021850032402	3/24/02 06:50 PM	3/25/02 08:35 AM
EWWPR	2	S031445032402	3/24/02 02:45 PM	3/25/02 08:35 AM
EWWPR	2	S031445032402 DUP	3/24/02 02:45 PM	3/25/02 08:35 AM
EWWPT	3	2S011800032402	3/24/02 06:00 PM	3/25/02 08:35 AM
EWWPV	4	4S011735032402	3/24/02 05:35 PM	3/25/02 08:35 AM

Notes(s):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity, pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weigh

G2C250135

Chain of Custody Record

SEVERN TRENT SERVICES — Severn Trent Laboratories, Inc

TL-4124 (1200)

Client: ERF / Law Office Sharon Duggan	Project Manager: Fred Everson	Date: 3-24-02	Chain of Custody Number: 101730
Address: 2070 Allston Way Suite 300	Telephone Number (Area Code)/Fax Number: (510) 647-1900 / 647-1905	Lab Number:	Page ____ of ____
City: Berkeley	State: CA	Zip Code: 94704	Site Contact:	Lab Contact:
Project Name and Location (State): ERFSP-032402 California	Carrier/Waybill Number: Mary Elizabeth		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH	# containers	Analysis: TOC	% moisture	Fullerton	Special Instructions/ Conditions of Receipt
S02185O032402	032402	18:50			X		X						2	X	X	X	SAMPLES WERE
S03 1445 032402	032402	1445			X		X						2	X	X	X	RECD AT 3°C
2S01180O032402	032402	1800			X		X						2	X	X	X	GC 3-25-02
4S01173SO32402	032402	1735			X		X						1	X	X	X	
					X												

RECEIVED IN GOOD CONDITION UNDER COC
MAR 25 2002
INI: GC

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For 3 Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other 72 Hrs.

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: MG Ceath	3.25.02	8:35	1. Received By:	3-25-02	0835
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

STL Sacramento 916-373-5600

LOT RECEIPT CHECKLIST

STL Sacramento

CLIENT EDF PM KD LOG # 14716

LOT# (QUANTIMS ID) G2C250135 QUOTE# 46874 LOCATION WHA

		Initials	Date
DATE RECEIVED	3-25-02 TIME RECEIVED 0835	EK	3-25-02

DELIVERED BY
- ☐ FEDEX ☐ CA OVERNIGHT ☒ CLIENT
- ☐ AIRBORNE ☐ GOLDENSTATE ☐ DHL
- ☐ UPS ☐ BAX GLOBAL ☐ GO-GETTERS
- ☐ STL COURIER ☐ B & B ☐ OTHER

CUSTODY SEAL STATUS ☒ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S)

SHIPPPING CONTAINER(S) ☒ STL ☐ CLIENT ☐ N/A

TEMPERTURE RECORD (IN °C) IR 1☐ 2☒ ☐ OTHER

COC #(S) 101736

TEMPERATURE BLANK

AMBIENT TEMPERATURE 3°

COLLECTOR'S NAME: ☐ Verified from COC ☒ Not on COC

pH MEASURED ☐ YES ☐ ANOMALY ☒ N/A

LABELED BY.....

LABELS CHECKED BY.....

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING

WETCHEM ☒ N/A

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☒ N/A

☒ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A

☐ Clouseau ☐ TEMPERATURE EXCEEDED (2 °-6 °C) ☒ N/A

☐ WET ICE ☐ BLUE ICE ☐ GEL PACK

☐ PM NOTIFIED ☐ NO COOLING AGENTS USED

Notes:

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES. QA185 8/00 NEK

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	2
VOA *																				
VOAh *																				
____AGB																				
AGBs																				
250AGB																				
250AGBs																				
250AGBn																				
250AGBna																				
____AGJ																				
500AGJ																				
250AGJ																				
125AGJ																				
____CGJ																				
500CGJ																				
250CGJ	2	2	2	1																
125CGJ																				
____PB/PJ																				
____PBn/PJn																				
500PB/PJ																				
500PBn/PJn																				
500PBna																				
500PBzn/na																				
250PB																				
250PBn																				
250PBna																				
250PBzn/na																				
____*CT																				
Encore																				
Folder/Filter																				
PUF																				
Petri/Filter																				
XAD Trap																				
Ziploc																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	2

h = hydrochloric acid s = sulfuric acid na = sodium hydroxide n = nitric acid zn = zinc acetate

