Draft Analysis of Brownfields Cleanup Alternatives

Redwood Marine Terminal II Debris Cleanup Project

Prepared for:

Humboldt Bay Harbor, Recreation and Conservation District

Consulting Engineers & Geologists, Inc.

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December 2016

016240.001

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Reference: 016240.001

December 2, 2016

Mr. Jack Crider, Executive Director
Humboldt Bay Harbor, Recreation and Conservation District
601 Startare Drive
Eureka, CA 95501

Subject: Draft Analysis of Brownfield Cleanup Alternatives Report for RMT II Debris Cleanup Project

Dear Mr. Crider:

Attached is the Draft Analysis of Brownfield Cleanup Alternatives (ABCA) Report for the RMT II debris cleanup project. This report is a required element of the US EPA's Brownfields Cleanup Grant application package, and its content and format follow the directions in the FY17 Guidelines for Brownfields Cleanup Grants.

Sincerely,

SHN Engineers & Geologists

Mike Foget, PE
Principal and Project Manager

MKF:dla

Enclosures: Draft Analysis of Brownfields Cleanup Alternatives

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QA/QC:MKF

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Abbreviations and Acronyms

mg/kg	milligram per kilogram
ABCA	Analysis of Brownfield Cleanup Alternatives
AOI	Area of Interest
APN	Assessor's Parcel Number
AST	above-ground storage tank
BGS	below ground surface
BMPs	best management practices
CDBG	Community Development Block Grant
CHHSLs	California Human Health Screening Levels
District	Humboldt Bay Harbor, Recreation & Conservation District
DTSC	California Department of Toxics Control
FTC	Freshwater Tissue Company (FTC)
GHG	Greenhouse gas
GP	Georgia Pacific
HAZWOPER	Hazardous Waste Operations and Emergency Response Standard
HUD	US Department of Housing and Urban Development
LACO	LACO Associates
LP	Louisiana-Pacific
OEHHA	California Office of Environmental Health Hazard Assessment
OSHA	US Department of Labor Occupation Safety & Health Administration
SHN	SHN Engineers & Geologists
RMT II	Redwood Marine Terminal II
RWQCB	North Coast Regional Water Quality Control Board
USDA	US Department of Agriculture
US EPA	US Environmental Protection Agency

1.0 Introduction and Background

This report contains the Analysis of Brownfield Cleanup Alternatives (ABCA) for three debris stockpiles on the Redwood Marine Terminal II site, which was formerly the Louisiana-Pacific (LP) Pulp Mill facility. The site is located at One TCF Drive in Samoa, California (Figure 1). SHN Engineers & Geologists (SHN) has prepared this report on behalf of and with the approval of the current owner of the site, Humboldt Bay Harbor, Recreation & Conservation District (District). This ABCA includes a brief discussion on the site's background, the nature and extent of the contamination, cleanup standards and regulations, analysis of four cleanup alternatives, and the proposed cleanup alternative.

This ABCA is based on an earlier Draft ABCA dated January 2014 (LACO, 2014). The 2014 Draft ABCA and its laboratory analytical reports are included in Appendix A. In developing this 2016 Draft ABCA, we used volumetric estimates and laboratory analyses from this earlier report, and assume that data and estimates sufficiently characterize the debris piles' contamination and volumes.

1.1 Site Description

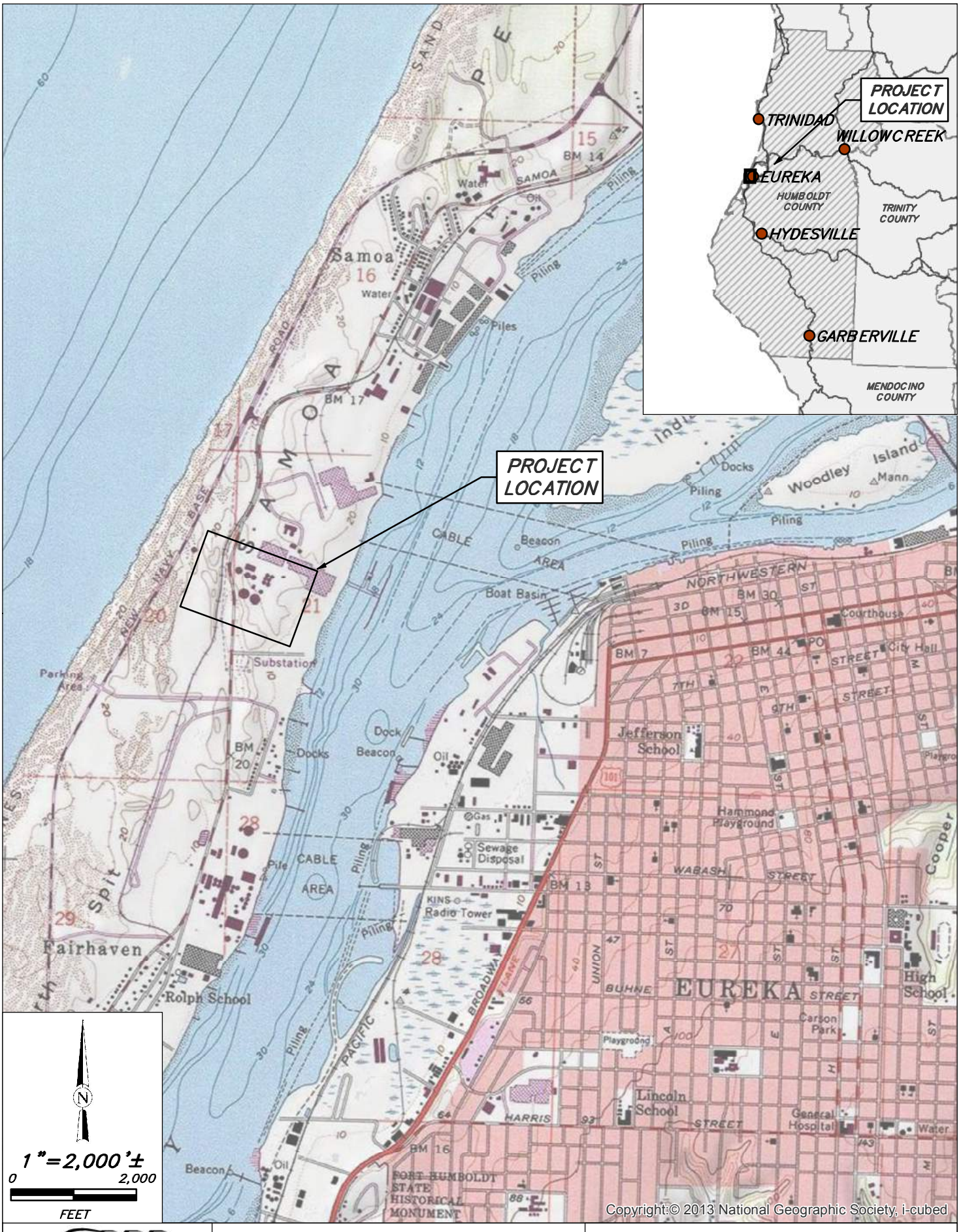
The site is located on the Samoa peninsula, a narrow divide between the Pacific Ocean, approximately 800 yards to the west, and the Humboldt Bay, directly to the east. Land use of the site and surrounding properties is industrial and commercial. No residences are in the immediate vicinity; however, the communities of Samoa and Fairhaven are located approximately 1.25 miles from the site to the north and south, respectively (Figure 1; SHN, 2014). The Samoa landfill (a closed Class III disposal site) is located to the west of the facility on the parcel. The site is located on Assessor's Parcel Number (APN) 401-112-021 and covers approximately 72 acres.

1.2 Site History

The first site development occurred in 1964 when a bleached Kraft pulp mill was constructed by Georgia Pacific (GP). The pulp mill, in its original configuration, was in operation between 1965 and 1994 when it was then converted to a chlorine-free process. Multiple owners including LP and Evergreen Pulp operated the mill from 1994 to 2008 (SHN, 2014). Freshwater Tissue Company (FTC) purchased the site in 2009 and planned on reopening the mill; however, they abandoned these plans and began decommissioning equipment, demolishing various buildings, and liquidating assets. Buildings and land uses of the site included offices, pulp warehouses, a machine building, a sand blasting shop, petroleum products distribution and storage, a hazardous waste storage area, diesel aboveground storage tanks, a chemical storage tank farm, a water treatment plant, a "black liquor" processing area, a bleach plant, and a chip conveyor. In August 2013, FTC transferred ownership of the site to the District.

1.3 Previous Studies and Remediation Activities

Many studies have been conducted to characterize the extent of the contamination throughout the site. The majority of these studies occurred before the District became the owner; studies focused on soil and groundwater contamination, and included sampling from numerous boring and monitoring well locations.



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Consulting Engineers & Geologists, Inc.	Redwood Marine Terminal II Draft Analysis of Brownfields Cleanup Alternatives Samoa, California	Project Location SHN 016000.134
	November 2016 | Figure1_ProjectLocationMap	Figure 1

Six studies that provide the majority of site characterization data include:

- 1997 Preliminary Site Investigation (LP, 1997)
- 2006 Site Characterization and Investigation Report (MFG, 2006)
- 2011 Conceptual Site Model (SHN, 2011)
- 2013 Updated Conceptual Site Model (SHN, 2013)
- 2013 Phase I Assessment (LACO, 2013)
- 2014 Phase II Assessment (LACO, 2014)
- 2014 Remedial Action Plan – Eastern Half (SHN, 2014)

Remediation activities prior to District ownership have been limited; however, between 1995 and 2003, soil adjacent to the aboveground and underground storage tanks was removed to limit the threat of groundwater contamination (SHN 2014).

In August 2013, the District contacted the United States Environmental Protection Agency (US EPA) to perform an assessment of hazardous materials remaining on the site. From the assessment, the US EPA determined that 1.3 million gallons of caustic pulping liquors were housed in tanks that were either deteriorating or not designed to hold caustic liquids. A 6.8 earthquake off the coast of Humboldt County on March 9, 2014, also caused significant concern about the tanks' structural integrity. Additionally, 20,000 gallons of sulfuric and hydrochloric acid; 10,000 tons of uncontained corrosive sludges; and various other chemicals were stored on site. The US EPA determined that the condition of the tanks and the site's proximity to Humboldt Bay necessitated an emergency response (US EPA 2013). Removal of hazardous and caustic liquors and sludges was completed under the direction of the US EPA throughout 2014.

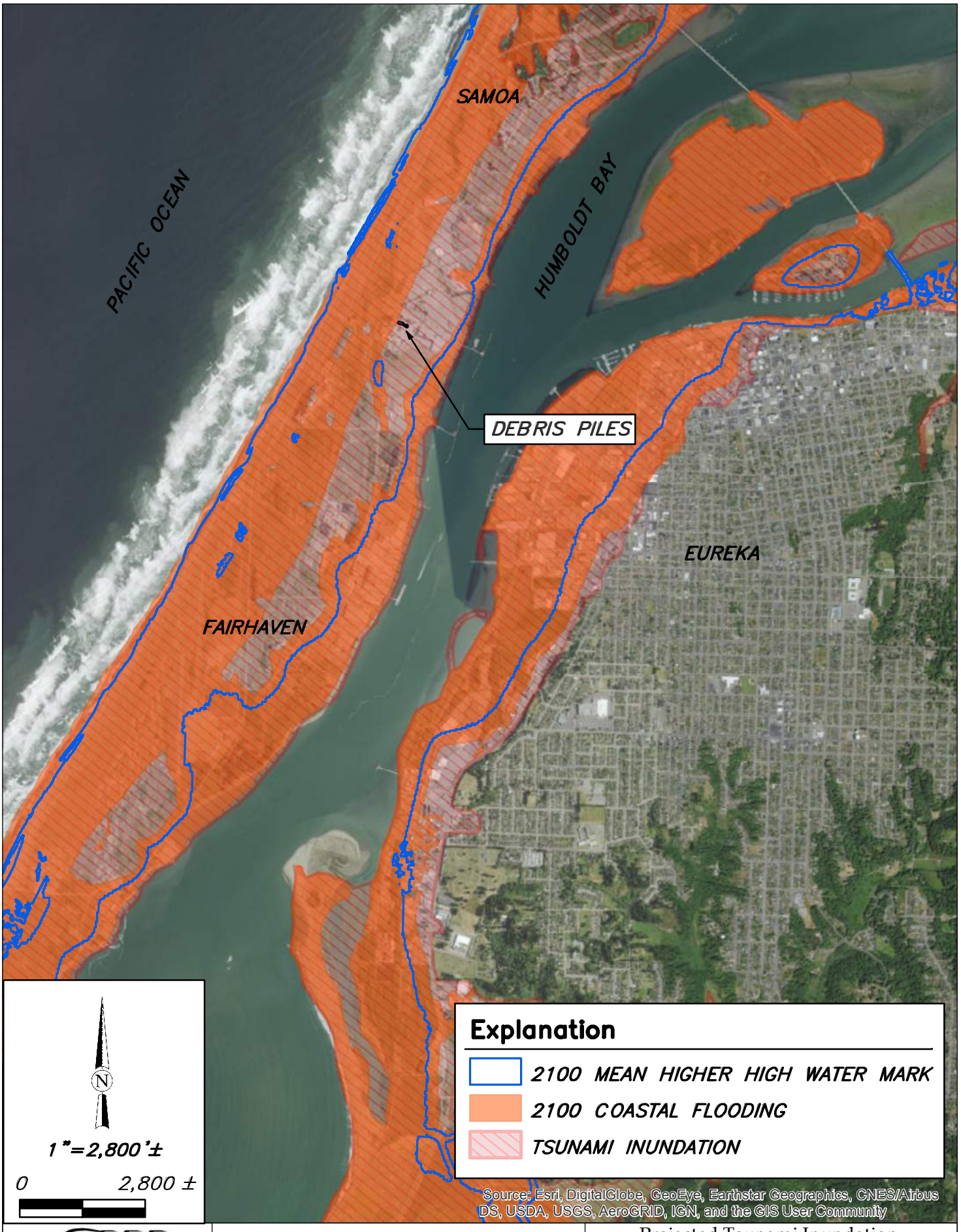
1.4 Current and Forecasted Climate Conditions

The current climate conditions and environmental hazards that impact the site include tsunamis, high precipitation rates, and shallow groundwater. The entire Samoa peninsula is located in a tsunami evacuation zone and the site may be inundated in the event of a tsunami or seismically generated seiche in Humboldt Bay (Figure 2).

