

Appendix A
Comment Letters



STATE OF WASHINGTON
DEPARTMENT OF HEALTH
Division of Environmental Health

Office of Environmental Health Assessments

234 Israel Road S.E. Town Center 3 PO Box 47846 Olympia, Washington 98504-7846

Tel: 360.236.3184 Toll Free: 1.877.485.7316 FAX: 360.236.2251

TDD Relay Service: 1.800.833.6388

Technical Assistance Memorandum

August 22, 2008

TO: Marian Abbett and Connie Groven
Washington Department of Ecology

FROM: Barbara Trejo
Washington Department of Health

SUBJECT: Technical Document Review
Rayonier Mill - Off-Property Soil Dioxin Study
Soil Sampling Plan – Public Review Draft
Port Angeles, Clallam County, Washington

The Washington Department of Health (DOH) has completed its review of the Washington Department of Ecology (Ecology), June 9, 2008, public review draft document titled *Rayonier Mill Off-Property, Soil Dioxin Study, Soil Sampling Plan*.¹ This is a well thought out and well written plan that will expand our understanding about the former Rayonier Mill's (Mill's) potential impact on dioxin/furan levels in the Port Angeles community.

The purpose of this soil dioxin study is twofold :

- Determine the magnitude of dioxin/furan contamination in off-property surface soils potentially affected by past air emissions from the former Mill, including the upper-bound concentrations of dioxins/furans throughout the study area
- Determine the former Mill's contribution to measured dioxin/furan levels in the Port Angeles area compared to other possible sources.

¹ Ecology provided DOH with a revised copy of the soil sampling plan on June 25, 2008, after DOH completed its review of the June 9 version. However, Ecology indicated that only a few small changes were made to the later version (e.g., changes to wording, page numbers, acronym list, and figures) (e-mail from Connie Groven, June 25, 2008). As a result, DOH's review and this technical assistance memo reflect DOH's comments on the June 9, 2008, version.

Marian Abbett and Connie Groven

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August 22, 2008

The plan indicates that the collection of a greater number of soil samples near the former Mill will increase the probability of capturing the upper range of dioxin/furan concentrations. It also indicates that characterization of the upper-bound range of concentrations is particularly important because it will provide information about the maximum impact of former Mill emissions and also will help distinguish between general urban and former Mill impacts.

The study area covers approximately 4.2 square miles in Port Angeles and was selected using multiple lines of evidence (e.g., wind data, community odor complaints, modeling results) about areas that might be affected by air emissions from the former Mill. Ecology reports that the scope for this study will produce one of the most detailed and extensive assessments of soil dioxin/furan contamination in an urban area completed to date. Because of cost constraints, not more than 100 soil samples can be collected and analyzed for this study. Although this may be a limitation, this proposed study provides the best strategy seen to date for assessing whether air emissions from the former Mill have affected soils in the Port Angeles community.

The plan indicates that the soil samples will be collected from zero to four-inches below ground surface (bgs). The rationale for that decision appears to be based on work conducted by EPA when evaluating dioxin levels in rural soils where no significant difference was observed between zero to two-inch and zero to four-inch bgs samples. DOH typically recommends a zero to three-inch bgs sample for evaluating health risks associated with exposure to contaminants in surface soil. However, these soil samples are not being used to assess health risk but rather are being used to determine whether air emissions associated with operation of the former Mill affected soils in the Port Angeles community. Given that many of the soils in Port Angeles are disturbed, a zero to four-inch bgs sample interval seems reasonable.

There are some other acknowledged limitations to the soil dioxin/furan study. This study will not allow Ecology to determine the extent of dioxin/furan contamination related to the former Mill, complete characterization of dioxin/furan levels on individual properties, interpolate results from sampled to not-sampled properties, nor define background levels. As a result, the collected data cannot be used to assess health risks. However, DOH understands that additional dioxin/furan characterization, necessary to support a health assessment, will be conducted by Rayonier, under Ecology oversight, in the future if it is determined that the former Rayonier Mill caused off- property dioxin/furan contamination.

Please feel free to contact me at (360) 236-3373 if you would like to discuss this memo.



July 30, 2008

Rebecca Lawson, Section Manager
Southwest Regional Office
WA Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

RE: Draft Rayonier Mill Off-Property Soil Dioxin Study

Ms. Lawson:

We appreciate the work that the Department is doing to address the investigation and eventual remediation, cleanup and reuse of the former Rayonier mill property in Port Angeles. This is important to the community.

The City would like to submit our comments on the *Draft Rayonier Mill Off-Property Soil Dioxin Study*. The City engaged technical experts to assist us in preparing those comments.

Please find attached a technical memorandum dated July 29, 2008 from *EXPONENT* containing the official comments of the City of Port Angeles on the draft study proposal.

Thank you again for the opportunity to provide input into this important project.

Sincerely,

Gary Braun
Mayor

Cc: Orville Campbell

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JUL 31 2008

**Comments on the Draft Rayonier Mill
Off-Property Soil Dioxin Study**Washington State
Department of Ecology

On behalf of the City of Port Angeles (the City), Exponent has reviewed the *Draft Rayonier Mill Off-Property Soil Dioxin Study Soil sampling plan* (sampling plan) and provides the following comments. The overall goal stated in the sampling plan is “to increase understanding of dioxin/furan soil contamination in areas surrounding the former Rayonier Mill, including the magnitude and likely sources of contamination of surface soils.” The City’s role in this process is to help ensure that the investigation is of benefit for the protection of health of the citizens of Port Angeles, using appropriate and scientifically accurate methods, while not unnecessarily alarming the public where health concerns are not indicated according the scientific evidence. Sampling investigations related to former sources of contamination are inherently conservative (i.e., tending to be overly inclusive in delineating and identifying contamination) to ensure the protection of public health and the environment; however, overly conservative assessments or interpretations can lead to unwarranted negative consequences for communities, including fear of hypothetical health effects and stigma. Thus, the City has requested that Exponent conduct a review of this document and associated materials (i.e., *Final Rayonier Mill Off-Property Soil Dioxin Study Conceptual Site Model Document*) to evaluate whether the goals are met using appropriate and technically accurate methods and interpretations.

In our review, we identified the following general issues:

- The title and introductory sections of the document indicate that contamination from the Rayonier Mill is the focus of this study; however, statements within the document regarding other potential sources and the broad areal extent of sampling away from the Rayonier site indicate more general interest in characterizing dioxins/furans in soil in the City of Port Angeles. The intent of this study should be more clearly and consistently stated throughout the document.