* Number of VOA's with air bubbles present / total number of VOA's

SOLID, 8290, Dioxins/Furans, HRGC/HRMS

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: S021850032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250135-001 Work Order #...: EWWPQ1AC Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.40	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	1.3	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	1.5	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	6.7		pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	4.3 J		pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	84		pg/g	SW846 8290
OCDD	560		pg/g	SW846 8290
2,3,7,8-TCDF	0.65 CON,J		pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.73	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.76	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	1.7	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.68	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.85	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.92	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	15		pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.77	pg/g	SW846 8290
OCDF	18		pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	58	(40 - 135)
13C-1,2,3,7,8-PeCDD	52	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	52	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	50	(40 - 135)
13C-OCDD	53	(40 - 135)
13C-2,3,7,8-TCDF	53	(40 - 135)
13C-1,2,3,7,8-PeCDF	53	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	51	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	52	(40 - 135)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than the reporting limit.

CON Confirmation analysis.

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: S031445032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250135-002 Work Order #...: EWWPR1AC Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.29	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.87	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.96	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	0.87	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.85	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	ND	3.7	pg/g	SW846 8290
OCDD	25		pg/g	SW846 8290
2,3,7,8-TCDF	ND	0.28	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.39	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.41	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.55	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.50	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.63	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.66	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	0.29	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.31	pg/g	SW846 8290
OCDF	ND	0.66	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	85	(40 - 135)
13C-1,2,3,7,8-PeCDD	75	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	79	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	74	(40 - 135)
13C-OCDD	75	(40 - 135)
13C-2,3,7,8-TCDF	78	(40 - 135)
13C-1,2,3,7,8-PeCDF	76	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	81	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	79	(40 - 135)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 2S011800032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250135-003 Work Order #...: EWWPT1AC Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	3.3		pg/g	SW846 8290
1,2,3,7,8-PeCDD	20		pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	32		pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	240		pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	100		pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	2500		pg/g	SW846 8290
OCDD	14000 E		pg/g	SW846 8290
2,3,7,8-TCDF	5.5 CON		pg/g	SW846 8290
1,2,3,7,8-PeCDF	6.4 J		pg/g	SW846 8290
2,3,4,7,8-PeCDF	7.8 J		pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	16		pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	15		pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	16		pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	1.7	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	340		pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	16		pg/g	SW846 8290
OCDF	430		pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	83	(40 - 135)
13C-1,2,3,7,8-PeCDD	90	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	75	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	91	(40 - 135)
13C-OCDD	93	(40 - 135)
13C-2,3,7,8-TCDF	83	(40 - 135)
13C-1,2,3,7,8-PeCDF	84	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	75	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	80	(40 - 135)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

E Estimated result. Result concentration exceeds the calibration range.

CON Confirmation analysis.

J Estimated result. Result is less than the reporting limit.

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 4S011735032402

Trace Level Organic Compounds

Lot-Sample #...: G2C250135-004 Work Order #...: EWWPV1AC Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.70	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	5.2	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	6.5 J		pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	71		pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	28		pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	680		pg/g	SW846 8290
OCDD	3300		pg/g	SW846 8290
2,3,7,8-TCDF	2.8 CON		pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	2.1	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	3.2	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	5.7	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	5.0	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	5.3	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	1.9	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	96		pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	4.3	pg/g	SW846 8290
OCDF	110		pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	82	(40 - 135)
13C-1,2,3,7,8-PeCDD	86	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	72	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	91	(40 - 135)
13C-OCDD	93	(40 - 135)
13C-2,3,7,8-TCDF	76	(40 - 135)
13C-1,2,3,7,8-PeCDF	84	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	72	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	83	(40 - 135)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than the reporting limit.

CON Confirmation analysis.

QC DATA ASSOCIATION SUMMARY

G2C250135

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	SOLID	SW846 8290		2084515	
002	SOLID	SW846 8290		2084515	
003	SOLID	SW846 8290		2084515	
004	SOLID	SW846 8290		2084515	

METHOD BLANK REPORT

Trace Level Organic Compounds

Client Lot #...: G2C250135 Work Order #...: EWXAJ1AA Matrix.....: SOLID
MB Lot-Sample #: G2C250000-515