Humboldt Bay receives an annual average rainfall of 38 inches, with 90% occurring between October and April (Humboldt County, 2009). The runoff associated with these rain events can facilitate the transport of contaminants.

Groundwater monitoring of the 26 monitoring wells on site has been conducted since 1997. The *Conceptual Site Model* and *Remedial Action Plan – Eastern Half* reports, prepared by SHN, summarize this groundwater monitoring and conclude that the groundwater surface at the site ranges between 12 and 16 feet below ground surface (BGS) in an unconfined aquifer, which is at groundwater elevations between 5 and 9 feet NAVD88 (SHN, 2011; SHN, 2013; SHN, 2014).

The forecasted climate change conditions that could affect the site are sea level rise and changing flood zones. Sea level rise will impact a large portion of the Samoa peninsula and potentially impact the current stockpile locations (Figure 2). Currently, a portion of the site is located within the projected coastal flood zone (Humboldt County GIS, Figure 2). With sea level rise, this flood zone will inundate a greater portion of the site potentially leading to greater environmental impacts from contaminated areas on site if the contaminated areas are not contained, secured, or removed.



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Consulting Engineers & Geologists, Inc.

Redwood Marine Terminal II
Draft Analysis of Brownfields Cleanup Alternatives
Samoa, California

Projected Tsunami Inundation, Sea Level Rise, and Flooding Extents
SHN 016000.134

November 2016 | Figure2RiseandFlooding.mxd | Figure 2

1.5 Site Assessment

1.5.1 Contaminant Origin

Demolition by FTC of Recovery Boilers 1 and 2, above ground storage tanks (ASTs), and a digester occurred between 2011 and 2012 (LACO, 2014). This work created demolition debris that remains at the site in three stockpiles (Figure 3). Debris from the ASTs and the digester is located in stockpile designated Area of Interest #1 (AOI #1) and debris from the recovery boilers is located in AOI #2. Based on the previous uses of the structures, the following contaminants may persist in the debris (LACO, 2014):

- Asbestos
- Boiler smelt
- Heavy metals
- Heavy-range petroleum hydrocarbons

1.5.2 Assessment Findings

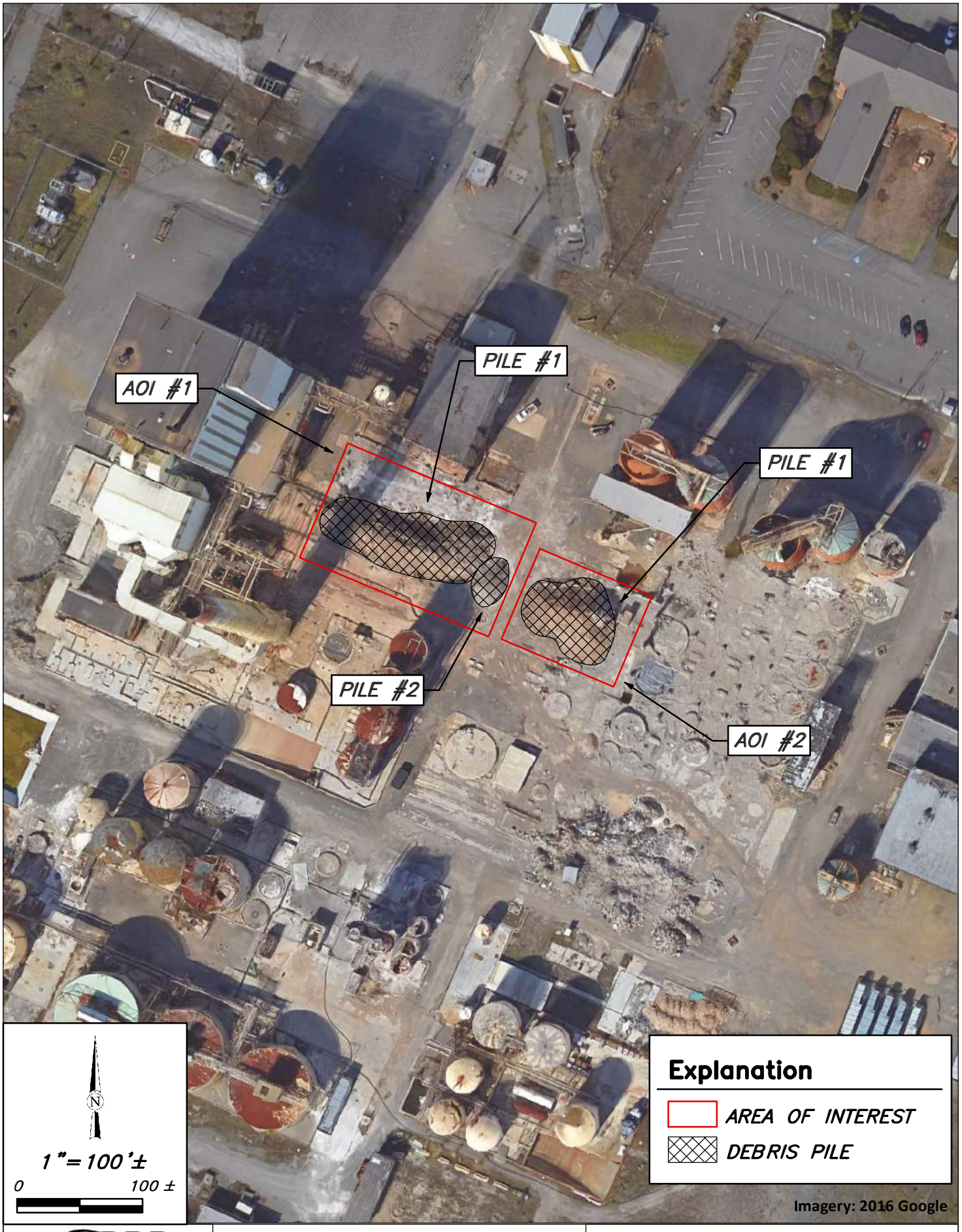
In December 2013, District consultants conducted field visits and performed stockpile sampling to determine the extent of the debris piles, to characterize the material makeup, and to analyze contamination concentrations (LACO, 2014). The analyses documented high levels of heavy metals and total petroleum hydrocarbons, and elevated pH. Of particular concern is high lead concentrations (2,300 to 33,000 milligrams per kilogram [mg/kg]) found in debris associated with ASTs and the digester. The sources and composition of the debris were described as mixtures of concrete, brick, metal, tile, sand, gravel, and wood. An initial estimate of consolidated volume of material was estimated to be approximately 2,400 cubic yards. The report, with detailed results of the analysis and sampling methodology, is included in Appendix A. A summary of the sampling results compared with regulatory levels is included in Appendix B. A map indicating locations of the Areas of Interest (AOI) is included as Figure 3.

1.6 Exposure Pathways Analysis

1.6.1 Pathways

The debris piles on the former pulp mill site are within the southern portion of the town of Samoa, and within 1,200 feet of Humboldt Bay and aquaculture development. The potential for target area exposure is from three types of pathways: windblown contaminants, contaminated storm water runoff, and contaminated groundwater.

During winter storms, wind is generally from the south, which tends to blow north towards the Town of Samoa, and has the potential to transport contaminated dust and rain (Humboldt County, 2002). Storm water runoff from the site has the potential to flow to Humboldt Bay and its oyster industry, potentially transporting contaminants from the three contaminated stockpiles. Additionally, contaminated storm water runoff has the potential to infiltrate into shallow groundwater. Once in Humboldt Bay, contaminants can bioaccumulate in aquatic life and lead to harmful contaminant levels in food sources. Contaminated storm water runoff that does not flow to Humboldt Bay may also travel to the Pacific Ocean through an ocean outfall connected to the facility drainage system.



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Consulting Engineers & Geologists, Inc.	Redwood Marine Terminal II Draft Analysis of Brownfield Cleanup Alternatives Samoa, California	Debris Sites SHN 016000.134
	November 2016 | Figure3AreaofInterest.mxd	Figure 3

1.6.2 Potential Receptors

Potential ecological receptors for the site are shellfish and other commercially-grown organisms in Humboldt Bay, and other aquatic life that would contact stormwater runoff or seepage from groundwater. Potential human receptors for the site are children and adults in downwind communities, and adults in construction, excavation, or other industrial settings. Potential indirect receptors include aquatic organisms that ingest sediment containing heavy metals that bioaccumulate in tissure, and people who ingest these organisms (fish and shellfish).

1.7 Proposed Redevelopment

In September 2015, the District submitted an Initial Study/Draft Mitigated Negative Declaration for the Redwood Marine Terminal II (RMT II) Costal Development Permit/Condition Use Permit (Planwest Partners, Inc., 2015). The plans are to renovate the existing facilities and infrastructure on the site, with no expansion of existing capacity. In July 2016, the Humboldt County Board of Supervisors showed support for the District's vision by voting to ease zoning restrictions along Humboldt Bay, allowing commercial opportunities such as aquaculture, biomass conversion, and renewable (solar) energy. Currently, contaminated debris remains at RMT II, which limits use on about one-third of the site, but one tenant is making use of a portion of the site, raising oyster seed. The District and the County intend to continue developing the aquaculture industry in Humboldt Bay, and maintaining its high water quality is critical to that industry.

The District has been working with Humboldt County on several recent Federal grants to assess the potential for economic developments on the Samoa peninsula, primarily the RMT II facility. These grants include a Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG), and a US Department of Agriculture (USDA) economic development grant.

2.0 Cleanup Levels and Applicable Laws

2.1 Cleanup Oversight Responsibility

Two agencies take primary responsibility for oversight of the cleanup activities: the North Coast Regional Water Quality Control Board (RWQCB) and the California Department of Toxics Control (DTSC). Because the facility is already an active RWQCB site, the RWQCB will most likely oversee the cleanup.

2.2 State Cleanup Levels

Cleanup levels in California are based on either site-specific risk assessments or on regulatory guidelines. The two guidance documents used in the site's region are the Environmental Screening Levels (ESLs) developed by the RWQCB, and the California Human Health Screening Levels (CHHSLs) developed by the California Office of Environmental Health Hazard Assessment (OEHHA). Both screening levels will be used during cleanup activities to ensure protection of human and environmental health. The screening levels for the contaminants of concern found in the debris are included in Appendix B and compared against the analytical data.

2.3 Applicable Laws and Regulations

The cleanup operation is subject to various laws and regulations pertaining to remediation of hazardous substances. These include, but are not limited to the:

- Health and Safety Code
- California Water Code
- Federal Small Business Liability Relief and Brownfields Revitalization Act
- Federal Davis-Bacon Act
- Federal Resource Conservation and Recovery Act
- California Code of Regulations Title 22
- RWQCB regulations
- Humboldt County laws

An additional regulation that pertains to worker safety is the US Department of Labor Occupation Safety & Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) 29 CFR 1910.120.

All regulations will be followed by the contractors involved in the cleanup. Additionally, permits will be obtained for waste transport and disposal (as applicable).

3.0 Evaluation of Cleanup Alternatives

3.1 Project Goal

The District's goals are to:

1. limit heavy metal and synthetic organic compounds exposure to the environment and people, and
2. develop the site as part of the new RMT II complex, leasing space for industrial uses.

Based on previous site assessments, contamination exists in the debris piles exceeding regulatory screening levels. These piles occupy an extensive and central area of the site. The goal of the project is to limit environmental impacts associated with the three debris stockpiles, in accordance with applicable regulatory guidelines, and to mitigate hazards to non-harmful levels to construction workers and future tenants of the site.

3.2 Alternatives Considered

Four cleanup alternatives are presented, which range from leaving the debris piles in place to complete removal. Any alternative must successfully reduce exposure by remediating and decreasing contamination on site. The four alternatives indentified as being potentially feasible are:

1. No Action
2. Store and Cap On Site
3. Total Removal and Offsite Disposal
4. Segregation and Offsite Disposal and On site Remediation

These four alternatives are evaluated for effectiveness, implementability, cost, and carbon emissions and climate change. The effectiveness of an alternative is based on its ability to meet the project goal in terms of clean up levels and protection of people and the environment. Implementability assesses the effort and potential barriers to an alternative, including technical and permitting/administration challenges. Costs include estimates of personnel time, contractors time and equipment, laboratory analyses, and transport and disposal fees. Carbon emissions and climate change are analyzed through an alternative's creation of greenhouse gases, and resilience to sea level rise and severe weather.

3.2.1 Alternative 1: No Action

The no action alternative leaves the three debris piles in place. No corrective actions would take place and the debris would remain vulnerable to wind, rain, and flooding.

Effectiveness: This alternative does not meet the project goal. Contaminants would remain on site and concentrations would not be reduced below screening levels. Human and environmental risks would remain and development of the site would not be possible.

Implementability: There are no barriers to this alternative and therefore could be implemented with no effort.

Cost: There are minimal costs associated with this alternative.

Emissions and Climate Change Impact: This alternative provides no resilience to the climate change impacts discussed in Section 1.4. Additionally, flooding from intense storms would erode the debris piles and spread contamination throughout the site and into the bay or ocean. Greenhouse gas (GHG) emissions would not be impacted by this alternative because no trucking or excavation would be involved.