- The intended use of the results of the soil sampling investigation is unstated and is particularly unclear, given that many of the expected uses of sampling investigations associated with contaminated soil are stated to be outside the scope of the study. Without a clear description of the how the data will be used, it is difficult to evaluate whether the data collected according to the sampling plan will be usable and for what purpose. Transparency in the intended use of the results and potential consequences is also important for providing property owners with fully informed consent for access agreements.
- The sampling plan notes several issues that are outside the scope of the study including definition of background dioxin/furan levels, characterization of contamination at sampled properties to support exposure and risk assessments or cleanup actions, or interpolation of results from sampled to not-sampled properties. However, samples from properties may then simply be compared to the Washington State Department of Ecology's (Ecology's) new more stringent default risk-based values for dioxins/furans in soil (as noted in the conceptual site model document) No information on background levels will be available for evaluation. Moreover, banks could then redline whole neighborhoods based on sampled properties that exceed the stringent risk-based values.
- A study that focuses on characterizing the magnitude (i.e., finding the maximum levels) of dioxins/furans in soil over a wide areal extent will provide a biased view of potential exposure and risk in the community regardless of the disclaimer that this is not the intent of the data.
- Given the stated resource limitations, a study more focused on the area within the likely area of deposition from the Rayonier Mill would be more likely to characterize the magnitude of impact from the Mill as well as provide a statistically valid sample size for distinguishing among sources within the vicinity of the Mill.

In addition to these general comments, specific comments by report section are provided below.

Introduction and Study Objectives

The report title and introductory section imply that dioxins/furans from the Rayonier Mill are the primary motivation for this investigation. The stated goal of the study likewise appears to be focused on the Rayonier Mill as the primary source: “The goal of the Rayonier Mill Off-Property Soil Dioxin Study is to increase understanding of dioxin/furan soil contamination in areas surrounding the former Rayonier Mill, including the magnitude and likely sources of contamination of surface soils.” The two study objectives listed are to determine 1) the magnitude of dioxin/furan contamination in offsite soils that result from airborne emissions from the Rayonier Mill, and 2) the relative contribution of the Rayonier Mill emissions compared to other potential sources.

The goal stated in the Conceptual Site Model document is inconsistent with the goal in the sampling plan (p. 4, last paragraph): “This study seeks to evaluate dioxin/furan concentrations near the former Rayonier Mill, recognizing there may be impacts from other nearby sources.” No mention is made of characterizing the magnitude or upper range of soil concentrations from the Mill.

Given the initial focus and study objectives on areas near the Rayonier Mill site that have been impacted by air emissions, the large study area designated for sampling seems overly broad to accomplish these stated goals. The sampling plan acknowledges that potential variability in soil contaminant concentrations among nearby sampling locations can be quite large, especially in more developed land use areas, which is typical of the study area. Given the focus and stated objectives, sample variability, and stated resource constraints limiting sample number and study phases (page 7, fifth paragraph), the study should focus on a smaller area near and downwind of the Rayonier Mill to sample more intensively. Such a study would better achieve the study objective of characterizing the magnitude of dioxins/furans in soil resulting from air emission from the Mill and would allow a more statistically valid comparison of sample concentrations in evaluating relative sources within the area primarily impacted by Mill emissions.

On page 7, fifth paragraph, the sampling plan notes: “[i]t is notable that the scope for the study will produce one of the most detailed and extensive assessments of soil dioxin/furan contamination in an urban area completed to date within Washington state.” The sampling plan does not justify why such an achievement would be of benefit to the people of the City of Port Angeles or Washington State. On the contrary, this statement and the large sampling area including properties far from the Rayonier Mill seem to imply that the community is being singled out for characterization of the upper range of dioxin/furan contamination. No rationale is provided for studying the urban sources in this community over other communities in the state with a long history of settlement, residential wood burning, use of burn barrels, and other common urban sources such as boilers, crematoriums, hospitals, etc. Because the study seeks to characterize the upper-range of soil dioxin/furan concentrations and similar data will not be available from other comparable communities, Port Angeles will appear to be a very contaminated area, if not the most contaminated in the state.

On page 9, first full paragraph under Source Identification, the sampling plan states: “[i]t will be important for Ecology to support its determination of potentially liable persons under MTCA (WAC 173-340-500), if any, based on credible evidence of the comparative contributions of different sources to the measured dioxins/furans in surface soil.” No further explanation is provided. Ecology’s intent of the sampling is thus unclear. This statement could be interpreted as directed at the Rayonier Mill, although the word “persons” almost implies that homeowners and other smaller parties may be targeted in a search for liable parties, which is consistent with the broad area extent of the sampling away from the Mill. Eighty-five percent of samples are to be collected from residential properties (85 of 100 samples are on residential properties, according to information provided at the Ecology Technical Workshop on July 19, 2008). Sampling limitations resulting from resource constraints would also limit Ecology’s ability to collect statistically valid “credible evidence” of contributions

Page 9, beginning with the third full paragraph, notes that chemical profiles or chemical “fingerprinting” of congeners will be evaluated and that multivariate statistical techniques will be used to provide source allocation estimates. As noted by the sampling plan, however, weathering will complicate this evaluation by tending to make the fingerprint of dioxin/furan

congeners from different sources more similar. Combined with a low sample frequency over the large area and small numbers for different sources (e.g., only two samples by the highway), it will likely be difficult statistically to distinguish sources.

On page 10, several issues are stated to be outside the scope of the study. However, these stated issues are those that sampling investigations for contaminated soil are typically intended to address, including delineation of contamination from emission from the Mill site, characterization of contamination on properties to support exposure and risk assessment or cleanup actions, definition of background levels, and interpolation of results from sampled to not-sampled properties. Consequently, the purpose and benefit of this sampling investigation is unclear. Whether stated by the sampling plan or not, the results could be used for red-lining properties and neighborhoods for denying mortgages or transactions, or for site listing of additional liable parties.

The conceptual site model (p. 4, last line) also notes that statistical and geospatial evaluations of the data will be used as lines of evidence to identify sources and contribution allocations. These evaluations, likely involving contouring of soil concentrations of dioxins/furans over sampled and not-sampled properties, are inconsistent with the statement in the sampling plan that results will not be interpolated from sampled to not-sampled properties.