Prep Date.....: 03/25/02
Analysis Date..: 03/27/02 Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	RESULT	DETECTION LIMIT	UNITS	METHOD
2,3,7,8-TCDD	ND	0.14	pg/g	SW846 8290
1,2,3,7,8-PeCDD	ND	0.37	pg/g	SW846 8290
1,2,3,4,7,8-HxCDD	ND	0.47	pg/g	SW846 8290
1,2,3,6,7,8-HxCDD	ND	0.42	pg/g	SW846 8290
1,2,3,7,8,9-HxCDD	ND	0.42	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDD	ND	0.21	pg/g	SW846 8290
OCDD	ND	0.42	pg/g	SW846 8290
2,3,7,8-TCDF	ND	0.14	pg/g	SW846 8290
1,2,3,7,8-PeCDF	ND	0.17	pg/g	SW846 8290
2,3,4,7,8-PeCDF	ND	0.17	pg/g	SW846 8290
1,2,3,4,7,8-HxCDF	ND	0.20	pg/g	SW846 8290
1,2,3,6,7,8-HxCDF	ND	0.18	pg/g	SW846 8290
2,3,4,6,7,8-HxCDF	ND	0.22	pg/g	SW846 8290
1,2,3,7,8,9-HxCDF	ND	0.24	pg/g	SW846 8290
1,2,3,4,6,7,8-HpCDF	ND	0.12	pg/g	SW846 8290
1,2,3,4,7,8,9-HpCDF	ND	0.13	pg/g	SW846 8290
OCDF	ND	0.34	pg/g	SW846 8290

INTERNAL STANDARDS	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	82	(40 - 135)
13C-1,2,3,7,8-PeCDD	82	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	83	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	86	(40 - 135)
13C-OCDD	89	(40 - 135)
13C-2,3,7,8-TCDF	77	(40 - 135)
13C-1,2,3,7,8-PeCDF	77	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	86	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	88	(40 - 135)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

Trace Level Organic Compounds

Client Lot #...: G2C250135 Work Order #...: EWXAJ1AC Matrix.....: SOLID
LCS Lot-Sample#: G2C250000-515
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD
2,3,7,8-TCDD	20.0	21.1	pg/g	106	SW846 8290
1,2,3,7,8-PeCDD	100	101	pg/g	101	SW846 8290
1,2,3,4,7,8-HxCDD	100	105	pg/g	105	SW846 8290
1,2,3,6,7,8-HxCDD	100	97.2	pg/g	97	SW846 8290
1,2,3,7,8,9-HxCDD	100	103	pg/g	103	SW846 8290
1,2,3,4,6,7,8-HpCDD	100	99.9	pg/g	100	SW846 8290
OCDD	200	202	pg/g	101	SW846 8290
2,3,7,8-TCDF	20.0	19.8	pg/g	99	SW846 8290
1,2,3,7,8-PeCDF	100	102	pg/g	102	SW846 8290
2,3,4,7,8-PeCDF	100	111	pg/g	111	SW846 8290
1,2,3,4,7,8-HxCDF	100	97.1	pg/g	97	SW846 8290
1,2,3,6,7,8-HxCDF	100	98.7	pg/g	99	SW846 8290
2,3,4,6,7,8-HxCDF	100	111	pg/g	111	SW846 8290
1,2,3,7,8,9-HxCDF	100	94.7	pg/g	95	SW846 8290
1,2,3,4,6,7,8-HpCDF	100	101	pg/g	101	SW846 8290
1,2,3,4,7,8,9-HpCDF	100	97.5	pg/g	98	SW846 8290
OCDF	200	183	pg/g	91	SW846 8290

INTERNAL STANDARD	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	87	(40 - 135)
13C-1,2,3,7,8-PeCDD	85	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	87	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	89	(40 - 135)
13C-OCDD	93	(40 - 135)
13C-2,3,7,8-TCDF	80	(40 - 135)
13C-1,2,3,7,8-PeCDF	80	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	91	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	89	(40 - 135)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