3.2.2 Alternative 2: Store and Cap On Site

This alternative requires reopening one of the cells in the Samoa landfill. The landfill is located on the parcel less than 2,500 feet from the debris piles. The top sand layer would be removed, the debris would be placed according to minimum slope requirements, and a compacted clay cap layer would be installed.

Effectiveness: This alternative does not meet the project goals. Even with a compacted clay cap, the landfill would still be located in a tsunami zone, and would be subject to sea level rise and high groundwater levels.

Implementability: Permitting would be a high barrier to implementing this alternative. The closed Samoa landfill was a Class III landfill that did not accept hazardous waste. The high levels of metals and hydrocarbons in the debris could potentially require a Class I permitted landfill. The possibility obtaining Class I permitting for reopening and reclassifying the landfill is extremely unlikely. Additionally, the landfill is located in the coastal zone and would require approval of the Coastal Commission and a coastal development permit.

Cost: The costs associated with this alternative include: transport of the material from its current location to the Samoa landfill, preparation of the existing landfill cell, restoration of the cap to meet regulations, installation and monitoring groundwater wells, and engineering and permitting costs.

The total cost estimated in 2014 was $300,000 (Appendix C). However, having recently completed similar work, costs are very likely to be much higher.

Emissions and Climate Change Impact: A small amount of greenhouse gas emissions would be created when the stockpile is transferred from its current site to the Samoa landfill. The landfill is located in the sea level rise zone, the 100-year flood zone, and the tsunami evacuation zone. This area is very unfavorable for permanent disposal and would not be resilient to climate change.

3.2.3 Alternative 3: Total Removal and Offsite Disposal

This alternative involves the total removal and disposal of the debris piles. The piles would be excavated, loaded, transported, and disposed of by qualified contractors and in accordance with applicable local, state and Federal regulations. Depending on results of waste characterization, the piles may be segregated into material designated for Class I, II or III waste facilities.

Effectiveness: The total removal of the three debris piles would eliminate the sources of contamination and eliminate site-specific exposure pathways to the environment and people, thus meeting the project goal. It is effective in both the long and short term.

Implementability: This alternative's ease of implementation is moderately difficult. The debris piles would need additional waste characterization so materials are directed to the proper class of landfill. Waste characterization requires extensive sampling and experience in selecting representative samples. Once characterized and separated, excavators would load transport trucks with the segregated debris and transfer it to the disposal sites.

Cost: Costs associated with this alternative include waste characterization, segregation of materials, transport of material, and disposal of material. Total removal of the piles to a Class I landfill was estimated to cost $921,000 in 2014 (Appendix C); however, if waste characterization results in AOI #1 being Class II material, the estimated cost is reduced to $745,000 (Appendix C).

Emissions and Climate Change Impact: This alternative would create the most GHG emissions due to the total excavation and transport of the debris piles. The spread of contamination from changing climate conditions would be eliminated by this alternative because the source of contamination would be completely removed from the site.

3.2.4 Alternative 4: Segregation and Offsite Disposal and On Site Remediation

This alternative involves characterizing and segregating the debris piles materials based on hazard level and type of contamination. Materials within the stockpile that are characterized to have no contaminants of concern and are suitable for industrial fill material would be used on site. Those materials characterized as containing petroleum hydrocarbons and/or other synthetic organic compounds would be secured for bioremediation. Once remediated to below screening levels, the material would also be used as industrial on site fill. The remaining material that is contaminated with heavy metals would be segregated based on the class of landfill that can accept it, loaded into dump trucks, and transported to Class I, II, or III facilities.

Effectiveness: This alternative meets the project goals by either removing contaminants or transforming them so that environmental and public health is maintained and the exposure risks of contaminants are greatly reduced.

Implementability: This alternative requires an appropriate waste classification plan to be developed, approved by regulating agencies, and implemented. Similar plans have been implemented at sites around the country. There is a need for fill material on the site, which can be met by remediated material. During the bioremediation process, material will be stored properly on site, applying the appropriate best management practices (BMPs) as needed. Materials containing heavy metals cannot be adequately remediated on site, and will be transported and disposed. Because on site bioremediation will require assistance and approval from regulating agencies, there are no significant barriers to implementing this alternative.
Cost: Costs associated with this alternative include coordinating with regulatory agencies, waste characterization, segregation of materials, and transport and disposal of material. Estimated costs are highly dependent on the results of additional waste characterization, but based on 2014 data, estimated costs are approximately $300,000.

Emissions and Climate Change Impact: The GHG emissions created from this alternative are from the transport of the material on and off site, and from heavy equipment used to handle materials during bioremediation. These emissions will be less than those associated with total removal, due to a portion of the material remaining on site. Removing or transforming all contaminated material will greatly reduce exposure pathways that occur during sea level rise and other conditions due to climate change.

3.3 Comparison of Alternatives

The four alternatives were compared based on the four criteria of effectiveness, implementability, cost, and emissions and climate change impact. Based on the narrative for each alternative in Section 3.2, a numerical ranking (1 to 3) was assigned for each criterion where 1 is the lowest rating, and 3 is the highest rating. The preferred alternative has the highest combined score. The assigned ranks are summarized in Table 1.

Table 1
Rankings for Each Criterion Assigned to the Alternatives[1]
Redwood Marine Terminal II Cleanup Project

Alternative	Effectiveness	Implementability	Cost	Emissions and Climate Change Impact	Score
1. No Action	1	1	3	2	**7**
2. Store and Cap On Site	1	1	1	2	**6**
3. Total Removal, Offsite Disposal	3	3	1	1	**8**
4. Segregation, Offsite Disposal, On Site Remediation	3	2	2	3	**10**

1. A numerical ranking (1 to 3) was assigned for each criterion where 1 is the lowest rating, and 3 is the highest rating.

Effectiveness is a primary criterion and only those alternatives that are effective are considered. Alternative 3, removal and disposal of all of the material, meets the project goals. It is relatively easy to implement; however, its costs and greenhouse gas emission impacts are high. Alternative 4, segregation and offsite disposal and on site remediation, is as effective as Alternative 3; however, the costs are less due because fewer tons of materials are transported and disposed at Class I or II landfills. Additionally, climate change impacts are less than those of Alternative 3, also due to reduced transportation.

3.4 Recommended Alternative

Alternative 4, segregation and offsite disposal and on site remediation, is the recommended alternative for cleanup of the debris piles at RMT II. It fulfills the project goals and will be effective in significantly decreasing environmental and public health risks.

4.0 References

Humboldt County. (2009). "Harbor Safety Plan of the Humboldt Bay Area." Mandated by Lempert-Keene-Seastrand Oil Spill Prevention and Response Action of 1990. Eureka, CA: County.

Humboldt County. (2002). "General Plan Update - Natural Resources and Hazards Report." Eureka, CA: County.

LACO Associates Inc. (2014). "Draft Analysis of Brownfield Cleanup Alternatives". Redwood Terminal 2 Debris Piles. Eureka, CA: LACO.

Planwest Partners, Inc. (2015). "Initial Study/ Draft Mitigated Negative Declaration for Redwood Marine Terminal II Coastal Development Permit/ Conditional Use Permit." Arcata, CA: Planwest.

SHN. (2011). "Conceptual Site Model". Former Louisiana-Pacific Pulp Mill. Eureka, CA: SHN.

--. (2013). "Updated Conceptual Site Model". Former Louisiana-Pacific Pulp Mill. Eureka, CA: SHN.

--. (2014). "Remedial Action Plan – Eastern Half". Former Louisiana-Pacific Pulp Mill. Eureka, CA: SHN.

US EPA. (2013). "Pollution/Situation Report #1." NR: US EPA.

Appendix A

2014 Draft ABCA Report

Draft Analysis of Brownfields Cleanup Alternatives

Redwood Terminal 2 Debris Piles
Samoa Peninsula
Humboldt County, California

January 2014

Prepared For:
County of Humboldt

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Project No. 7174.28

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1.0 INTRODUCTION AND BACKGROUND

1.1 Site Location

The project site is located on the Humboldt Bay Harbor, Recreation & Conservation District's (HBHRCD) Redwood Terminal 2 property, located at 1 TCF Drive, and near the unincorporated community of Samoa, California (hereinafter referred to as "Subject Property"; see Figure 1). The Subject Property comprises approximately 71.8 acres and is located on Assessor's Parcel Number (APN) 401-112-021. The Subject Property is identified as being located within the California coastal zone. The project site under analysis in this document consists of two Areas of Interest (AOIs); AOI 1 contains two debris piles and AOI 2 contains one debris pile. Collectively, the area containing the three debris piles are referred to in this analysis as the "Site," which totals approximately 9,250 square feet (see Figure 2).

1.2 Previous Property Uses and any Previous Cleanup/Remediation

Historical land use research, anecdotal sources, and interviews with stakeholders contacted as part of a May 2013 Phase I Environmental Site Assessment of the Subject Property by LACO Associates (LACO) indicate that the Subject Property was vacant and undeveloped until a 500-ton/day bleached Kraft pulp mill was constructed by Georgia Pacific (GP) between 1963 and 1965. The pulp mill was operational between 1965 and 1994, at which time the mill was converted to a chlorine free process. The Subject Property underwent ownership change in 1973 when GP was forced to divest the mill site to Louisiana Pacific (LP). The Subject Property was under multiple ownership regimes between the late 1990s and 2009, when it was purchased by Freshwater Tissue Company (FTC). FTC scuttled plans to reopen the mill in 2010, and began the process of dismantling the mill and liquidating mill assets. The HBHRCD took possession of the Subject Property in the third quarter of 2013.

Buildings and features historically located on the Subject Property include office structures, pulp warehouses, shops, stores, a machine building, a sand blasting shop, petroleum product distribution and storage, a hazardous waste storage area, multiple diesel Aboveground Storage Tanks (ASTs), a chemical storage tank farm, a water treatment plant and leach field, a recausticizing area, a black liquor processing area, a bleach plant, a chip conveyor, and an outdoor storage area referred to as the "boneyard".

The U.S. Environmental Protection Agency (US EPA) is scheduled to coordinate the removal of approximately four million gallons of black liquor from the former Kraft pulp processing facility, under an emergency response action, in February 2014.

1.3 Site Assessment Findings

1.3.1 Need for Assessment

In the period between 2011 and 2012, the Digester, ASTs, and Recovery Boilers 1 and 2, previously facilities integral to the Kraft pulp process at the former LP Pulp Mill, were demolished by Freshwater Tissue Company. Three piles of demolition debris remain on the Site. Based on correspondence with Jack Crider, CEO of the HBHRCD, and Jim Lund, former operator of the Kraft pulp mill facility, these debris piles contain constituents of concern (COCs) associated on the previous uses of the demolished structures. According to Mr. Lund, the following deleterious materials may be present at the Site:

- Heavy metals
- Heavy-range Petroleum Hydrocarbons
- Asbestos
- Boiler smelt, which is primarily sodium sulfide and sodium carbonate

As part of a large clean-up effort of the former LP Pulp Mill (now known as Redwood Terminal 2), HBHRCD and the County of Humboldt are seeking funding assistance from the US EPA to clean up the debris piles.

1.3.2 Debris Measurement and Characterization

On December 12, 2013, LACO conducted a field visit to the Site to measure the three debris piles and develop an estimate of volume for the purpose of developing a debris sampling plan. LACO also developed an estimate of the total weight of the three debris piles, to develop preliminary cost estimates for transport and off-site disposal. LACO field staff roughly characterized the material makeup of the piles through visual estimation of percentage of each major component (e.g., concrete, iron piping). An estimate of percent solids versus voids was also made. Unit weight of each major component was based on unit weight information from "Weights of Building Materials, Agricultural Commodities, and Floor Loads for Buildings," published by the Penn State College of Agricultural Sciences. The estimated total weight was calculated based on the estimated volume of each major component multiplied by the standardized unit weight of the component. The total estimated volume and weight will be used support estimating the cost for loading, transportation, and disposal.

- AOI 1 contains debris from the demolition from Recovery Boilers 1 and 2. The debris in AOI 1, Pile 1 is roughly characterized as approximately 94 percent blocky or crushed/disaggregated concrete, 1.5 percent metal, 1.5 percent brick, and 3 percent wood material. The total estimated volume of this debris pile is 1,182 cubic yards; the total estimated weight is 2,379 tons.
- AOI 1, Pile 2 is characterized as roughly 87 percent sand and gravel, 7 percent concrete, 1.5 percent metal, 1.5 percent brick, and 3 percent wood material. The total estimated volume of this debris pile is 141 cubic yards; the total estimated weight is 201 tons.
- AOI 2, Pile 1 contains debris from the demolition of the Digester and ASTs. The debris pile is characterized as approximately 80 percent concrete, 13 percent ceramic tile, 4 percent metal, and 3 percent wood. The total estimated volume of this debris pile is 1,080 cubic yards; the total estimated weight is 2,215 tons.

Photos of the three debris piles are included in Appendix 1.