Undisturbed areas are stated to be the ideal soil sampling locations for the study (p. 11) and “samples will not be collected from locations considered ideal for risk assessment, areas where people are most likely to contact soil.” These statements are misleading because they imply that samples will not be collected from residential yards or that the study results will not be from soil that residents might contact; however, most of the samples will be collected from residential yards. The sampling procedures later note that samples will be collected in yards under the existing turf; however, soil sample results under turf are often assumed to represent potential exposure in a yard. Ecology would not consider contamination covered by a few inches of turf to be acceptable for a residential cleanup.

Definition of Study Area

The TRC odor study (p. 16) results appear to be used to justify the large area selected for sampling. Nevertheless, odorous compounds from the Mill are gases that may be expected to behave differently in the environment than particulates; other sources of odors exist in the area as well (e.g., tidal areas). Airborne transport of gases from the Mill likely differs from that of dioxin/furan compounds bound to particulates (the conceptual site model notes that most dioxins/furans adsorb to particles because of their low vapor pressure, p. 15). Sources and emission characteristics may also differ for odorous gases from the Mill versus the dioxin/furan compounds adsorbed to particulates. These characteristics would affect the dispersion of gases versus likely areas of highest deposition of particulates from the Mill and should be considered in the sampling plan. The odor study data thus should not be considered representative of locations of upper ranges of dioxin/furan deposition from the Mill.

Page 18, second paragraph, acknowledges that the proposed study area is quite large compared to the limited areas of higher deposition according to air modeling, and that impacts associated with the Mill may be limited to a small portion of the study area. The rest of the paragraph attempts to justify the large area of the study as “an opportunity for compiling ‘confirming negative evidence’ without pre-judging the spatial scale of impacts.” This rationale seems inconsistent with the study focus and the resource constraints noted earlier. Because the intent of the study is not to delineate the extent of contamination from the Mill, sampling a more limited distance from the expected area of high impact from the Mill should be sufficient to confirm this expectation and accomplish the goal of characterizing the upper range of soil concentrations from the Mill.

Selection of Sampling Locations

Although undisturbed areas (such as mature forested areas) are repeatedly stated to be preferred sampling locations (e.g., p. 11, p. 19, p. 21) to provide the best estimates of upper range soil concentrations, relatively few of the actual planned samples are from forested areas. Repeated

mention of preferred sampling areas as undisturbed areas such as mature forests is misleading, given that 85 percent of sampling locations are on residential properties.

Page 23, third full paragraph, notes that “sample allocations for more distant zones are anticipated to be sufficient to reveal other potential sources for soil dioxins/furans and for initial evaluation of spatial gradients in concentrations at the scale of the study area.” Justification is needed for this statement. Statistical confidence would require information on variability in sample concentrations throughout the large study area. Such information does not appear to be available given the data reviewed by the sampling plan.

Sample Analysis

Page 31, last paragraph, states that samples submitted to the laboratory are to be archived for at least one year in case tracer chemicals of emissions from the Mill are later identified. Archiving samples for this length of time will be in violation of holding time requirements and could result in chemical alteration of the samples.

Implementation of Soil sampling plan

Full disclosure should be provided to prospective property owners regarding the purpose of the study, how the data will be used, whether their identity and their results will be disclosed to other parties, and potential implications for their property

Data Reporting

The sampling plan does not mention whether the results will be provided to property owners or residents. If information is provided to owners or residents, Ecology should consider that people will have questions about what their sample results mean and may potentially be concerned about health risks, particularly if default MICA risk-based screening levels are used as a comparison, as noted in the Conceptual Site Model report.

Table 1-2 presents a summary of dioxin/furan data collected in Port Angeles. The names of residential property owners are listed in this table, which seems inappropriate for a public document. This listing of owner names implies that the report of results from the planned sampling investigation will also list the residential data by owner name. If this is true, property owners should be notified that their names and data will not be held confidential before asking for their consent to sample

**Comments on
Rayonier Off-Property Soil Dioxin Study
Soil Sampling Plan
Prepared by
Environmental Stewardship Concepts
On Behalf of the Olympic Environmental Council
July 24, 2008**

General Comments

We appreciate Ecology's efforts to evaluate the spatial distribution of dioxins in Port Angeles. Undertaking large studies such as this one are difficult, but provide invaluable data for both the cleanup of the Port Angeles Harbor and other sites around the country. The applicability of this study to other urban locations increases the importance of making the study design as strong as possible.

We recommend that the study area be expanded to the south, if possible, to better determine trends in dioxin soil concentrations south of the former mill. Expanding either sampling zone E3 or E4 could make collecting these additional data possible while increasing the potential gradient of measured dioxin depositions. If this expansion is not possible, then Ecology should attempt to obtain a number of samples on the southern borders of sampling zones E2 and E4. These samples could be used in conjunction with samples from the areas described in Figure 5-3 to provide better resolution for these southern areas and provide better estimations of dioxin exposures experienced by those that reported odors from the plant.

The term "chemometric evaluation", referring to the analysis of detected chemical profiles to determine the source, is an appropriate method to use in this case. Since Rayonier used specific industrial methods at the mill, the types and proportions of chemicals released (like PCB/dioxin congeners) should be specific to the source. It is a useful approach that can identify the contamination from Rayonier. The methods for using this analysis should be presented in this document in some form. The proper scientific approach is to define the methods *before* data collection.

Section 3 seems not highly relevant to the document. As an overview, it doesn't provide a substantial amount of context to the sampling plan. The information and overview within this section would be better suited to either of the two preceding chapters. For the most part, the chapter simply refers the reader to other chapters, too far into the document to provide a readily accessible and useful summary. Therefore, we recommend that this chapter a) be deleted from the document, b) the summary of study

objectives be in Section 1 and c) the rest of the information presented in this chapter be included in Section 2.

Otherwise the report is well written and proposes appropriate sampling techniques and criteria. Studies like the one proposed can be complex and difficult to manage, and Ecology should be commended for its efforts thus far. We welcome all efforts to acquire more data about the extent of dioxin contamination in Port Angeles and hope these efforts continue in the future.

Specific Comments

Section 1.3, page 4, bullet points: The report notes but we would like to further emphasize that the data from the 2006 Uplands RI were collected by Rayonier and may not be applicable to investigations of this nature. We appreciate Ecology is seeking independent data.