Trace Level Organic Compounds

Client Lot #...: G2C250135 Work Order #...: EWXAJ1AC Matrix.....: SOLID
LCS Lot-Sample#: G2C250000-515
Prep Date.....: 03/25/02 Analysis Date..: 03/27/02
Prep Batch #...: 2084515
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
2,3,7,8-TCDD	**106**	**(60 - 141)**	**SW846 8290**
1,2,3,7,8-PeCDD	**101**	**(65 - 140)**	**SW846 8290**
1,2,3,4,7,8-HxCDD	**105**	**(52 - 152)**	**SW846 8290**
1,2,3,6,7,8-HxCDD	**97**	**(62 - 138)**	**SW846 8290**
1,2,3,7,8,9-HxCDD	**103**	**(58 - 147)**	**SW846 8290**
1,2,3,4,6,7,8-HpCDD	**100**	**(65 - 137)**	**SW846 8290**
OCDD	**101**	**(64 - 143)**	**SW846 8290**
2,3,7,8-TCDF	**99**	**(59 - 140)**	**SW846 8290**
1,2,3,7,8-PeCDF	**102**	**(64 - 140)**	**SW846 8290**
2,3,4,7,8-PeCDF	**111**	**(61 - 141)**	**SW846 8290**
1,2,3,4,7,8-HxCDF	**97**	**(66 - 137)**	**SW846 8290**
1,2,3,6,7,8-HxCDF	**99**	**(60 - 138)**	**SW846 8290**
2,3,4,6,7,8-HxCDF	**111**	**(65 - 148)**	**SW846 8290**
1,2,3,7,8,9-HxCDF	**95**	**(59 - 146)**	**SW846 8290**
1,2,3,4,6,7,8-HpCDF	**101**	**(64 - 138)**	**SW846 8290**
1,2,3,4,7,8,9-HpCDF	**98**	**(58 - 145)**	**SW846 8290**
OCDF	**91**	**(58 - 145)**	**SW846 8290**

INTERNAL STANDARD	PERCENT RECOVERY	RECOVERY LIMITS
13C-2,3,7,8-TCDD	87	(40 - 135)
13C-1,2,3,7,8-PeCDD	85	(40 - 135)
13C-1,2,3,6,7,8-HxCDD	87	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDD	89	(40 - 135)
13C-OCDD	93	(40 - 135)
13C-2,3,7,8-TCDF	80	(40 - 135)
13C-1,2,3,7,8-PeCDF	80	(40 - 135)
13C-1,2,3,4,7,8-HxCDF	91	(40 - 135)
13C-1,2,3,4,6,7,8-HpCDF	89	(40 - 135)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

General Chemistry - Various Methods

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: S021850032402

General Chemistry

Lot-Sample #...: G2C250135-001 Work Order #...: EWWPQ Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH
Percent Moisture	18.1	0.10	%	ASTM D 2216-90	03/26-03/27/02	2 08455
	Dilution Factor: 1					
Total Organic Carbon	9110	100	mg/kg	SW846 9060	03/26-03/27/02	2 08542
	Dilution Factor: 1					

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: S031445032402

General Chemistry

Lot-Sample #...: G2C250135-002 Work Order #...: EWWPR Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH
Percent Moisture	45.7	0.10	%	ASTM D 2216-90	03/26-03/27/02	208456
		Dilution Factor: 1				
Total Organic Carbon	10100	100	mg/kg	SW846 9060	03/26-03/27/02	208542
		Dilution Factor: 1				

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 2S011800032402

General Chemistry

Lot-Sample #...: G2C250135-003 Work Order #...: EWWPT Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH
Percent Moisture	52.1	0.10	%	ASTM D 2216-90	03/26-03/27/02	208456
	Dilution Factor: 1					
Total Organic Carbon	62700	100	mg/kg	SW846 9060	03/26-03/27/02	208542
	Dilution Factor: 1					

ECOLOGICAL RIGHTS FOUNDATION

Client Sample ID: 4S011735032402

General Chemistry

Lot-Sample #...: G2C250135-004 Work Order #...: EWWPV Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH
Percent Moisture	61.3	0.10	%	ASTM D 2216-90	03/26-03/27/02	208456
	Dilution Factor: 1					
Total Organic Carbon	113000	100	mg/kg	SW846 9060	03/26-03/27/02	208542
	Dilution Factor: 1					

QC DATA ASSOCIATION SUMMARY

G2C250135

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	SOLID	SW846 9060		2085428	2086285
	SOLID	SW846 8290		2084515	
	SOLID	ASTM D 2216-90		2084559	2084331
002	SOLID	SW846 9060		2085428	2086285
	SOLID	SW846 8290		2084515	
	SOLID	ASTM D 2216-90		2084560	2084332
003	SOLID	SW846 9060		2085428	2086285
	SOLID	SW846 8290		2084515	
	SOLID	ASTM D 2216-90		2084560	2084332
004	SOLID	SW846 9060		2085428	2086285
	SOLID	SW846 8290		2084515	
	SOLID	ASTM D 2216-90		2084560	2084332

METHOD BLANK REPORT

General Chemistry

Client Lot #...: G2C250135 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH
Total Organic Carbon		Work Order #: EW3DQ1AA		MB Lot-Sample #:	G2C260000-428	
	ND	100	mg/kg	SW846 9060	03/26-03/27/02	20854