1.3.3 Waste Sampling and Testing Methodology

Based on the estimated volumes for the three debris piles, LACO prepared a workplan for sample collection and testing, based on pre-disposal testing requirements for the Recology Hay Road waste facility in Vacaville, California, which was selected as the proxy facility to establish sampling methodology. The Recology standards require a 4:1 composite sample for each 250 cubic yards of material. The samples must be tested for any constituents that may be present based on prior use of the demolished structure. This waste characterization consisted of collection of 40 samples from the perimeter and vertical axis of the debris piles, in compliance with Recology's pre-disposal testing requirements. The number of samples for each debris pile is summarized in the table below:

Debris Pile	Estimated Volume (cubic yards)	No. of Samples to be Collected	No. of Consolidated Samples to be Tested
AOI 1, Pile 1	1,182	20	5
AOI 1, Pile 2	141	4	1
AOI 2, Pile 1	1,080	16	4
TOTALS	**2,403**	**40**	**10**

The samples were collected and shipped to Kiff Analytical Laboratories in Davis, California and Micro Analytical Laboratories in Emeryville, California (for Asbestos only) under standard chain of custody protocols for testing. The 40 samples were composited by the lab into 10 samples for testing. Based on the prior uses of the demolished structures, and in consultation with Jim Lund, whom is the former operator of the Kraft pulp facility, the samples were analyzed for the following constituents:

a. Asbestos, tested by Polarized Light Microscopy (PLM) using EPA Method – Building Materials
b. Diesel and Motor Oil with silica gel cleanup, by EPA 8105M
c. BTEX/MTBE, by EPA 8260 (standard requirement for all pre-disposal testing)
d. pH by EPA 150.2
e. LUFT 5 Metals by EPA 6010B
f. Sulfide by EPA 300.0
g. Sulfate by SM 4500-S2 D

1.3.4 Preliminary Waste Testing Results

To support evaluation of the cleanup alternatives and to determine the waste category for each of the three debris piles, LACO compared the concentration ranges of the COCs reported by the laboratory (see Appendix 2) with the California Title 22 Hazardous Waste Levels and the San Francisco Bay Regional Water Quality Control Board Screening Levels:

- Direct Exposure - Addresses direct exposure and toxicity to humans. Includes incidental ingestion, dermal contact, and inhalation of vapors or dust particles in outdoor air.
- Terrestrial Exposure – Addresses potential toxicity to terrestrial flora and fauna. For use in developed urban areas only.
- Ceiling – Addresses odor, nuisance, and general ceiling limits.
- Leaching – Addresses potential leaching of chemicals from soil and subsequent impact on shallow groundwater. Leaching of inorganic chemicals must be addressed on a site-by-site basis.
- Total Threshold Limit Concentration (TTLC) – The total concentrations of a COC which determines if a waste is characterized as hazardous.

- Soluble Threshold Limit Concentration (STLC) - The amount of each analyte that is soluble in the "Waste Extraction Test", (WET) leachate.

A table summarizing results for the laboratory testing is found in Appendix 3.

1.4 Project Goal

HBHRCD is currently working with the County of Humboldt and the US EPA to conduct cleanup efforts across the Subject Property. Mid- and long-term goals for the Subject Property include a public dock facility, aquaponics research facility, mariculture operations, and an energy research facility.

The Subject Property is currently zoned for coastal-dependent industrial uses. While the County of Humboldt, which has land use jurisdiction over the Subject Property, is undergoing a General Plan Update, the Subject Property's proposed General Plan land use and subsequent zoning designation will not change.

2.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS

2.1 Cleanup Oversight Responsibility

The Site cleanup will be overseen by HBHRCD.

2.2 Cleanup Standards for Major Contaminants

Cleanup standards for major contaminants will be based on the concentrations of COCs reported in each debris pile and whether or not they exceed respective environmental standards. Hazardous waste will be transported to a Class I waste facility (see section 3.1 for definitions). Designated waste will be transported to a Class II facility. Non-hazardous and inert waste will be either transported to a Class II or III waste facility or retained on-site for use as industrial fill.

2.3 Laws and Regulations Applicable to the Cleanup

Laws and regulations that are applicable to this cleanup include the Federal Small Business Liability Relief and Brownfields Revitalization Act, the Federal Davis-Bacon Act, the Federal Resource Conservation and Recovery Act, California Code of Regulations Title 22, California Regional Water Quality Control Board regulations, and County of Humboldt regulations. Federal, state, and local laws regarding procurement of contractors to conduct the cleanup and transport debris will be followed. In addition, all appropriate permits (e.g., waste transport/disposal manifests) will be obtained prior to the work commencing.

3.0 EVALUATION OF CLEANUP ALTERNATIVES

3.1 Cleanup Alternatives Considered

To address different waste classifications present at the Site, three different alternatives were considered, limited to: Alternative #1 - Cover and Prevent Access; Alternative #2 - Full Removal and Disposal; and Alternative #3 - Partial Removal and Disposal, On-site Reuse of Non-hazardous Waste. A No Action alternative was not considered due to the risk of exposure to COCs resulting from leaving the debris piles uncovered and accessible.

For the purposes of this analysis, the following definitions for waste classes and waste facilities will be applied:
(based on Article 2, Title 27, California Code of Regulations [CCR])

- Hazardous waste: Means any waste which, under Article 1, Chapter 11, Division 4.5 (§66261.3 et seq.) of Title 22 of the CCR, is required to be managed according to Division 4.5 of Title 22 of the CCR.
- Designated waste: either
  (a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code.
  (b) Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.
- Non-hazardous solid waste: All putrescible and non-putrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and other discarded waste (whether of solid or semi-solid consistency); provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste).
- Inert waste: That subset of solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste.

(per California State Water Resources Control Board)

- Class I waste facility: May accept hazardous and nonhazardous wastes.
- Class II waste facility: May accept "designated" and nonhazardous wastes.
- Class III waste facility: May accept nonhazardous wastes.
- Unclassified site: May accept inert wastes only.

3.1.1 Alternative #1: Cover and Prevent Access

This alternative involves covering the piles with a durable sheeting, installing stormwater BMPs, and fencing off access.

3.1.2 Alternative #2: Full Removal and Disposal

This alternative involves the removal of the three debris piles within the boundaries of the Site. All hazardous waste would be removed by a qualified contractor and transported and disposed of at a permitted Class I waste facility. All designated waste would be removed by a qualified contractor and transported and disposed of at a permitted Class I, II, or III waste facility, depending on waste characterization results. All non-hazardous waste would be removed by a qualified contractor and transported and disposed of at a permitted Class III waste facility. All inert waste would be removed by a qualified contractor and transported and disposed of at a permitted Class III or Unclassified waste facility.

3.1.3 Alternative #3: Partial Removal and Disposal, On-site Reuse of Non-hazardous Waste

This alternative involves the removal of hazardous waste from the three debris piles within the boundaries of the Site, and retention of non-hazardous waste on-site for future industrial fill uses. All hazardous waste would be removed by a qualified contractor and transported and disposed of at a permitted Class I waste facility. All non-hazardous solid waste would undergo additional testing with an XRF at the cubic yard level of discretion to support an evaluation of its reuse on the Subject Property for industrial fill material, following site analysis and development of industrial controls and under a Waste Discharge Permit from the North Coast Regional Water Quality Control Board. Prior to the use of the retained non-hazardous material for industrial fill, the material would be covered with durable sheeting and fenced off to prevent access.

3.2 Cost Estimate of Cleanup Alternatives

To satisfy EPA requirement, the effectiveness, implementability, and cost of each alternative must be considered prior to selecting a recommended cleanup alternative.

3.2.1 Effectiveness

- Alternative #1: Cover and Prevent Access has limited effectiveness in controlling or preventing the exposure of receptors to COCs at the Site. This alternative also increases the potential for leaching and runoff of COCs into the soil or surface waters over time. In addition, the presence of the debris on the Site would limit the ability of the Subject Property owner to accomplish the Project Goal and proposed site reuse.
- Alternative #2: Full Removal and Disposal is effective in removing the debris from the Site and properly disposing of the material at appropriate facilities. This would eliminate site specific exposure pathways.
- Alternative #3: Partial Removal and Disposal, On-site Reuse of Non-hazardous Waste is effective in removing the debris from the Site and properly disposing of the material at appropriate waste facilities, while reusing non-hazardous materials on-site for proper uses under industrial controls.

3.2.2 Implementability

- Alternative #1: Cover and Prevent Access is simple to implement since this alternative is limited to covering and presenting access to the debris piles.
- Alternative #2: Full Removal and Disposal is relatively simple to implement. Following characterization of the waste material, the waste material would need to be separated by waste classification and transported and disposed of at appropriately-classified waste facilities.
- Alternative #3: Partial Removal and Disposal, On-site Reuse of Non-hazardous Waste is relatively simple to implement. Following characterization of the waste material, the waste material would need to be separated by waste classification and transported and disposed of at appropriately-classified waste facilities. Non-hazardous waste deemed appropriate for on-site reuse would be kept on the Subject Property for use as industrial fill. The non-hazardous waste would need to be stored properly on the Site, which may entail the application of Best Management Practices to prevent release of pollutants into stormwater runoff and associated water quality impacts.

3.2.3 Cost

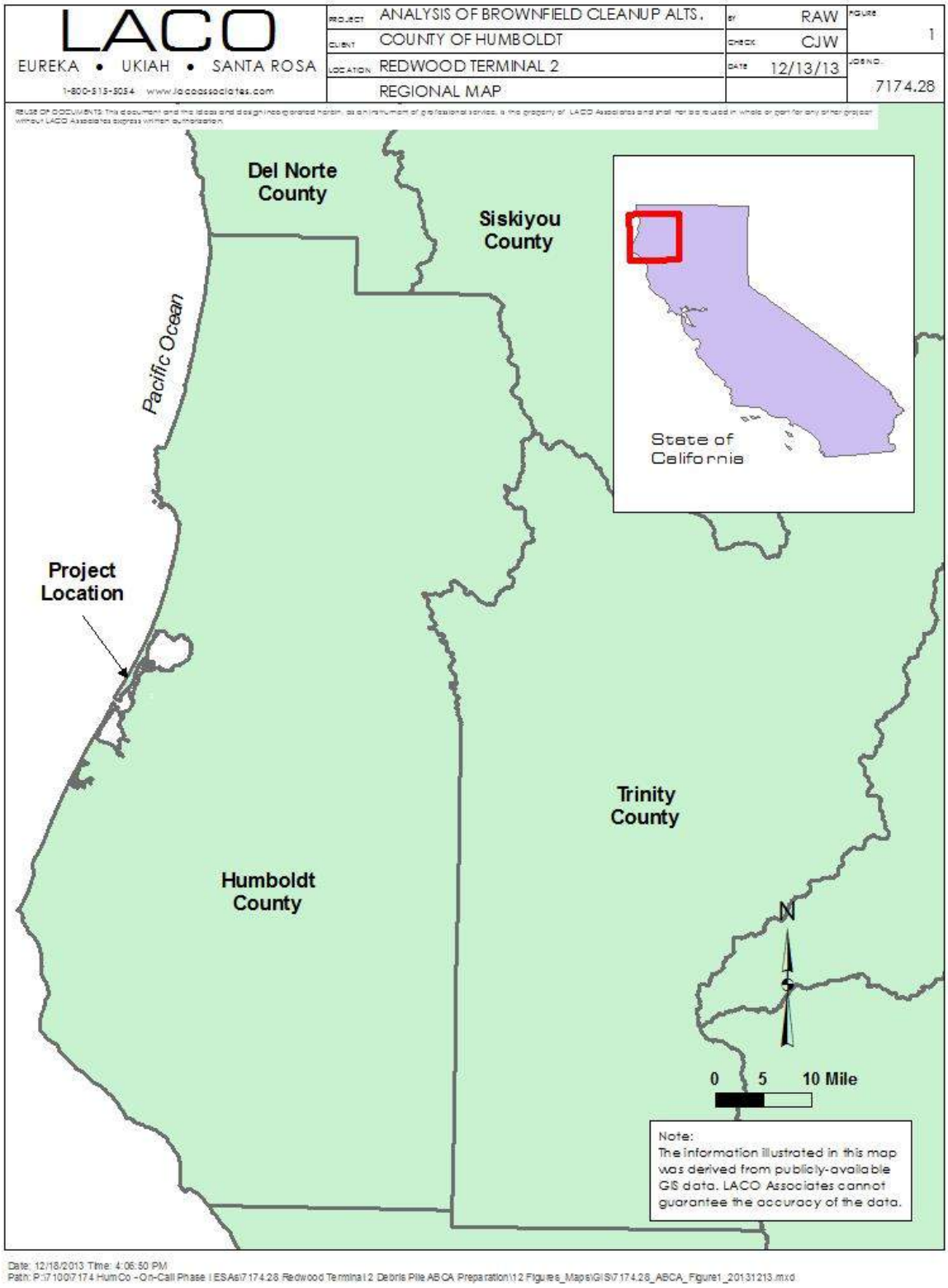
A preliminary cost comparison is provided below. A table with cost scenario comparisons is found in Appendix 4:

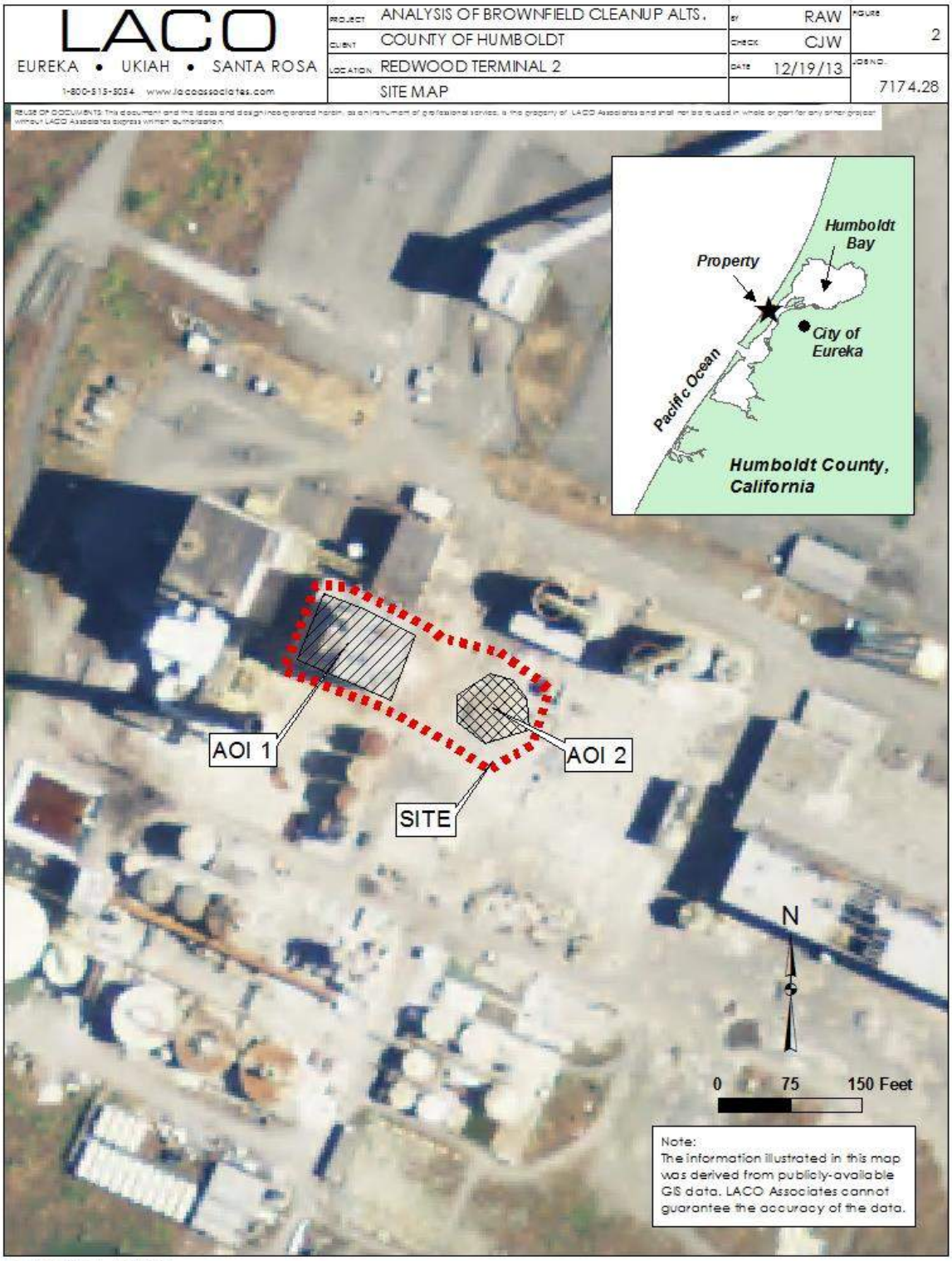
- Alternative #1: Cover and Prevent Access is the low cost alternative; costs would be limited to the purchase, installation, and maintenance of durable sheet plastic, stormwater BMPs, and fencing. Preliminary cost estimate is $5,000; this includes one year of implementation and maintenance of this alternative. Ongoing maintenance of this alternative would involve recurring costs.
- Alternative #2: Full Removal and Disposal is the highest-cost alternative, as it assumes removal and shipping of all debris from AOI 1 to a Class II waste facility, and removal and shipping of all debris from AOI 2 to a Class I waste facility. The preliminary cost estimate of this alternative is approximately $668,000. Should subsequent testing result in the need to ship all debris from all three debris piles to a Class I waste facility, the preliminary cost estimate is approximately $837,000. Subsequent testing results allowing for the disposal of more debris to Class II and Class III waste facilities will reduce the estimated cost of this alternative. The final cost estimate of this alternative will require further waste characterization testing to determine the level of contamination for particular constituents.
- Alternative #3: Partial Removal and Disposal, On-site Reuse of Non-hazardous Waste includes the cost of a Waste Discharge Permit from the North Coast Regional Water Quality Control Board (NCRWQCB) and a site analysis for on-site disposal of non-hazardous materials. The preliminary cost estimate for this alternative assumes: removal and shipping of 25 percent of debris from AOI 1 (Piles 1 and 2) to a Class II waste facility; removal and shipping of 25 percent of the debris from AOI 2 to a Class I waste facility; site analysis for materials disposal; NCRWQCB Waste Discharge Permit; County of Humboldt grading permit; and costs for on-site disposal of non-hazardous materials. The preliminary cost estimate for this alternative is approximately $220,000. Should subsequent XRF testing result in a higher volume of debris needing to be shipped and disposed of off-site at a Class I or II waste facility, the cost estimate will be higher; lower volumes required to be shipped off-site will reduce the cost estimate. The final cost estimate of this alternative will require further waste characterization testing with an XRF at the cubic yard level of discretization to determine the level of contamination for particular constituents. This cost estimate also assumes that a suitable location will be found on the Site for disposal of the non-hazardous materials, and that the NCRWQCB will issue a Waste Discharge Permit. This alternative may reduce future Site development costs by providing industrial fill for future Site grading or construction activities.

3.3 Recommended Cleanup Alternative

The recommended cleanup alternative is Alternative #3: Partial Removal and Disposal, On-site Reuse of Non-hazardous Waste. Alternative #1: Cover and Prevent Access cannot be recommended because it does not address exposure of receptors to COCs; temporary covering and fencing does not remedy the problem. The presence of the debris piles also limits the ability of the Subject Property owner to meet the project goals. Alternative #2, while addressing the potential presence of COCs and the potential exposure to receptors, is a higher-cost alternative than Alternative #3. In addition, because the Subject Property is expected to undergo significant development in the mid-term, the availability of quality industrial fills will reduce the costs of future construction. Implementation of Alternative #3 will retain the utility of the non-hazardous material from the Site.

FIGURES


LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com
PROJECT ANALYSIS OF BROWNFIELD CLEANUP ALTS.
CLIENT COUNTY OF HUMBOLDT
LOCATION REDWOOD TERMINAL 2
REGIONAL MAP
BY RAW
CHECK CJW
DATE 12/13/13
FIGURE 1
JOB NO. 7174.28
REUSE OF DOCUMENTS: This document and the ideas and designs incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be used in whole or part for any other project without LACO Associates express written authorization.
Del Norte County
Siskiyou County
Pacific Ocean
State of California
Project Location
Trinity County
Humboldt County
N
0 5 10 Mile
Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.
Date: 12/18/2013 Time: 4:06:50 PM
Path: P:\7100\7174 HumCo -On-Call Phase I ESAs\7174.28 Redwood Terminal 2 Debris Pile ABCA Preparation\12 Figures_Maps\GIS\7174.28_ABCA_Figure1_20131213.mxd



Date: 12/18/2013 Time: 4:07:19 PM
Path: P:\7100\7174 HumCo -On-Call Phase I ESAs\7174.28 Redwood Terminal 2 Debris Pile ABCA Preparation\12 Figures_Maps\GIS\7174.28_ABCA_Figure2_20131218.mxd

APPENDIX 1

Site Photos

LACO

AOI 1: Pile 1 (left) and Pile 2 (right)

AOI 1: Close-up of Pile 1

AOI 1: Pile 1 currently partially covered

AOI 1: Pile 1 currently partially covered

LACO

AOI 1: Pile 2

AOI 1: Close-up of Pile 2

AOI 2: Pile 1

AOI 2: Close-up of Pile 1

APPENDIX 2

Laboratory Testing Results

LACO

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/2014

Laboratory Results

Chris Watt
LACO Associates, Inc.
311 S. Main Street
Ukiah, CA 95482

Subject : 10 Soil Samples
Project Name : Pulp Mill Debris Pile Sampling
Project Number : 7591.09

Dear Mr. Watt,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed. Testing procedures comply with the 2003 NELAC and TNI 2009 standards. Laboratory results relate only to the samples tested. This report may be freely reproduced in full, but may only be reproduced in part with the express permission of Kiff Analytical, LLC. Kiff Analytical, LLC is certified by the State of California under the National Environmental Laboratory Accreditation Program (NELAP), lab # 08263CA. If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Troy G. Turpen

Troy Turpen

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/2014

Subject : 10 Soil Samples
Project Name : Pulp Mill Debris Pile Sampling
Project Number : 7591.09

Case Narrative

All soil samples were reported on a total weight (wet weight) basis.

Recoveries for some Matrix Spike/Matrix Spike Duplicate analytes were outside of control limits. This may indicate a bias for the samples that were spiked. Since the LCS recoveries were within control limits, no data are flagged.

KIFF Analytical LLC

Analysis Summary

Report Number : 87006
Date : 01/02/14

Attention : Chris Watt
LACO Associates, Inc.
311 S. Main Street
Ukiah, CA 95482

Project Name :Pulp Mill Debris Pile Sampling
Project Number : 7591.09

		Sample Name	7174-AOI1-A		7174-AOI1-B		7174-AOI1-C		7174-AOI1-D		7174-AOI1-E		7174-AOI2-A		7174-AOI2-B		7174-AOI2-C	
		Sample Date	12/23/13		12/23/13		12/23/13		12/23/13		12/23/13		12/23/13		12/23/13		12/23/13	
Analyte	Method	Units	MRL	Results	MRL	Results	MRL	Results	MRL	Results	MRL	Results	MRL	Results	MRL	Results	MRL	Results
pH	EPA 9045C	pH Units		**10.01**		**10.09**		**9.99**		**9.98**		**10.01**		**8.75**		**8.51**		**8.53**
Cadmium	EPA 6010B	mg/Kg	0.50	**6.9**	0.50	**4.8**	2.5	**4.5**	0.50	**3.8**	0.50	**4.4**	0.50	**1.0**	0.50	**2.0**	0.50	**2.3**
Chromium	EPA 6010B	mg/Kg	0.25	**180**	0.25	**210**	0.25	**310**	0.25	**740**	0.25	**220**	0.25	**110**	0.25	**100**	0.25	**61**
Lead	EPA 6010B	mg/Kg	0.50	**44**	0.50	**84**	2.5	**90**	0.50	**49**	0.50	**53**	0.50	**2300**	0.50	**2300**	0.50	**2100**
Nickel	EPA 6010B	mg/Kg	0.25	**190**	0.25	**330**	1.2	**340**	0.25	**490**	0.25	**200**	0.25	**85**	0.25	**72**	0.25	**50**
Zinc	EPA 6010B	mg/Kg	2.4	**650**	2.5	**860**	2.5	**1000**	2.4	**710**	2.4	**730**	1.0	**510**	2.4	**620**	2.4	**680**
Benzene	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Ethylbenzene	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Toluene	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Total Xylenes	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Methyl-t-butyl ether (MTBE)	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
1,2-Dichloroethane-d4 (Surr)	EPA 8260B	%		102		103		99.2		95.3		98.9		105		101		103
Toluene - d8 (Surr)	EPA 8260B	%		99.6		99.8		99.0		99.0		98.9		99.4		99.8		101
TPH as Diesel (Silica Gel)	M EPA 8015	mg/Kg	100	**270**	100	**480**	100	**370**	100	**390**	100	**440**	20	**110**	20	**100**	10	**57**
TPH as Motor Oil (Silica Gel)	M EPA 8015	mg/Kg	800	**1200**	800	**2200**	800	**1600**	800	**1900**	800	**2000**	200	**370**	200	**380**	80	**210**
Octacosane (Silica Gel Surr)	M EPA 8015	%		Diluted		Diluted		Diluted		Diluted		Diluted		Diluted		Diluted		127

MRL = Method Reporting Limit
ND = Not Detected

2795 2nd St., Suite 300 Davis, CA 95616 530-297-4800
ELAP # 2236

KIFF Analytical LLC

Analysis Summary

Report Number : 87006
Date : 01/02/14

Attention : Chris Watt
LACO Associates, Inc.
311 S. Main Street
Ukiah, CA 95482

Project Name :Pulp Mill Debris Pile Sampling
Project Number : 7591.09

		Sample Name	7174-AOI2-D		7174-AOI1-SP	
		Sample Date	12/23/13		12/23/13	
Analyte	Method	Units	MRL	Results	MRL	Results
pH	EPA 9045C	pH Units		**8.79**		**9.69**
Cadmium	EPA 6010B	mg/Kg	2.4	**2.7**	0.50	**0.75**
Chromium	EPA 6010B	mg/Kg	1.2	**110**	0.25	**100**
Lead	EPA 6010B	mg/Kg	2.4	**33000**	0.50	**29**
Nickel	EPA 6010B	mg/Kg	1.2	**83**	0.25	**72**
Zinc	EPA 6010B	mg/Kg	2.4	**840**	2.4	**2100**
Benzene	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND
Ethylbenzene	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND
Toluene	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND
Total Xylenes	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND
Methyl-t-butyl ether (MTBE)	EPA 8260B	mg/Kg	0.0050	ND	0.0050	ND
1,2-Dichloroethane-d4 (Surr)	EPA 8260B	%		103		100
Toluene - d8 (Surr)	EPA 8260B	%		99.9		100
TPH as Diesel (Silica Gel)	M EPA 8015	mg/Kg	10	**130**	20	**72**
TPH as Motor Oil (Silica Gel)	M EPA 8015	mg/Kg	80	**550**	200	**300**
Octacosane (Silica Gel Surr)	M EPA 8015	%		123		Diluted

MRL = Method Reporting Limit
ND = Not Detected

2795 2nd St., Suite 300 Davis, CA 95616 530-297-4800
ELAP # 2236

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI1-A** Matrix : Soil Lab Number : 87006-01
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**10.01**		pH Units	EPA 9045C	12/27/13 10:25
Cadmium	**6.9**	0.50	mg/Kg	EPA 6010B	12/31/13 10:28
Chromium	**180**	0.25	mg/Kg	EPA 6010B	12/31/13 10:28
Lead	**44**	0.50	mg/Kg	EPA 6010B	12/31/13 10:28
Nickel	**190**	0.25	mg/Kg	EPA 6010B	12/31/13 10:28
Zinc	**650**	2.4	mg/Kg	EPA 6010B	01/02/14 10:55
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 13:46
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 13:46
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 13:46
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 13:46
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 13:46
1,2-Dichloroethane-d4 (Surr)	102		% Recovery	EPA 8260B	12/27/13 13:46
Toluene - d8 (Surr)	99.6		% Recovery	EPA 8260B	12/27/13 13:46
TPH as Diesel (Silica Gel)	**270**	100	mg/Kg	M EPA 8015	12/31/13 12:07
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**1200**	800	mg/Kg	M EPA 8015	12/31/13 12:07
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/31/13 12:07