Section 9.1, page 37, last paragraph: “After completion of the technical memorandum and submittal to Ecology for review, an appropriate strategy for chemometric evaluation of the data will be assessed and discussed with Ecology.” This sampling plan should provide all the information about the spatial extent, the types of compounds sampled for, and sampling methods to develop an approach for chemometric evaluations. There is no reason that the design of this evaluation cannot begin as soon as the soil sampling plan is approved. Waiting until data have been collected could introduce a number of biases into chemometric evaluations.

Figure 4-3, page 77: The color gradients used in this figure do not provide enough contrast and are difficult to distinguish. The figure would be easier to read if the colors went from green for lower concentrations to red for higher ones.



July 30, 2008

Connie Groven, Project Manager
WA Department of Ecology
Toxics Cleanup Program, SWRO
P.O. Box 47775
Olympia, WA 98504-7775
(360) 407-6254
E-mail: cgro461@ecy.wa.gov

RE: Rayonier Off-Property Soil Dioxin Study Soil Sampling Plan

To Ms Groven,

We are writing to comment on *Rayonier Off-Property Soil Dioxin Study Soil Sampling Plan, Public Review Draft*, dated June 23, 2008.

People For Puget Sound is a nonprofit, citizens' organization whose mission is to protect and restore Puget Sound and the Northwest Straits.

We are pleased that Ecology is undertaking this study of off-site soils. This detailed and systematic study is long overdue. We look forward to the results. We hope that funds will be found quickly to conduct a full characterization, if warranted by the results of this study.

We have no specific comments about the document other than supporting the comments provided by Environmental Stewardship Concepts on Behalf of the Olympic Environmental Council.

Thank you for the opportunity to comment on the draft document. Please contact me with questions at (206) 382-7007 X215.

Sincerely,

Heather Trim
Urban Bays and Toxics Program Manager

MAIN OFFICE	NORTH SOUND	SOUTH SOUND
911 Western Avenue, Suite 580 Seattle, WA 98104 tel • 206.382.7007 fax • 206.382.7006 email • people@pugetsound.org	407 Main Street, Suite 201 Mount Vernon, WA 98273 tel • 360.336.1931 fax • 360.336.5422 email • northsound@pugetsound.org	120 East Union Avenue, Suite 204 Olympia, WA 98501 tel • 360.754.9177 fax • 360.534.9371 email • southsound@pugetsound.org

July 29, 2008

Ms. Connie Groven
Project Manager
WA Department of Ecology
Toxics Cleanup Program, SWRO
P.O. Box 47775
Olympia, WA 98504-7775

Re: Rayonier Mill Off-Property Soil Dioxin Study

Dear Ms. Groven:

Rayonier appreciates the opportunity to comment on the Draft Soil Sampling Plan ("Plan"). Technical comments prepared by our consultant, Malcolm Pirnie Inc., are attached for your review.

We have several overarching comments that preface the technical review. They are as follows:

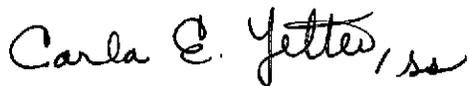
1. As Ecology states in the plan, this is a very large data collection effort. The Plan anticipates collection of 100 samples across a three mile area in Port Angeles, yet excludes from the study's objectives the delineation of contamination, data collection for risk assessment, and background determination. Rayonier questioned the exclusion of these objectives in earlier briefings with Ecology and was told that the agency expects that the areas being sampled in the proposed study will need to be sampled again by others in the future, to then characterize contamination, determine background, and develop data for risk assessments. Besides being expensive and a waste of public resources, Rayonier is very concerned that redundant sampling will result in further delays in reaching cleanup decisions about the former mill site.
2. Ecology has correctly identified that there are a number of other widely acknowledged sources of dioxin in Port Angeles, including: the hospital incinerator, the crematorium, several industrial boilers, and burning of wood and other waste. Rayonier is very concerned that the contractor does not plan to characterize any of these other recognized sources as part of this study. Not only are these sources likely contributors to any contamination that might be found in the proposed study area, but many are upwind of the former mill; plumes from other sources may have contributed to contamination on the mill site. It is not clear how Ecology will achieve its stated objective of determining relative contribution to dioxin/furan concentrations without fully characterizing all likely contributors.

Ms. Connie Groven
Page 2 of 2
July 29, 2008

3. We believe that Ecology's contractor has selected non-standard methods for conducting the study and analyzing the samples, and indicates that they plan to use an experimental approach for pattern analysis. EPA has already tested and validated models and methods precisely designed for conducting these types of soil studies. Given the objective basis and effective history of the EPA models, Rayonier questions whether Ecology has selected the best study design to conduct a defensible and unbiased study of contamination in the soils at Port Angeles.

In summary, we believe this sampling model (as proposed) is seriously flawed and stands to deliver results that will fall significantly short of serving the public interests you represent. If additional sampling is to be pursued, we suggest applying EPA-tested and validated methodology.

Sincerely,

A handwritten signature in cursive script that reads "Carla E. Yetter, ss".

Carla E. Yetter
Director, Environmental Affairs

Comments on the Ecology 2008 Former Rayonier Mill Off-Property Soil Dioxin Study in Port Angeles, Washington

This paper provides comments on the *Rayonier Mill Off-Property Soil Dioxin Study, Soil Sampling Plan* prepared by Ecology & Environment (E&E) for Washington State Department of Ecology (Ecology) (E&E June 23, 2008).

Overview of the Study Design – The Study Design is Based on an Area-Wide Contamination Approach which is Neither Efficient, nor Necessary for Determining the Impacts from a Single Facility. Based on the comments received at the public meeting, Ecology has received questions regarding the magnitude of the study design. We believe this is because of an inconsistency between the approach and the document's objectives.

This section starts out with the statement "As with other area-wide sampling programs developed in Washington State" indicating the study design is based on approaches that Ecology has taken with area-wide contamination issues at other sites. Three references are listed noting the approach follows an Area-Wide Contamination sampling program, and two of these three references include authorship by the primary author of this report (Glass).

Limited information is given in the remaining document to discuss the area-wide concept as presented by the Washington Department of Ecologyⁱ. In particular, Ecologyⁱ notes that: "area-wide soil contamination is low-to-moderate level of soil contamination that is dispersed over large geographic areas, ranging in size from several hundred acres to many square miles," and that "Area-wide soil contamination was caused by a number of historical activities ..."