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Client Lot #...: G2C250135 **Matrix.....:** SOLID

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Organic Carbon		Work Order #: EW3DQ1AC		LCS Lot-Sample#: G2C260000-428			
	12700	14800	mg/kg	117	SW846 9060	03/26-03/27/02	2085428

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: G2C250135 **Matrix.....:** SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Organic Carbon		Work Order #: EW3DQ1AC	LCS Lot-Sample#: G2C260000-428		
	117	(75 - 125)	SW846 9060	03/26-03/27/02	2085428

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: G2C250135 Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATC
Total Organic Carbon			WO#: EWWPQ1AE-MS/EWWPQ1AF-MSD				MS Lot-Sample #: G2C250135-001		
	9110	14000	23300	mg/kg	101		SW846 9060	03/26-03/27/02	2085
	9110	14000	20300	mg/kg	80	14	SW846 9060	03/26-03/27/02	2085

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: G2C250135 Matrix.....: SOLID
Date Sampled...: 03/24/02 Date Received..: 03/25/02

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Organic Carbon		WO#: EWWPQ1AE-MS/EWWPQ1AF-MSD				MS Lot-Sample #: G2C250135-001	
	101	(75 - 125)			SW846 9060	03/26-03/27/02	2085428
	80	(75 - 125)	14	(0-25)	SW846 9060	03/26-03/27/02	2085428

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

EXHIBIT D

Summary and Biography of Dioxin Toxicity

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April 15, 2002

Summary of Toxicological Effects:

Dioxins interfere with the production and activity of enzymes, hormones, other growth factors, thereby adversely affecting reproduction, growth, and development through a variety of mechanisms. They are also capable of producing cancer in exposed animals, including but not limited to thyroid cancer and lymphopoietic neoplasms, and are known to the State of California to cause cancer more generally.

General Discussion:

Dioxins, among the better known and studied endocrine disruptors, are a family of related compounds differing in the number and position of chlorine atoms on the basic underlying structure. The toxicity of each member of the family varies considerably and is usually described relative to the most toxic. Together, they demonstrate several different mechanisms of hormone-disrupting action and have diverse biological effects.

Dioxins result from heating mixtures of chlorine and organic compounds in industrial processes, such as the bleaching of paper pulp, production of some pesticides or preservatives, especially pentachlorophenol, or during incineration of chlorine-containing materials. Because many consumer products contain chlorinated organic compounds (e.g. polyvinyl chloride), municipal, medical, and hazardous waste incinerators are leading dioxin sources. It is not easily broken down in the environment, accumulating in soils and sediments and biomagnifying as it passes up the food chain. Dioxins bioaccumulate in fat tissue with as estimated half-life in humans of approximately seven years.

There may be significant regional variations depending on local industrial activity, but dioxin is widely spread around the globe. Beef, pork, fish, shellfish, and animal and human milk are the major sources of human exposure to dioxins. Because breast milk has a high fat content, nursing infants are actually exposed to higher daily amounts of dietary dioxin than most adults and may receive more than 10 percent of their anticipated lifetime exposure during this particularly vulnerable period of mental and physical development.[1] Although there is some variation with geographical location and diet, many people have dioxin levels at or near those known to cause harmful effects in animal studies.[2]

In animal studies, dioxin has a wide range of health effects, which differ among the fetus, newborn, and adult. Some are apparent only with large doses, but cancer, immune system toxicity, and reproductive and developmental effects occur at low levels

of exposure. Dioxin causes the liver to produce metabolic enzymes at exposures of 1-10 picograms per kilogram daily, a level similar to average daily adult human exposures. (A picogram is one-trillionth of a gram.) These enzymes alter the metabolism of hormones and other endogenous or exogenous chemicals. Enzyme induction occurs at levels that also cause immune system toxicity in mice and reproductive effects in rats.[3]

In rats, thyroid tumors occur at doses as low as 1,400 pg/kg/day.[4] There is considerable variability in the toxicity of dioxin among adults of different animal species but much less among fetuses and infants, particularly with respect to the sensitivity of offspring to developmental effects. For example, adult hamsters are several thousand times more resistant to dioxin toxicity than adult guinea pigs.[5] But the hamster fetus is only ten times more resistant to dioxin that the guinea pig fetus. Similarly, early life stages of fish and birds are more sensitive to dioxin toxicity than adults.[6,7]