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI1-B** Matrix : Soil Lab Number : 87006-02
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**10.09**		pH Units	EPA 9045C	12/27/13 10:25
Cadmium	**4.8**	0.50	mg/Kg	EPA 6010B	12/31/13 10:33
Chromium	**210**	0.25	mg/Kg	EPA 6010B	12/31/13 10:33
Lead	**84**	0.50	mg/Kg	EPA 6010B	12/31/13 10:33
Nickel	**330**	0.25	mg/Kg	EPA 6010B	12/31/13 10:33
Zinc	**860**	2.5	mg/Kg	EPA 6010B	01/02/14 11:00
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 14:25
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 14:25
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 14:25
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 14:25
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 14:25
1,2-Dichloroethane-d4 (Surr)	103		% Recovery	EPA 8260B	12/27/13 14:25
Toluene - d8 (Surr)	99.8		% Recovery	EPA 8260B	12/27/13 14:25
TPH as Diesel (Silica Gel)	**480**	100	mg/Kg	M EPA 8015	12/31/13 11:31
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**2200**	800	mg/Kg	M EPA 8015	12/31/13 11:31
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/31/13 11:31

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI1-C** Matrix : Soil Lab Number : 87006-03
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**9.99**		pH Units	EPA 9045C	12/27/13 10:25
Cadmium	**4.5**	2.5	mg/Kg	EPA 6010B	01/02/14 11:06
Chromium	**310**	0.25	mg/Kg	EPA 6010B	12/31/13 10:38
Lead	**90**	2.5	mg/Kg	EPA 6010B	01/02/14 11:06
Nickel	**340**	1.2	mg/Kg	EPA 6010B	01/02/14 11:06
Zinc	**1000**	2.5	mg/Kg	EPA 6010B	01/02/14 11:06
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:01
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:01
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:01
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:01
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:01
1,2-Dichloroethane-d4 (Surr)	99.2		% Recovery	EPA 8260B	12/27/13 15:01
Toluene - d8 (Surr)	99.0		% Recovery	EPA 8260B	12/27/13 15:01
TPH as Diesel (Silica Gel)	**370**	100	mg/Kg	M EPA 8015	12/30/13 23:24
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**1600**	800	mg/Kg	M EPA 8015	12/30/13 23:24
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/30/13 23:24

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI1-D** Matrix : Soil Lab Number : 87006-04
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**9.98**		pH Units	EPA 9045C	12/27/13 10:26
Cadmium	**3.8**	0.50	mg/Kg	EPA 6010B	12/31/13 10:43
Chromium	**740**	0.25	mg/Kg	EPA 6010B	12/31/13 10:43
Lead	**49**	0.50	mg/Kg	EPA 6010B	12/31/13 10:43
Nickel	**490**	0.25	mg/Kg	EPA 6010B	12/31/13 10:43
Zinc	**710**	2.4	mg/Kg	EPA 6010B	01/02/14 11:11
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:35
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:35
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:35
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:35
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 15:35
1,2-Dichloroethane-d4 (Surr)	95.3		% Recovery	EPA 8260B	12/27/13 15:35
Toluene - d8 (Surr)	99.0		% Recovery	EPA 8260B	12/27/13 15:35
TPH as Diesel (Silica Gel)	**390**	100	mg/Kg	M EPA 8015	12/31/13 10:21
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**1900**	800	mg/Kg	M EPA 8015	12/31/13 10:21
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/31/13 10:21

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI1-E** Matrix : Soil Lab Number : 87006-05
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**10.01**		pH Units	EPA 9045C	12/27/13 10:26
Cadmium	**4.4**	0.50	mg/Kg	EPA 6010B	12/31/13 10:48
Chromium	**220**	0.25	mg/Kg	EPA 6010B	12/31/13 10:48
Lead	**53**	0.50	mg/Kg	EPA 6010B	12/31/13 10:48
Nickel	**200**	0.25	mg/Kg	EPA 6010B	12/31/13 10:48
Zinc	**730**	2.4	mg/Kg	EPA 6010B	01/02/14 11:16
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 16:09
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 16:09
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 16:09
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 16:09
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 16:09
1,2-Dichloroethane-d4 (Surr)	98.9		% Recovery	EPA 8260B	12/27/13 16:09
Toluene - d8 (Surr)	98.9		% Recovery	EPA 8260B	12/27/13 16:09
TPH as Diesel (Silica Gel)	**440**	100	mg/Kg	M EPA 8015	01/02/14 11:33
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**2000**	800	mg/Kg	M EPA 8015	01/02/14 11:33
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	01/02/14 11:33

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI2-A** Matrix : Soil Lab Number : 87006-06
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**8.75**		pH Units	EPA 9045C	12/27/13 10:26
Cadmium	**1.0**	0.50	mg/Kg	EPA 6010B	12/31/13 10:12
Chromium	**110**	0.25	mg/Kg	EPA 6010B	12/31/13 10:12
Lead	**2300**	0.50	mg/Kg	EPA 6010B	12/31/13 10:12
Nickel	**85**	0.25	mg/Kg	EPA 6010B	12/31/13 10:12
Zinc	**510**	1.0	mg/Kg	EPA 6010B	12/31/13 10:12
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 23:08
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 23:08
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 23:08
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 23:08
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 23:08
1,2-Dichloroethane-d4 (Surr)	105		% Recovery	EPA 8260B	12/27/13 23:08
Toluene - d8 (Surr)	99.4		% Recovery	EPA 8260B	12/27/13 23:08
TPH as Diesel (Silica Gel)	**110**	20	mg/Kg	M EPA 8015	12/30/13 21:03
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**370**	200	mg/Kg	M EPA 8015	12/30/13 21:03
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/30/13 21:03

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI2-B** Matrix : Soil Lab Number : 87006-07
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**8.51**		pH Units	EPA 9045C	12/27/13 10:26
Cadmium	**2.0**	0.50	mg/Kg	EPA 6010B	12/31/13 11:00
Chromium	**100**	0.25	mg/Kg	EPA 6010B	12/31/13 11:00
Lead	**2300**	0.50	mg/Kg	EPA 6010B	12/31/13 11:00
Nickel	**72**	0.25	mg/Kg	EPA 6010B	12/31/13 11:00
Zinc	**620**	2.4	mg/Kg	EPA 6010B	01/02/14 11:21
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 22:29
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 22:29
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 22:29
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 22:29
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 22:29
1,2-Dichloroethane-d4 (Surr)	101		% Recovery	EPA 8260B	12/27/13 22:29
Toluene - d8 (Surr)	99.8		% Recovery	EPA 8260B	12/27/13 22:29
TPH as Diesel (Silica Gel)	**100**	20	mg/Kg	M EPA 8015	12/30/13 21:39
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**380**	200	mg/Kg	M EPA 8015	12/30/13 21:39
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/30/13 21:39

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI2-C** Matrix : Soil Lab Number : 87006-08
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**8.53**		pH Units	EPA 9045C	12/27/13 10:26
Cadmium	**2.3**	0.50	mg/Kg	EPA 6010B	12/31/13 11:05
Chromium	**61**	0.25	mg/Kg	EPA 6010B	12/31/13 11:05
Lead	**2100**	0.50	mg/Kg	EPA 6010B	12/31/13 11:05
Nickel	**50**	0.25	mg/Kg	EPA 6010B	12/31/13 11:05
Zinc	**680**	2.4	mg/Kg	EPA 6010B	01/02/14 11:25
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:53
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:53
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:53
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:53
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:53
1,2-Dichloroethane-d4 (Surr)	103		% Recovery	EPA 8260B	12/27/13 21:53
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	12/27/13 21:53
TPH as Diesel (Silica Gel)	**57**	10	mg/Kg	M EPA 8015	12/31/13 09:45
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**210**	80	mg/Kg	M EPA 8015	12/31/13 09:45
Octacosane (Silica Gel Surr)	127		% Recovery	M EPA 8015	12/31/13 09:45

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI2-D** Matrix : Soil Lab Number : 87006-09
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**8.79**		pH Units	EPA 9045C	12/27/13 10:26
Cadmium	**2.7**	2.4	mg/Kg	EPA 6010B	01/02/14 11:30
Chromium	**110**	1.2	mg/Kg	EPA 6010B	01/02/14 11:30
Lead	**33000**	2.4	mg/Kg	EPA 6010B	01/02/14 11:30
Nickel	**83**	1.2	mg/Kg	EPA 6010B	01/02/14 11:30
Zinc	**840**	2.4	mg/Kg	EPA 6010B	01/02/14 11:30
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:16
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:16
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:16
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:16
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 21:16
1,2-Dichloroethane-d4 (Surr)	103		% Recovery	EPA 8260B	12/27/13 21:16
Toluene - d8 (Surr)	99.9		% Recovery	EPA 8260B	12/27/13 21:16
TPH as Diesel (Silica Gel)	**130**	10	mg/Kg	M EPA 8015	12/31/13 09:10
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**550**	80	mg/Kg	M EPA 8015	12/31/13 09:10
Octacosane (Silica Gel Surr)	123		% Recovery	M EPA 8015	12/31/13 09:10

KIFF Analytical LLC

Report Number : 87006
Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**
Project Number : **7591.09**

Sample : **7174-AOI1-SP** Matrix : Soil Lab Number : 87006-10
Sample Date :12/23/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date/Time Analyzed
pH	**9.69**		pH Units	EPA 9045C	12/27/13 10:27
Cadmium	**0.75**	0.50	mg/Kg	EPA 6010B	12/31/13 11:16
Chromium	**100**	0.25	mg/Kg	EPA 6010B	12/31/13 11:16
Lead	**29**	0.50	mg/Kg	EPA 6010B	12/31/13 11:16
Nickel	**72**	0.25	mg/Kg	EPA 6010B	12/31/13 11:16
Zinc	**2100**	2.4	mg/Kg	EPA 6010B	01/02/14 11:35
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 20:42
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 20:42
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 20:42
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 20:42
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13 20:42
1,2-Dichloroethane-d4 (Surr)	100		% Recovery	EPA 8260B	12/27/13 20:42
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	12/27/13 20:42
TPH as Diesel (Silica Gel)	**72**	20	mg/Kg	M EPA 8015	12/30/13 20:28
(Note: Hydrocarbons are higher-boiling than typical Diesel Fuel.)					
TPH as Motor Oil (Silica Gel)	**300**	200	mg/Kg	M EPA 8015	12/30/13 20:28
Octacosane (Silica Gel Surr)	Diluted Out		% Recovery	M EPA 8015	12/30/13 20:28

Report Number : 87006

Date : 01/02/14

QC Report : Method Blank Data

Project Name : **Pulp Mill Debris Pile Sampling**

Project Number : **7591.09**

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Cadmium	< 0.50	0.50	mg/Kg	EPA 6010B	12/31/13
Chromium	< 0.25	0.25	mg/Kg	EPA 6010B	12/31/13
Lead	< 0.50	0.50	mg/Kg	EPA 6010B	12/31/13
Nickel	< 0.25	0.25	mg/Kg	EPA 6010B	12/31/13
Zinc	< 1.0	1.0	mg/Kg	EPA 6010B	12/31/13
TPH as Diesel (Silica Gel)	< 1.0	1.0	mg/Kg	M EPA 8015	12/31/13
TPH as Motor Oil (Silica Gel)	< 10	10	mg/Kg	M EPA 8015	12/31/13
Octacosane (Silica Gel Surr)	94.8		%	M EPA 8015	12/31/13
Benzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13
Ethylbenzene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13
Toluene	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13
Total Xylenes	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg	EPA 8260B	12/27/13
1,2-Dichloroethane-d4 (Surr)	98.9		%	EPA 8260B	12/27/13
Toluene - d8 (Surr)	100		%	EPA 8260B	12/27/13

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed

KIFF ANALYTICAL, LLC

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Report Number : 87006

QC Report : Matrix Spike/ Matrix Spike Duplicate

Date : 01/02/14

Project Name : **Pulp Mill Debris Pile Sampling**

Project Number : **7591.09**

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
Cadmium														
	87006-06	1.0	49.0	49.0	52.6	50.8	mg/Kg	EPA 6010B	12/31/13	105	102	3.56	75-125	20
Chromium														
	87006-06	110	49.0	49.0	113	132	mg/Kg	EPA 6010B	12/31/13	**0.00**	**36.7**	15.5	75-125	20
Lead														
	87006-06	2300	49.0	49.0	1400	2320	mg/Kg	EPA 6010B	12/31/13	**0.00**	92.2	**49.2**	75-125	20
Nickel														
	87006-06	85	49.0	49.0	116	108	mg/Kg	EPA 6010B	12/31/13	**63.6**	**48.5**	6.59	75-125	20
Zinc														
	87006-06	510	49.0	49.0	317	750	mg/Kg	EPA 6010B	12/31/13	**0.00**	**495**	**81.3**	75-125	20
TPH-D (Si Gel)														
	86994-03	11	20.0	19.9	54.9	45.7	mg/Kg	M EPA 8015	12/31/13	**220**	**175**	22.9	60-140	25
Benzene														
	86948-01	<0.0050	0.0366	0.0351	0.0319	0.0280	mg/Kg	EPA 8260B	12/27/13	87.2	79.8	8.87	70.0-130	25
Ethylbenzene														
	86948-01	<0.0050	0.0366	0.0351	0.0322	0.0275	mg/Kg	EPA 8260B	12/27/13	88.0	78.2	11.8	70.0-130	25
Methyl-t-butyl ether														
	86948-01	<0.0050	0.0365	0.0350	0.0390	0.0329	mg/Kg	EPA 8260B	12/27/13	107	93.9	12.8	60.0-130	25

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2795 2nd Street, Suite 300 Davis, CA 95618 530-297-4800