These definitions of area-wide contamination are in conflict with the study objectives (and title)ⁱⁱ which focus on characterizing soil contamination from a single facilityⁱⁱⁱ. If Ecology is approaching this study as an investigation of area-wide contamination, then most of our comments can simply be addressed by changing the title and the objectives of the study to not be facility-specific, but rather to be the first step in characterizing area-wide Dioxin and Furan (D/F) soil contamination in Port Angeles, Washington from several sources. Otherwise, we believe the sampling program and rationale are inappropriate and inefficient for determining sources of D/F soil contamination around Port Angeles from Rayonier.

Overview of the Study Design – No Reference is Provided to Indicate the Authors have Reviewed or Conducted Studies Using the Proposed Methods to Achieve the Objectives noted with D/Fs at Concentrations Currently Observed in the Port Angeles Study Area.

Given the magnitude of the proposed sampling design, indirect economic impacts are likely to occur to both the City of Port Angeles and the property owners in the study area. Because conducting one of the “largest studies^{iv}” of this type implicitly communicates this area has a significant problem. Knowing this economic impact will occur, we believe the department has a responsibility to use methods which have precedence and scientific acceptance. However, despite past requests, the department has not provided any references to justify or demonstrate that source attribution techniques proposed can differentiate sources of D/Fs at the concentrations found in Port Angeles.

We do not believe that such techniques have been scientifically proven at the levels found in Port Angeles. Sites involving D/F contamination with multiple stakeholders (and thus need techniques to determine source contribution) have historically been managed by EPA, and EPA has historically applied a cleanup level for D/Fs of 1,000 ppt TEQ in residential soils^v. Thus, source attribution techniques as described in this plan have historically been applied to soil concentrations above 1,000 ppt TEQ. Thus, they have not been routinely applied to soil levels such as those found in Port Angeles.

In addition, we direct Ecology’s attention to one of the only references to D/F source attribution techniques in soils (Plumb 2004) which states:

“... samples, with a calculated total dioxin-furan congener concentration ranging from 231 <ppt> nanograms per kilogram (ng/kg) to 1,302,460 <ppt> ng/kg, were specifically selected to demonstrate the capability of this fingerprinting technique...”

A methods validity for determining sources of D/Fs in soils where concentrations have increased to 1,302,460 ppt does not extend to its validity for evaluating soils with <1 to 29 ppt.

Depth of Sampling. This document proposes to sample soil from 0-4”. The rationale for this is based on professional judgment. EPA and ATSDR generally recommend the soil interval of 0-2” be sampled for the purposes of characterizing exposure in risk assessment, but many sites have used 0-3” for such evaluations. EPA’s previous sampling in proximity to the former Rayonier Mill was based on 0-3” sampling. Unless there is compelling evidence that extending the samples another inch would provide some benefit to the analyses, we recommend maintaining a 0-3” sampling depth so the data are comparable to past studies, and, if further analyses are warranted in the future for risk assessment or remediation, these samples do not need to be redone.

Scope of the Sampling is Unjustified – Why Port Angeles? Based on the air model (*Remedial Investigation for the Uplands Environment of the Former Rayonier Mill Site: Port Angeles, Washington*), the highest areas of deposition off-property are spatially located in an area approximately 100 by 1,000 feet downwind from the mill (see Figure 4-3). The air model remains a validated, EPA developed and endorsed, and academically reviewed approach to determine the spatial extent of contamination from a stack emission such as the former Rayonier Mill. Furthermore, the air model at this location is not

nearly as meteorologically or topographically complex as most sites where it has been successfully applied for this purpose. Pattern analyses as proposed will provide a separate line of evidence regarding the former Rayonier Mill's impact, but given the limited availability of any data for defining the pattern in the source, such an approach is not superior to the air model and any conclusions would not necessarily take precedent over the air model or prior pattern analyses.

Ecology's perception that the original data did not correlate well with the air model is noted; however, as stated by Ecology this is most likely due to the samples being located in disturbed soils. It does not indicate that the model is inaccurate. In fact, nothing provided by Ecology in the report indicates the model is inaccurate or justifies ignoring it for the purposes of planning additional sampling activities. Thus, while additional sampling in undisturbed areas of the deposition field may provide better data on the magnitude and influence of the former Rayonier Mill, this could be done with fewer than 10 samples due to the small area of influence. Ecology's design which takes over 100 samples across more than three miles is unjustified within the document, and the number of samples within the work plan provided for review is noted as determined due to 'budget constraints', not scientific design.

The decision to focus, as Ecology characterizes "one of the largest studies of its kind," on the off-property area of the former Rayonier Mill in Port Angeles, Washington appears inappropriate based on the information provided in the report. Consider the following:

1. Port Angeles, Washington soil sample D/F concentrations range from non-detect to 29 ppt TEQ^{VI} (Table 1-2).
2. Bellingham, Washington soil sample D/F concentrations range above concentrations found in Port Angeles, but those samples sampled away from the Oeser site range from 0.1 to 18.8 ppt TEQ (Table 1-3).
3. City Parks sampled throughout the State of Washington ranged from 0.13 to 19 ppt TEQ (Table 1-3).

Although the upper range of the City of Port Angeles samples is marginally higher than other areas near the former Rayonier Mill, the difference between a maximum concentration of 29 ppt, and 18.8 ppt or 19 ppt can be the result of analytical chemistry precision at these low levels, the number of samples, or the soil types (presence of smaller particles or organic carbon) and thus, does not support such a large study effort to be focused on this site.

Collection of Site-Specific Data May Not Provide for a Better Understanding of the Source or Magnitude of the D/Fs in the Off-Property Areas. In the absence of detailed explanations which do not exist in the report being reviewed, most people fundamentally accept statements that "real data" are always better than a "model". However, such a conclusion relies heavily on the quality of the "real data" that can be collected. We believe the air model will continue to be the strongest line of evidence for

determining relative deposition rates and impacts from sources at the former Rayonier Mill and thus this sampling program is too large and unwarranted. Consider the following:

1. The air model has had a long history of use dating back to 1979^{vii};
2. Over the years, it has undergone numerous updates by EPA, has been released for review by the National Academy of Sciences, Public, EPA Science Advisory Board, and has undergone numerous peer reviews^{viii}.
3. The ability of this model to estimate particulate deposition, wet flux, and dry flux has been validated by EPA and numerous researchers^{ix}.
4. The air model being proposed has been validated by showing a statistically significant correlation with near-field data predominantly located in the riparian area maintained by Rayonier on their property^x.