From these data, one might suspect that dioxin toxicity in human fetuses would be similar to that in fetuses of other species, even if human adults were relatively resistant. Sufficient exposure to dioxin during pregnancy causes prenatal mortality in the monkey, guinea pig, rabbit, rat, hamster, and mouse. The response is dose related, and there is a species difference. Monkeys and guinea pigs are the most sensitive, followed by rabbits, rats, hamsters, and mice, which are the most resistant. In these species, the maternal dose necessary to cause prenatal mortality ranges from 1 to 500 µg/kg (cumulative dose). The timing of maternal exposure is just as important as the magnitude of the dose, often demonstrating a window of vulnerability. In the guinea pig, for example, prenatal death is caused by a single dose of 1.5 µg/kg on day 14 of pregnancy, whereas later in pregnancy, larger amounts are needed.[8]

Similarly, a single low maternal dose of dioxin at a critical time in pregnancy may cause permanent developmental effects in male offspring, including altered sexual differentiation of the brain.[9] On day 15 of a typical twenty-one-day pregnancy in rats, most organs are formed, but the hypothalamic-pituitary-gonadal (HPG) axis is just beginning to function. The critical period of sexual differentiation of the brain extends from late fetal life through the first week of postnatal life. A single low maternal dose of dioxin (0.16 µg/kg) on that day of pregnancy reduces male testosterone levels, delays descent of the testicles, decreases anogenital distance (making it more female-like), and reduces prostate weight and sperm production in offspring.[10] It also demasculinizes their sexual behavior in the months that follow. A single maternal dose of just 0.064 µg/kg on day 15 of pregnancy causes a 43 percent reduction in sperm production in male offspring.

Dioxin does not attach to the estrogen receptor, yet is causes both estrogenic and antiestrogenic activity in different tissues of the body. Both dioxin and PCB's attach to another intracellular receptor, called the Ah-receptor, whose function is not otherwise fully understood. (Unlike dioxins, some forms of PCBs also attach to the estrogen receptor.) The occupied Ah-receptor is transported into the nucleus of a cell, where it attaches to DNA, influencing the activity of genes, which regulate chemical production. By this mechanism, dioxin indirectly influences estrogen activity. Its antiestrogenic effects, which seem to predominate, may result from causing the cells to produce an

enzyme that metabolizes the body's normal estrogen or decreasing the number of estrogen receptors available for normally occurring estrogen.[11,12]

Epidemiological Studies: In the Ranch Hands study, reproductive histories of men who sprayed Agent Orange in Vietnam from 1962 to 1971 were examined beginning in 1978 in an attempt to see if exposure to dioxin might have had adverse effects in their children.[13]

Agent Orange is a mixture of two herbicides, almost always contaminated with dioxin. Dioxin in the blood of participants was measured years after exposure, and an attempt was made to estimate earlier levels from those results. An increase in all nervous system defects in offspring was found. However, increases in spina bifida and cleft palates were too few to allow formal statistical analysis. One finding that is difficult to explain was an increased risk for spontaneous abortion, all birth defects, and specific developmental delays in the low – but not the high – dioxin exposure group.

Another study of Vietnam veterans found that opportunity for Agent Orange exposure was associated with an increased risk of spinal cord abnormalities (spina bifida) and cleft palates in offspring.[14] The National Academy of Sciences has concluded that there is limited but suggestive evidence of a relationship between paternal Agent Orange exposure and spina bifida in offspring.

In a study of 248 chemical production workers in New Jersey and Missouri, investigators found that workers with higher dioxin levels had higher amounts of luteinizing hormone and follicle-stimulating hormone and lower amounts of testosterone than a control group from the neighborhood.[15] These results must be interpreted with caution since it was a cross-sectional study (all measurements of dioxin, testosterone, and gonadotropins were done on the same blood specimen, making it difficult to determine cause-and-effect relationships), but the results are consistent with the effects of dioxin in animal studies.

In 1977, an industrial accident in Seveso, Italy, released large amounts of dioxin, contaminating the environment and exposing local residents. From 1977 to 1984, there was a marked increase in the female-to-male birth sex ratio among those most heavily exposed.[16] Almost twice as many girls as boys were born during those years. Over the next ten years, the ratio began to return to normal. The mechanism by which dioxin may have this effect on sex determination is unclear. In this same population, there was no increase in the rate of birth defects, as determined from a birth defects registry, when compared to an unexposed population.[17] However, in this study, the number of children of mothers with the highest likelihood of exposure was too small to assess specific categories of birth defects. Other limitations include possible exposure misclassification and unrecognized spontaneous abortions that may have resulted from fetal malformations. Children of exposed women have not been examined for subtle structural of functional developmental deficits.[18]

In Times Beach, Missouri, an area contaminated with dioxin-containing oil that had been spread on roads for dust control, there was no apparent increased risk of fetal deaths or low-birth-weight babies.[19] There was, however, a two-to-three-fold increase in risk of nervous system defects and undescended testicles, though this was not statistically significant. Because of the small sample size, a six-fold increase in risk would have been necessary in order to achieve statistical significance.