Report Number : 87006

QC Report : Matrix Spike/ Matrix Spike Duplicate

Date : 01/02/2014

Project Name : **Pulp Mill Debris Pile Sampling**

Project Number : **7591.09**

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
P + M Xylene														
	86948-01	<0.0050	0.0366	0.0351	0.0314	0.0270	mg/Kg	EPA 8260B	12/27/13	85.7	76.8	10.9	70.0-130	25
Toluene														
	86948-01	<0.0050	0.0366	0.0351	0.0323	0.0280	mg/Kg	EPA 8260B	12/27/13	88.1	79.6	10.1	70.0-130	25

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QC Report : Laboratory Control Sample (LCS)

Project Name : **Pulp Mill Debris Pile Sampling**

Project Number : **7591.09**

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Cadmium	50.0	mg/Kg	EPA 6010B	12/31/13	98.5	85-115
Chromium	50.0	mg/Kg	EPA 6010B	12/31/13	98.9	85-115
Lead	50.0	mg/Kg	EPA 6010B	12/31/13	97.4	85-115
Nickel	50.0	mg/Kg	EPA 6010B	12/31/13	97.8	85-115
Zinc	50.0	mg/Kg	EPA 6010B	12/31/13	99.8	85-115
TPH-D (Si Gel)	20.0	mg/Kg	M EPA 8015	12/31/13	93.7	70-130
Benzene	0.0400	mg/Kg	EPA 8260B	12/27/13	97.1	70.0-130
Ethylbenzene	0.0400	mg/Kg	EPA 8260B	12/27/13	94.8	70.0-130
Methyl-t-butyl ether	0.0399	mg/Kg	EPA 8260B	12/27/13	114	60.0-130
P + M Xylene	0.0400	mg/Kg	EPA 8260B	12/27/13	93.0	70.0-130
Toluene	0.0400	mg/Kg	EPA 8260B	12/27/13	97.5	70.0-130

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Report Number : 87006

QC Report : Sample Duplicate

Date : 01/02/2014

Project Name : **Pulp Mill Debris Pile Sampling**

Project Number : **7591.09**

Parameter	Sample ID	Units	Analysis Method	Date Analyzed	Sample Value	Duplicate Value	RPD	RPD Limit
pH	87006-01	pH	EPA 9045C	12/27/13	10.01	9.97	0.4	25

NC RPD not calculated. Both Sample and Duplicate < Lab PQL

KIFF ANALYTICAL, LLC

2795 2nd Street, Suite 300 Davis, CA 95618 530-297-4800

KIFF Analytical LLC

2795 2nd Street, Suite 300
Davis, CA 95618
Lab: 530.297.4800
Fax: 530.297.4802

SRG # / Lab No. 87006

Page ___ of ___

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To): Chris Watt - LACO	California EDF Report? ☐ Yes ☑ No
Company / Address: 21 W 4th Street, Eureka, CA	Sampling Company Log Code:
Phone Number: 707-443-5054	Global ID:
Fax Number: 707-443-0553	EDF Deliverable To (Email Address): wattc@lacoassociates.com
Project #: 7591.09 P.O. #:	Bill to: LACO Associates
Project Name: Pulp Mill Debris Pile Sampling	Sampler Print Name: John Wellik
	Sampler Signature:

Project Address:

TAT: ☐ 12 hr ☐ 24 hr ☐ 48hr ☐ 72hr ☑ 1 wk

PLEASE CIRCLE METHOD

Sample Designation	Date	Time	Container: 40 ml VOA	Sleeve	Poly	Glass	Tedlar		Preservative: HCl	HNO_3	None			Matrix: Water	Soil	Air		MTBE @ 0.5 ppb (EPA 8260B)	BTEX (EPA 8260B)	TPH Gas (EPA 8260B)	5 Oxygenates (MTBE, DIPE, ETBE, TAME, TBA) (EPA 8260B)	7 Oxygenates (5 oxy + EtOH, MeOH) (EPA 8260B)	Lead Scav. (1,2 DCA & 1,2 EDB) (EPA 8260B)	Volatile Halocarbons (EPA 8260B)	Volatile Organics Full List (EPA 8260B)	Volatile Organics (EPA 524.2 Drinking Water)	TPH as Diesel (EPA 8015M) with silica gel clean up	TPH as Motor Oil (EPA 8015M) with silica gel clean up	CAM 17 Metals (EPA 200.7 / 6010)	5 Waste Oil Metals (Cd,Cr,Ni,Pb,Zn) (EPA 200.7 / 6010)	Mercury (EPA 245.1 / 7470 / 7471)	Total Lead (EPA 200.7 / 6010)	W.E.T. Lead (STLC)	SULFIDE BY EPA 300.0	SULFATE BY SM 4500-S2 D	pH by EPA 150.2		For Lab Use Only
7174-AOI1-A	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			01
7174-AOI1-B	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			02
7174-AOI1-C	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			03
7174-AOI1-D	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			04
7174-AOI1-E	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			05
7174-AOI2-A	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			06
7174-AOI2-B	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			07
7174-AOI2-C	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			08
7174-AOI2-D	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			09
7174-AOI1-SP	12/23/2013					X					X				X			X	X							X	X		X				X	X	X			10

Relinquished by:	Date	Time	Received by:
John Wellik	12/23/2013	1530	FED EX
	122413	13:21	

Remarks:
composite samples with identical sample id's (i.e. 4 jars lableled 7174-AOI1-A to be composited into one sample for analysis with an ID of 7174-AOI1-A); do the same for each sample ID

For Lab Use Only: Sample Receipt

Temp °C	Initials	Date	Time	Therm. ID #	Coolant Present
					Yes / No

Distribution: White - Lab; Pink - Originator
Rev: 052011

KIFF Analytical LLC

SAMPLE RECEIPT CHECKLIST

SRG #: 87006

Sample Receipt	**Initials/Date:** Eaj 122413	**Storage Time:** 1321	**Sample Login**	**Initials/Date:** Eaj 122413	
TAT: ☑ Standard	☐ Rush	☐ Split	☐ None	**Method of Receipt:** ☐ Courier	☐ Over-the-counter ☑ Shipped
Temp °C 5.2 ☐ N/A	Therm ID IR3	Time 0945	Coolant present ☑ Yes	☐ No ☐ Water	☐ Temp Excursion
For Shipments Only:	Cooler Receipt Initials/Date/Time: MAS 122413 0945		Custody Seals ☑ N/A	☐ Intact	☐ Broken

Chain-of-Custody:	**Yes**	**No**
Is COC present?	✓	
Is COC signed by relinquisher?	✓	
Is COC dated by relinquisher?	✓	
Is the sampler's name on the COC?	✓	
Are there analyses or hold for all samples?	✓	

Documented on	**COC**	**Labels**	**Discrepancies:**
Sample ID	✓	✓	
Project ID	✓		
Sample Date	✓	✓	
Sample Time			
Does COC match project history?	☑ N/A	☐ Yes	☐ No

Samples:	**N/A**	**Yes**	**No**
Are sample custody seals intact?	✓		
Are sample containers intact?		✓	
Is preservation documented?	✓		
In-house Analysis:	**N/A**	**Yes**	**No**
Are preservatives acceptable?	✓		
Are samples within holding time?		✓	
Are sample container types correct?		✓	
Is there adequate sample volume?		✓	

Receipt Details:

Matrix	Container Type	# of Containers
SO	4oz-glass	40

Comments: There is no method for the 5 waste oil Analysis request on the coc, SR logged it in as by 6010. Client Services to provide clarification for the sulfide and sulfate methods. Eaj 122413 1321

CS Required: ☑

Proceed With Analysis: ☐ YES ☐ NO Init/Date:
Client Communication:

Leaders in Analytical Science and Service

KIFF Analytical LLC

Subcontract Laboratory Report Attachments

2795 Second Street, Suite 300 Davis, CA 95618
tel 530.297.4800 fax 530.297.4808
www.kiffanalytical.com

Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 13-12-1954

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Kiff Analytical

Client Project Name: Pulp Mill Debris Pile Sampling

Attention: Joel Kiff
2795 2nd Street, Suite 300
Davis, CA 95618-6505

Amanda Porter

Approved for release on 01/03/2014 by:
Amanda Porter
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories, Inc.

Contents

Client Project Name: Pulp Mill Debris Pile Sampling
Work Order Number: 13-12-1954

Calscience Environmental Laboratories, Inc.

Work Order Narrative

Work Order: 13-12-1954 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain of Custody (COC) on 12/27/13. They were assigned to Work Order 13-12-1954.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

New York NELAP air certification does not certify for all reported methods and analytes, reference the accredited items here: http://www.calscience.com/PDF/New_York.pdf

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Kiff Analytical
2795 2nd Street, Suite 300
Davis, CA 95618-6505
Project: Pulp Mill Debris Pile Sampling

Date Received: 12/27/13
Work Order: 13-12-1954

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI1-A	**13-12-1954-1**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	6000	100	10		mg/kg	12/31/13	01/03/14	EPA 300.0
Sulfide, Total	12	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI1-B	**13-12-1954-2**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	9000	200	20		mg/kg	12/31/13	01/03/14	EPA 300.0
Sulfide, Total	7.5	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI1-C	**13-12-1954-3**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	5100	100	10		mg/kg	12/31/13	01/03/14	EPA 300.0
Sulfide, Total	11	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI1-D	**13-12-1954-4**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	14000	500	50		mg/kg	12/31/13	01/03/14	EPA 300.0
Sulfide, Total	7.0	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI1-E	**13-12-1954-5**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	5600	100	10		mg/kg	12/31/13	01/03/14	EPA 300.0
Sulfide, Total	1.5	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI2-A	**13-12-1954-6**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	490	10	1		mg/kg	12/31/13	12/31/13	EPA 300.0
Sulfide, Total	1.5	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI2-B	**13-12-1954-7**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	900	10	1		mg/kg	12/31/13	12/31/13	EPA 300.0
Sulfide, Total	ND	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Calscience Environmental Laboratories, Inc.

Analytical Report

Kiff Analytical
2795 2nd Street, Suite 300
Davis, CA 95618-6505
Project: Pulp Mill Debris Pile Sampling

Date Received: 12/27/13
Work Order: 13-12-1954

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI2-C	**13-12-1954-8**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	480	10	1		mg/kg	12/31/13	12/31/13	EPA 300.0
Sulfide, Total	2.5	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI2-D	**13-12-1954-9**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	410	10	1		mg/kg	12/31/13	12/31/13	EPA 300.0
Sulfide, Total	0.50	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
7174-AOI1-SP	**13-12-1954-10**	**12/23/13 00:00**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	1000	20	2		mg/kg	12/31/13	01/03/14	EPA 300.0
Sulfide, Total	0.50	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
Method Blank		**N/A**	**Solid**

Parameter	Results	RL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
Sulfate	ND	10	1		mg/kg	12/31/13	12/31/13	EPA 300.0
Sulfide, Total	ND	0.50	1		mg/kg	12/28/13	12/28/13	EPA 376.2M

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Kiff Analytical
2795 2nd Street, Suite 300
Davis, CA 95618-6505

Date Received: 12/27/13
Work Order: 13-12-1954
Preparation: N/A
Method: EPA 300.0

Project: Pulp Mill Debris Pile Sampling

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
7174-AOI1-A	**Solid**	**IC 7**	**12/31/13**	**12/31/13 22:25**	**131231S02**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Sulfate	5978	500.0	7286	4X	7297	4X	80-120	4X	0-20	Q

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - Sample Duplicate

Kiff Analytical		Date Received:	12/27/13
2795 2nd Street, Suite 300		Work Order:	13-12-1954
Davis, CA 95618-6505		Preparation:	N/A
		Method:	EPA 376.2M
Project: Pulp Mill Debris Pile Sampling			Page 1 of 1

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
7174-AOI2-D	**Solid**	**N/A**	**12/28/13 00:00**	**12/28/13 17:46**	**D1228SD1**

Parameter	Sample Conc.	DUP Conc.	RPD	RPD CL	Qualifiers
Sulfide, Total	0.5000	0.5000	0	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Quality Control - LCS

Kiff Analytical
2795 2nd Street, Suite 300
Davis, CA 95618-6505

Project: Pulp Mill Debris Pile Sampling

Date Received: 12/27/13
Work Order: 13-12-1954
Preparation: N/A
Method: EPA 300.0

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	LCS Batch Number
099-12-922-325	**Solid**	**IC 7**	**12/31/13 19:25**	**131231L02**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Sulfate	500.0	491.3	98	90-110	

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RPD: Relative Percent Difference. CL: Control Limits

Calscience Environmental Laboratories, Inc.