In contrast, data collected and analyzed from soil sampling near the facility will have the following limitations:

5. The history of the soils, and therefore the source of the soil, or the chemicals in the soil will be impossible to definitively determine based on visual observations and current property owner interviews considering the timeframe that the former Rayonier mill may have influenced the soils. Consider the following timeframes:
 - A. The mill ceased operations in 1997. For the past 11 years, stack emissions from the mill have not been a source of D/Fs to the surface soils.
 - B. In 1981, the mill installed updated emission controls which included a scrubber that drastically reduced the amount of particulate (which is what the D/Fs would have been associated with) being released. The change in off-property deposition is shown in the Figure 1 of these comments. The plan provided shows the particulate deposition rates and patterns which predominantly occurred more than 20 years ago. Substantially less emission occurred after 1981 as shown in Figure 1 (attached).
 - C. Other sources (fireplaces, wood burning and oil burning stoves, backyard trash burning, fertilizers and other soil amendments, and other industrial emissions in the Port Angeles area) that have been contributing to the report's referenced 'urban plume' D/F concentrations have been ongoing while the Rayonier emissions

have ceased to exist, or been dramatically reduced in the past 10 – 27 years.

6. Not knowing the history of the soils will cause uncertainty in the soils data analyses because much of it relies on the assumption that those soils were present when the emissions occurred. Furthermore, some of the proposed statistical analyses assume the soils samples collected are replicates, and thus uniformly exposed for those years.
7. Undisturbed soils probably do not exist, or do not exist at sufficient frequency to allow for near-field development of a source pattern. The use of the term “undisturbed soils” can be misleading. Within the plan, undisturbed soils are targeted and implicitly defined to represent soils which have not been influenced by activities such as gardening, lawn maintenance, or other urban development and landscaping practices. However, as the near-field, off-property soils occur in housing developments, even non-landscaped soils have been influenced by the development of the housing division and the surrounding urban environment (and thus subject to soil compaction, grading, and disturbances of the natural soil layers^{x1}), and they are likely subject to greater degrees of wind erosion. As wind erosion occurs continuously from the surface layers of soils which have no vegetation or are sparsely vegetated, any analyses linking sources of D/Fs in soils will have uncertainty regarding the actual soil layer’s exposure to the prior emission.
8. During the EPA led Expanded Site Inspection (ESI) in 1998, the collection of off-site soils was attempted. The 1998 study noted that [emph. added] “specific sampling locations for the project were determined in the field by the START based on available background information; discussions with Rayonier, State, and Tribal representatives; field sampling conditions; and demolition activities.” Without access to the SAP which was not provided by Ecology for public review, it seems like the current study is proposing to collect residential samples using background information and field observations that will be no different than the information used previously and thus is likely to give the same result.

Table 6-1. D/F Reporting Limits. The Report is Proposing a Non-Standard Analytical Method, but Does Not Identify This, Nor Does it Provide the Appropriate Detail to Allow all Reviewers to Understand and Comment on This Method.

The amount of a chemical that is in a given sample is *estimated* based on a series of assumptions and *mathematical calculations* characterizing how the sample concentrations perform with respect to the instrument sensor and is quantified based on a relationship to known standards on a specific piece of equipment in a specific media. Inherent with any *mathematical calculation*, is the ability to *theoretically* calculate very small numbers, but the validity of these numbers is unknown if unmeasured against proven standards. Calibration standards are chemical concentrations in clean media (such as distilled water)

which are purchased by laboratories from certified sources. A series of standards at various concentrations are performed prior to analyzing a batch of samples, and these standards are then used to calibrate the instrument. For example, EPA Method 1613b identifies five concentrations to calibrate the instrument for 2378-TCDD: 1 ppt, 10 ppt, 100 ppt, 1,000 ppt, and 10,000 ppt. The PQL/RL under Method 1613b for 2378-TCDD is set at 1 ppt as this is the lowest concentration which can be proven and compared to a known certified reference, and is thus highly reproducible, defensible, and widely accepted by the scientific and legal communities.

To define the MDL, chemists have prepared statistical arguments regarding the amount of error that may occur as detections are extrapolated below the lowest calibration standards. As a professional practice, chemists, site managers and EPA guidance suggest an acceptable error for the purposes of hazardous waste site risk assessments occurs when peaks can be seen on the chromatogram above noise levels at detectable levels up to 10 times lower than the PQL/RL. Thus, common practice is to report levels up to 10 times below the PQL/RLs as an MDL, but to flag these as “estimated” values as the accuracy and precision do not meet the standards set forth for reproducibility.

The technical and legal issue of the appropriate “detection limit” has been defined by professional practices used by site managers nationwide as well as CERCLA and MTCA which use the terms Practical Quantitation Limit (PQL as defined under MTCA) and Reporting Limit (RL as defined by EPA) which are synonymous, and the Method Detection Limit (MDL) used under both regulations. The standard of practice for defining the PQL/RL is to set it at the limit of the lowest calibration standard used to calibrate the instrument.

Table 6-1 reports that the intent of this investigation is to use a 20 gram sample following EPA Method 1613B to derive a detection limit of 0.025 ppt. This is approximately 100 times lower than the lowest calibration standard defined in Method 1613B. The report does not indicate if a lower internal standard than defined in the method will be prepared, if the standard will be prepared in the laboratory or be purchased from a certified source, and other key aspects of the method to justify a valid detection limit of 0.025 ppt. By simply stating “EPA Method 1613B” the document gives the impression that this is a standard analytical method. It is not a standard method and should be reported as a “Modified Method 1613B” and all modifications identified to allow for full review by the public. Any methods that are proprietary to the laboratory should also be fully disclosed to allow scientific review and reproducibility or an alternative lab should not be pursued.

Additional Methodology Concerns: When evaluating chemical concentrations, the laboratory must maintain the instrument within the calibration range or the data will be qualified as estimated. When analyzing a D/F mixture in soil or sediment, the 2378-TCDD and 2378-TCDF congeners can commonly occur at levels near 0.1 ppt while OCDD and OCDF can occur at levels of 100 ppt or greater. In a single analysis on a GC/MS as defined in Method 1613B, it is impossible for the instrument to satisfy the calibration requirements for such an extreme range of values in a single extract. The

report does not propose how this problem will be resolved. If the extract will be split and analyzed twice, this can maintain the instrument calibration, but creates additional QA/QC requirements which should also be provided for review, and the analyses of two extracts at such low levels will further introduce error thereby reducing the precision and accuracy of the estimates.