Investigators in the Netherlands found that higher dioxin levels in breast milk correlate with lower thyroid hormone levels in breast-feeding infants.[20] This finding is particularly important since the correlation appears at current levels of ambient dioxin exposure. Moreover, in pre-term and low-birth-weight babies, decreased thyroid hormone in the first weeks of life is associated with increased risk of neurological disorders, including the need for special education by age nine.[21] Although the thyroid hormone levels in the Netherlands study were still in the normal range, it is possible that the observed changes will influence infant development, a subject that will require further research.

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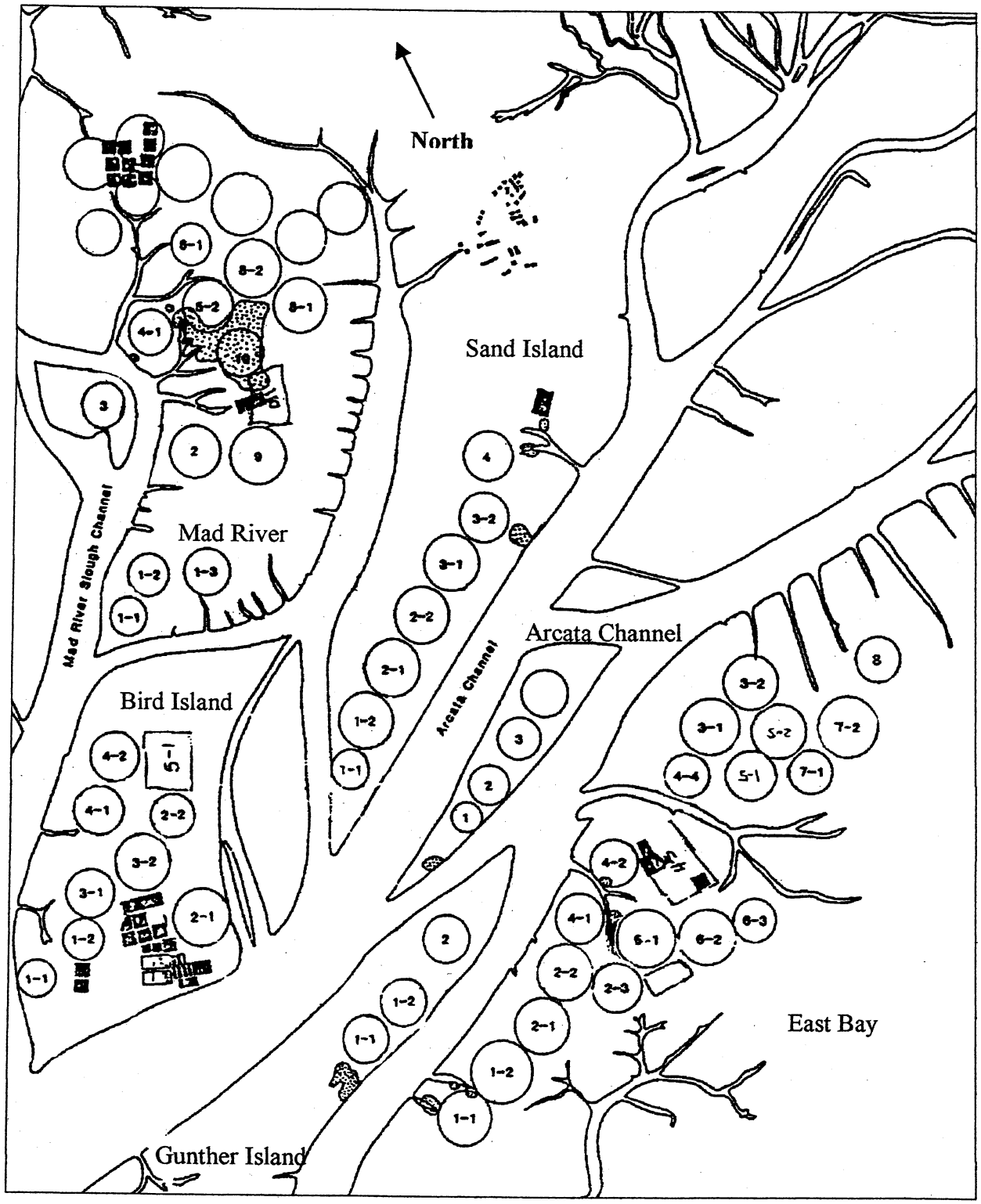
EXHIBIT E

Humboldt Bay Mariculture Location Map



Map 1. Map of all Coast Seafoods beds in Humboldt Bay.