The Modification of the EPA 1613B Method is not Necessary for the Study Objectives. While lower detection limits may provide additional information, that information will ultimately be of little use for accomplishing the study's objectives because:

1. The data will be inaccurate and lack reproducibility (precision). Split samples will be analyzed at more than one laboratory and intra-laboratory variation will be enumerated and it is very likely that splits will show a difference between the laboratory results at these trace levels are greater than any difference which may be found using post hoc, exploratory statistical pattern analyses.
2. The report proposes to determine the magnitude of concentrations, but to a large extent, the ranges of concentrations are likely to be below the PQL. Given that values below the PQL are by definition "estimated," and that the PQL represents a threshold for cleanup, the quantification of the magnitude of D/Fs off-site below the PQL does not meet any purpose under MTCA and the expenditure of such funds is unwarranted. Furthermore, MTCA defines the PQL as that concentration which can be reliably measured during routine laboratory conditions.

Figure 7-1. Process for Obtaining Property Access. The process indicates that the pre-sampling interview is only going to be used if more than one property in a grid grants access for sampling. We believe this is inappropriate. Regardless of the number of properties that can be accessed within a grid, the screening process is meant to identify those properties which have soils that could represent the magnitude and source pattern from past emissions. Properties which have had localized activities (e.g., urban landscaping) that would influence the D/F concentrations in the soils would provide no value to the study's objectives, and incurring costs associated with sampling and analyses of such areas would be unwarranted regardless of the availability of other samples.

Section 8.0 Data Evaluation. This section indicates that a weight of evidence approach will be used to evaluate source contributions using various methods which include FALCON, univariate and multivariate statistics, and mixture analysis methods. Because these are described as different "methods", it can be confused with the concept of an analytical or censusing method that produces data. The methods discussed in this section are simply ways in which data can be mathematically rearranged and calculated. The underlying data remains constant regardless of the method.

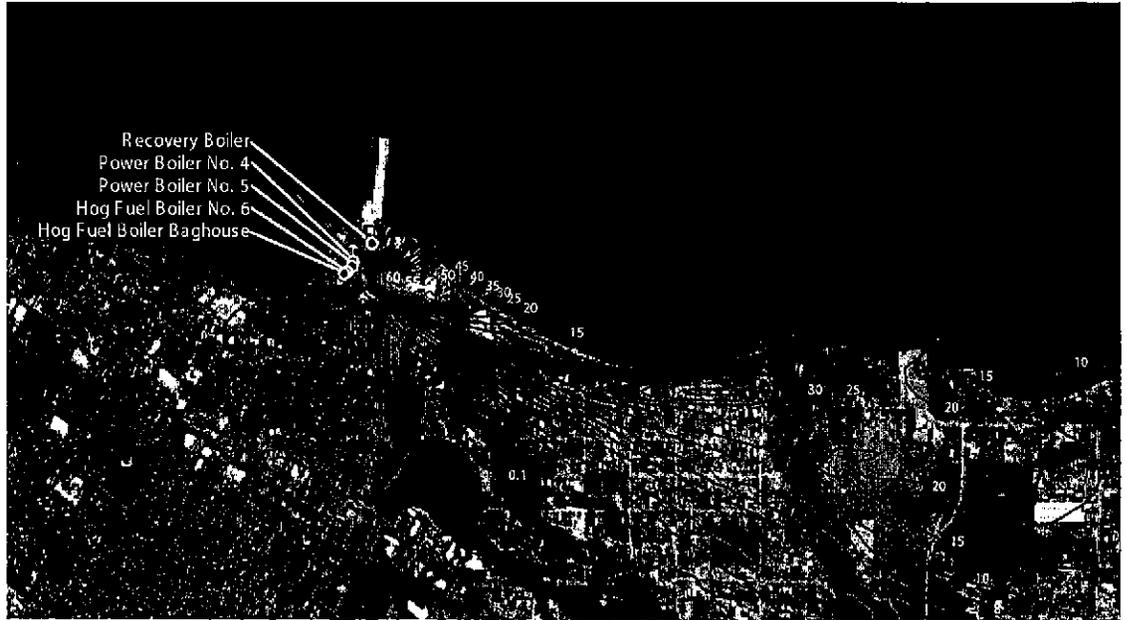
Our concerns with the approach are:

1. This approach relies on post hoc methods. That is, the scientists are applying them after the data have become available. If the researcher is tasked with trying to find a pattern to fit a presumed source such as a Mill, by “identifying <and eliminating> anomalous data” as stated in the report, and ‘exploring’ the data by mathematically creating various calculations to represent patterns, the large number of patterns that can be created will result in the researcher’s ability to show a pattern to that source. However, this does not necessarily indicate that such a pattern exists, or that the pattern is in fact statistically valid as suggested in this section. Thus, the analyses will not lead to any definitive conclusions about a source.
2. The individual acknowledged as performing the data analyses is not an author to the work plan. Since most of the methods briefly discussed rely on the relative concentrations of the congeners/homologs among samples, the sample density, detection limits, and chemical pattern will influence the chemometric analyses. We recommend that the report be revised under the partial authorship of the chemometric expert and that he establish *a priori* statistical hypotheses tests based on proven peer-reviewed literature derived patterns to demonstrate sources. This does not preclude post hoc analyses, but provides for the report to have an opportunity to achieve its second goal in a more scientifically rigorous manner and avoid the perception of bias that can be associated with post hoc analyses.
3. Two historical sources are acknowledged in the report: The Olympic Memorial Hospital Medical Waste Incinerator and the former Rayonier Mill stacks (predominantly from the hog fuel boiler). These are approximately 2,500 feet apart based on the scale shown in Figure 1-1. Given the proximity of these sources to each other, and the report’s acknowledgement that limited data confirming the congener patterns of either source are available, the study will be inconclusive regarding the attribution or assignment of a source to the various data. Since the hospital is positioned on the bluff, that stack may have been as high, or higher than the Rayonier stack. Thus, it is entirely possible that the primary and highest area of deposition was adjacent to and even overlapped the former Rayonier Mill property which is downwind. Given that medical waste incinerators have been identified by EPA as the biggest sources of release of D/Fs to the air (Exposure and Human Health

Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds National Academy Sciences (NAS) Review Draft EPA 2003), dismissing this source's influence because of a lack of data is inappropriate, and the report does not seem to acknowledge that no amount of mathematical/statistical calculations will ever provide data regarding the presence, height, longevity, D/F load and D/F pattern of that incinerator. Thus, the effort proposed here can not accomplish the second objective of the study.

4. As noted, the analytical method proposed is not the standard, but rather a modified method which is attempting to analyze the data at a lower concentration. This method modification may result in a mathematical change to the patterns of the congeners and homologs detected in the soil samples and thus, may invalidate the use of published reference patterns since the reference patterns were analyzed using different methods.

Pre-1981 Emissions



Post 1981 Emissions



Figure 1. Deposition Patterns and Rates prior to, and after emissions upgrades in 1981.

- i http://www.ecy.wa.gov/programs/tcp/area_wide/AW/toolbox_chap1.html
- ii Rayonier Mill Off-Property Soil Dioxin Study
- iii The study objectives on page 7 state (emph. added): “Determine the magnitude of dioxin/furan contamination in off-property surface soils potentially impacted by airborne emissions from the former Rayonier Mill, and determine the relative contribution to measured soil dioxin/furan concentrations of former Rayonier Mill emissions compared to other potential sources.”
- iv As noted several times within the report and verbally at meeting by Ecology’s contractors
- v EPA OSWER Directive 9200.4-26. <http://www.epa.gov/WTC/panel/pdfs/oswerdir98.pdf>.
- vi One exception to this range is from a sample collected from an excavated soil pile upwind of the Rayonier Facility in the West End of the Harbor as part of the Graving Yard study which was 228.9 ppt TEQ.
- vii Bowers, J.F., and A.J. Anderson, An Evaluation Study for the Industrial Source Complex (ISC) Dispersion Model, EPA-450/4-81-002, U.S. Environmental Protection Agency, Research Triangle Park, NC, January 1981.
- viii As part of developing and accepting the ISCST3 model, EPA funded and conducted numerous validation studies. All of these studies collectively form the basis for the model’s accuracy, capability, and validation:
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- ix EPA Validation Discussion of the ISCST3 Model at http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/sab03/vol3/3_app_a.pdf
- x Malcolm Pimie Inc. 2006. Further validation of ISC Model Presented in the Remedial Investigation for the Uplands Environment of the Former Rayonier Mill Site, Port Angeles, Washington. Rayonier Technical Paper 1/2006-3 rev. 01.
- xi [http://soils.usda.gov/use/urban/downloads/primer\(screen\).pdf](http://soils.usda.gov/use/urban/downloads/primer(screen).pdf)



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Washington State
Department of Ecology

July 16, 2008

Connie Groven,
Public Involvement Coordinator
Toxics Cleanup Program, Southwest Regional Office
Washington Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

Subject: Rayonier Mill Off-Property Soil Dioxin Study

Dear Ms. Groven:

Thank you for the opportunity to comment on the *Rayonier Mill Off-Property Soil Dioxin Study – Soil Sampling Plan*.

The Department of Natural Resources (DNR) as the steward of the aquatic lands owned by the State of Washington has the obligation to protect state owned aquatic lands. State-owned aquatic lands are managed by DNR for future and current citizens of the state to sustain ecosystems and economic viability and to ensure long-term access to aquatic lands and the benefits derived from them. DNR is directed by the legislature to balance land management activities with other public benefits including environmental protection, fostering water dependent uses, utilizing natural resources, encouraging public use, and generating revenue

DNR is pleased that the Department of Ecology is undertaking a study of the levels of dioxins and furans in the upland areas above Port Angeles Harbor. The Department is concerned that the levels of dioxins and furans that may occur in the upland areas surrounding Port Angeles harbor may represent a source of contamination to aquatic lands

General Comments:

1. The Study is well conceived and developed. The results of the sampling methodology and data analyses should be able to clarify significantly the nature and extent of dioxin/furans attributable to emissions from the former Rayonier Port Angeles Mill
2. The proposed study should be able to resolve the first key objective, namely: "Determine the magnitude of dioxin/furan contamination in off-property surface soils potentially impacted by airborne emissions from the former Rayonier Mill." The other key specific objective is "determine the relative contribution to measured soil dioxin/furan concentrations of former Rayonier Mill emissions compared to other potential sources." It is unlikely that the data from this study will be able to meet the second objective. The sampling is not sufficiently adequate in western parts of the city of Port Angeles to



answer that question unequivocally. The sampling is clustered in the former primary wind plume of the Rayonier Mill and does not extend far enough west to include all other possible existing or former paper or wood processing dioxin/furan sources.

3. The data will be analyzed with complex multivariate data analyses that may not lead to conclusive determinations showing clear relationships between past and present potential sources and present dioxin levels. Because dioxins are present in the upper 6 inches or so of soil layers and urban soils are subject to high levels of disturbance, a very high level of variation may exist within the data. In addition the very nature of the complex pattern of sampling may confound clear analyses of the data. Stratifying the sampling by time with an initial survey and then focusing on areas of concern should be considered. Simply increasing the number of samples would resolve the question, but is undoubtedly cost prohibitive. DNR would like to see as one of the outcomes of the study clear identification of past and present dioxin sources.
4. The next step alternatives should be clearly laid out. Ecology should be now evaluating next step alternatives based upon the expected outcome of the study and be prepared to move forward with them
5. A stakeholders group should be formed that would be able to interact effectively with the community and concerned agencies as the sampling, data analyses, interpretation of data, and explorations of alternatives take place. A stakeholders group could be an effective vehicle to coordinate and disseminate information to the community.
6. Ecology is to be commended for the well presented technical and public workshops held on July 9 in Port Angeles.
7. Ecology is to be commended for undertaking a unique detailed study. Hopefully, the study will lead to a clear identification of the nature and extent of the dioxin/furan contamination in upland areas of Port Angeles.

Thank you again for the opportunity to comment on the Rayonier Soil Dioxin Study. DNR looks forward to reviewing the data, the analyses, and interpretations.

Sincerely,



Lionel Klikoff
Environmental Specialist
Sediment Quality Unit

Appendix B References

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