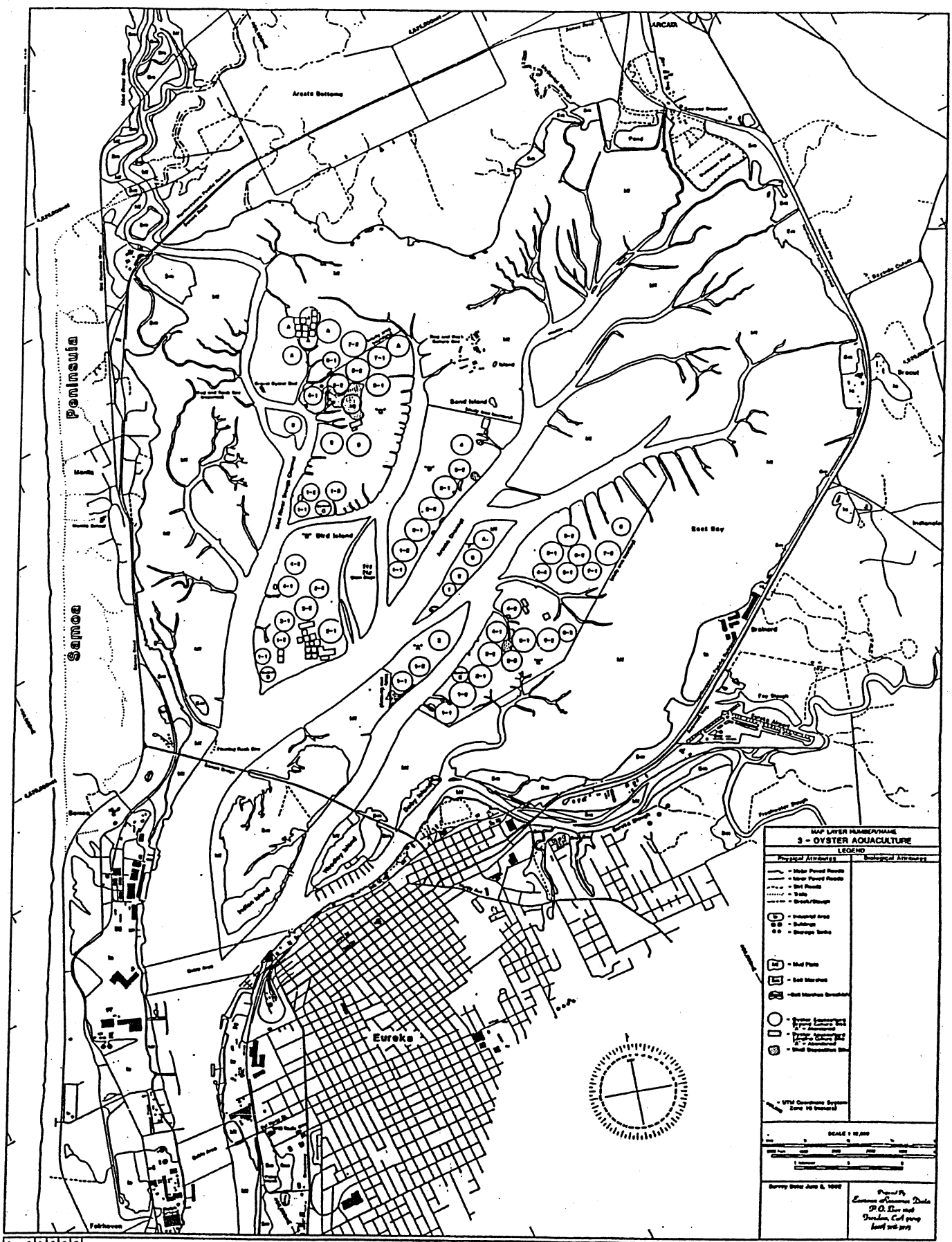


Figure 2

HUMBOLDT BAY ECOSYSTEM STUDY (MAP 1-ARCATA BAY)

Oyster Aquaculture