Sample Analysis Summary Report

Work Order: 13-12-1954 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 300.0	N/A	811	IC 7	1
EPA 376.2M	N/A	880	N/A	1

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Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order: 13-12-1954 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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KIFF Analytical LLC

2795 Second Street, Suite 300
Davis, CA 95618
Lab: 530.297.4800
Fax: 530.297.4808

Calscience
7440 Lincoln Way
Garden Grove, CA 92841-1427
714-895-5494

13-12-1954

COC No. **87006** Page 1 of 1

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF to): Scott Forbes

EDF Report? NO

Company/Address: Kiff Analytical

Phone No.: 530-297-4800 FAX No.: 530-297-4808

Project Number: 7591.09 P.O. No.: **87006**

Project Name: Pulp Mill Debris Pile Sampling

Project Address:

Recommanded but not mandatory to complete this section:

Sampling Company Log Code:

Global ID:

Deliverables to (Email Address): inbox@kiffanalytical.com

Sample Designation	Sampling Date	Sampling Time	Container / Preservative: 4 Oz. Glass None	Matrix: Soil	Analysis Request: Anions by EPA 300.0 SUB (1)	Analysis Request: Sulfide SUB	TAT: 4-Days	For Lab Use Only
7174-AOI1-A	12/23/13		1	X	X	X	X	1
7174-AOI1-B	12/23/13		1	X	X	X	X	2
7174-AOI1-C	12/23/13		1	X	X	X	X	3
7174-AOI1-D	12/23/13		1	X	X	X	X	4
7174-AOI1-E	12/23/13		1	X	X	X	X	5
7174-AOI2-A	12/23/13		1	X	X	X	X	6
7174-AOI2-B	12/23/13		1	X	X	X	X	7
7174-AOI2-C	12/23/13		1	X	X	X	X	8
7174-AOI2-D	12/23/13		1	X	X	X	X	9
7174-AOI1-SP	12/23/13		1	X	X	X	X	10

Relinquished by: Kiff Analytical LLC	Date 122613	Time 1700	Received by:	Remarks: Please refer to attached Test Detail.
Relinquished by:	Date	Time	Received by:	
Relinquished by: (Outrac)	Date 12/27/13	Time 1015	Received by Laboratory:	Bill to: Accounts Payable

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Test Detail for Kiff Work Order: 87006

1954

Anions by EPA 300.0 SUB (1)
Sulfate

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1954

Date Printed 12/26/2013

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KIFF ANALYTICAL
2795 2ND STREET 300
DAVIS, CA 95618

Sent By: SAMPLE RECEIVINGX125
Phone#: (530)297-4800
wgt(lbs): 40
Reference: SUBS
Reference 2: 600

Ship To Company:	*Service:* **S**
CALSCIENCE ENVIRONMENTAL LABS **7440 LINCOLN WAY** **GARDEN GROVE, CA 92841** **SAMPLE RECEIVING (714)895-5494**	*Sort Code:* **ORG** *Special Services:* **Signature Required**

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Calscience Environmental Laboratories, Inc.

WORK ORDER #: 13-12-1954

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Kiff

DATE: 12/27/13

TEMPERATURE: Thermometer ID: SC2 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 1.9 °C - 0.2 °C (CF) = 1.7 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter **Checked by:** 836

CUSTODY SEALS INTACT:

☑ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A **Checked by:** 836

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Checked by:** 836

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☐	☑	☐
☑ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☐	☐	☑
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Aqueous samples received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfides ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☑4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Aqueous: ☐VOA ☐VOAh ☐VOAna_2 ☐125AGB ☐125AGBh ☐125AGBp ☐1AGB ☐1AGBna_2 ☐1AGBs ☐500AGB ☐500AGJ ☐500AGJs ☐250AGB ☐250CGB ☐250CGBs ☐1PB ☐1PBna ☐500PB ☐250PB ☐250PBn ☐125PB ☐125PBznna ☐100PJ ☐100PJna_2 ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** 836

Container: C: Clear A: Amber P: Plastic G: Glass J: Jar B: Bottle Z: Ziploc/Resealable Bag E: Envelope **Reviewed by:** 659

Preservative: h: HCL n: HNO_3 na_2:$Na_2S_2O_3$ na: NaOH p: H_3PO_4 s: H_2SO_4 u: Ultra-pure znna: $ZnAc_2$+NaOH f: Filtered **Scanned by:** 659

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MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1004
John Wellik
LACO Associates
21 W. 4th Street
Ukiah, CA 95501

PROJECT:
PULP MILL DEBRIS SAMPLING
JOB NO. 7174.20

Micro Log In	**189503**
Total Samples	10
Date Sampled	10/23/2013
Date Received	12/26/2013
Date Analyzed	12/28/2013

SAMPLE IDENTIFICATION	ASBESTOS INFORMATION QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES	DOMINANT OTHER MATERIALS
Client #: **7174-A01 1 CN** Micro #: 189503-01 Analyst: MO **SOIL / DEBRIS**	**SOIL: NONE DETECTED**	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.
Client #: **7174-A01 1 W** Micro #: 189503-02 Analyst: MO **SOIL / DEBRIS**	**SOIL: NONE DETECTED**	3 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY
Client #: **7174-A01 1 E** Micro #: 189503-03 Analyst: MO **SOIL / DEBRIS**	**SOIL: NONE DETECTED**	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.
Client #: **7174-A01 1 CS** Micro #: 189503-04 Analyst: MO **SOIL / DEBRIS**	**SOIL: NONE DETECTED**	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY
Client #: **7174-A01 2 S** Micro #: 189503-05 Analyst: MO LZ **SOIL / DEBRIS**	**SOIL: NONE DETECTED**	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.

Technical Supervisor: Gamini Ranatunga, Ph.D. 12/29/2013 Date Reported

Analyses use Polarized Light Microscopy (PLM), Micro Analytical SOP PLM-101 (Rev. 1/4/2013). Basic techniques follow the EPA Interim Method for Bulk Insulation Samples (1982), and EPA-600/R93-116 (1993). The 1993 method covers all types of bulk materials and is based on the 1982 Method, with improved analytical techniques for layered samples as required for NESHAP compliance. Asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (much less than 1%) may not be reliable or reproducible by PLM. Weight % cannot be determined by PLM. Asbestos with diameter below ~1 µm may not be detected by PLM. Absence of asbestos in dust, debris, and some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Tremolite-asbestos or actinolite- asbestos may be indistinguishable by PLM from some similar, non-regulated amphiboles (e.g. the "Libby Amphiboles" richterite and winchite), and should be confirmed by TEM. The lower quantitation limit (reporting limit) of PLM estimation is 1%. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos; however, reliable determination of asbestos percent at this level cannot be done by PLM estimation; PLM Point Counting or TEM weight percent analysis are recommended. Only dominant non-asbestos materials are indicated. Interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Sample heterogeneity is indicated by listing more than one distinct layer or material on the report. Layers are analyzed separately when feasible; if asbestos is detected, percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. The notation ND (or "NONE DETECTED") indicates a result of "NO ASBESTOS DETECTED" in a homogeneous sample, or in all layers of a heterogeneous sample. Composite asbestos percentages from multiple layers are applicable only to wallboard / joint compound systems; compositing is based on customers' descriptions of material as "joint compound". Customers are solely responsible for identification and description of bulk materials listed on field forms. Laboratory descriptions may differ from those given by customers. Quality Control (QC): all results have been determined to be within acceptance limits prior to reporting. Samples that were reanalyzed are denoted by two sets of analyst initials. AIHA Accredited Laboratory ID No. 101768. NVLAP Lab Code 101872-0. CA ELAP Certification #1037. Unless otherwise stated herein, all samples were received in acceptable condition for analysis. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report shall not be reproduced except in full without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed.

MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1004
John Wellik
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21 W. 4th Street
Ukiah, CA 95501

PROJECT:
PULP MILL DEBRIS SAMPLING
JOB NO. 7174.20

Micro Log In **189503**
Total Samples 10
Date Sampled 10/23/2013
Date Received 12/26/2013
Date Analyzed 12/28/2013

SAMPLE IDENTIFICATION	ASBESTOS INFORMATION QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES	DOMINANT OTHER MATERIALS
Client #: 7174-A01 2 W Micro #: 189503-06 Analyst: MO SOIL / DEBRIS	SOIL: NONE DETECTED	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.
Client #: 7174-A01 2 E Micro #: 189503-07 Analyst: MO SOIL / DEBRIS	SOIL: NONE DETECTED	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.
Client #: 7174-A01 1 N Micro #: 189503-08 Analyst: MO SOIL / DEBRIS	SOIL: NONE DETECTED	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.
Client #: 7174-A01 1 N Micro #: 189503-09 Analyst: MO A01 1 DEBRIS PILE 2	SOIL / DEBRIS: NONE DETECTED	1 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.
Client #: 7174-A01 S Micro #: 189503-10 Analyst: MO A01 1 DEBRIS PILE 2	SOIL / DEBRIS: NONE DETECTED	2 % FIBROUS GLASS Matrix Type: ROCK FRAGMENTS, CLAY.

Technical Supervisor: for G. Gamini Ranatunga, Ph.D. 12/30/2013 Date Reported

Analyses use Polarized Light Microscopy (PLM), Micro Analytical SOP PLM-101 (Rev. 1/4/2013). Basic techniques follow the EPA Interim Method for Bulk Insulation Samples (1982), and EPA-600/R93-116 (1993). The 1993 method covers all types of bulk materials and is based on the 1982 Method, with improved analytical techniques for layered samples as required for NESHAP compliance. Asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (much less than 1%) may not be reliable or reproducible by PLM. Weight % cannot be determined by PLM. Asbestos with diameter below ~1 µm may not be detected by PLM. Absence of asbestos in dust, debris, and some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Tremolite-asbestos or actinolite- asbestos may be indistinguishable by PLM from some similar, non-regulated amphiboles (e.g. the "Libby Amphiboles" richterite and winchite), and should be confirmed by TEM. The lower quantitation limit (reporting limit) of PLM estimation is 1%. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos; however, reliable determination of asbestos percent at this level cannot be done by PLM estimation; PLM Point Counting or TEM weight percent analysis are recommended. Only dominant non-asbestos materials are indicated. Interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Sample heterogeneity is indicated by listing more than one distinct layer or material on the report. Layers are analyzed separately when feasible; if asbestos is detected, percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. The notation ND (or "NONE DETECTED") indicates a result of "NO ASBESTOS DETECTED" in a homogeneous sample, or in all layers of a heterogeneous sample. Composite asbestos percentages from multiple layers are applicable only to wallboard / joint compound systems; compositing is based on customers' descriptions of material as "joint compound". Customers are solely responsible for identification and description of bulk materials listed on field forms. Laboratory descriptions may differ from those given by customers. Quality Control (QC): all results have been determined to be within acceptance limits prior to reporting. Samples that were reanalyzed are denoted by two sets of analyst initials. AIHA Accredited Laboratory ID No. 101768. NVLAP Lab Code 101872-0. CA ELAP Certification #1037. Unless otherwise stated herein, all samples were received in acceptable condition for analysis. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report shall not be reproduced except in full without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed.

Client ID #

MICRO ANALYTICAL LABORATORIES, INC.

5900 Hollis St., Suite M, Emeryville, CA 94608
(510) 653-0624 - (510) 653-1361 - FAX

Log in # 189507

Name / Client / Address:
LACO Associates
21 W. 4th Street
Eureka, CA 95501

Tel. (707) 443-5054
Fax (707) 443-0553
E-mail wellikj@lacoassociates.com

Project
Pulp Mill Debris Sampling

Job No. 7174.20

Asbestos (TEM)
Asbestos PLM SOIL
Lead Only
Metals (Specify)
Mold, Non-Viable
Other (Specify)

Number of Samples: 10
Turn-Around Time: 3-5 DAYS

Micro ID # (For Lab Use Only)	Client Sample ID#	Description	Date Sampled	Time Sampled Start / Stop / Total Minutes	Average LPM	Total Liters	Filter Pore Size
1	7174-AOI 1 CN	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
2	7174-AOI 1 W	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
3	7174-AOI 1 E	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
4	7174-AOI 1 CS	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
5	7174-AOI 2 S	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
6	7174-AOI 2 W	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
7	7174-AOI 2 E	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
8	7174-AOI 2 N	SOIL/DEBRIS	12/23/2013	: : 0		0.00	
9	7174-AOI 1 N	AOI 1 DEBRIS PILE 2	12/23/2013	: : 0		0.00	
10	7174-AOI 1 S	AOI 1 DEBRIS PILE 2	12/23/2013	: : 0		0.00	

Instructions / Comments: ☐ Fax ☑ E-mail To: wellikjc@lacoassociates.com

Sample Return: YES ☐ NO ☑ If "YES" is checked, samples will be returned to the client or archived at Micro Analytical if required.
If "NO" is checked, solid samples may be disposed of within three months (one week for liquid samples, lab suspensions, and digestates).

Sampler's Signature / Name
John Wellik

Note to Lab: If any samples are not acceptable, record reasons for rejection.

Relinquished By: John Wellik — Date / Time: 12/23/13 1530 — Drop Box / Courier ☑ — Received By: FED EX — Date / Time: 12/23/13 1530

Relinquished By: — Date/Time: — Received By: Rec'd 1/7/14 P.26 — Date / Time: 11:07

APPENDIX 3

Laboratory Testing Results Summary Table

LACO

Constituent		Sample Location	Screening Levels									
			Direct Exposure[1]		Terrestrial Exposure[1]		Ceiling[1]		Leaching[1]		TTLC[1]	
			Res.	Com./ Ind.	Res.	Com./ Ind.	Res.	Com./ Ind.	Res.	Com./ Ind.	TTLC	STLC X 10
Cadmium	SL (mg/kg)		78	1,000	12	12	1,000	2,500	NV	NV	100	10
	Concentration Range	AOI 1 Pile 1	6.9 to 3.8 mg/kg									
		AOI 1 Pile 2	0.75 mg/kg									
		AOI 2 Pile 1	2.7 to 1.0 mg/kg									
Chromium III	SL (mg/kg)		120,000	1,500,000	750	750	1,000	2,500	NV	NV	2,500	**50**
	Concentration Range	**AOI 1 Pile 1**	**740** to **180** mg/kg									
		AOI 1 Pile 2	**100** mg/kg									
		AOI 2 Pile 1	**110** to **61** mg/kg									
Lead	SL (mg/kg)		**80**	**320**	**200**	NV	**1,000**	**2,500**	NV	NV	**1,000**	**50**
	Concentration Range	**AOI 1 Pile 1**	**90** to 44 mg/kg									
		AOI 1 Pile 2	29 mg/kg									
		AOI 2 Pile 1	**33,000** to **2,300** mg/kg									
Nickel	SL (mg/kg)		1,500	17,000	**150**	**150**	1,000	2,500	NV	NV	2,000	**200**
	Concentration Range	**AOI 1 Pile 1**	**490** to **190** mg/kg									
		AOI 1 Pile 2	72 mg/kg									
		AOI 2 Pile 1	85 to 50 mg/kg									
Zinc	SL (mg/kg)		23,000	310,000	**600**	**600**	**1,000**	2,500	NV	NV	5,000	2,500
	Concentration Range	**AOI 1 Pile 1**	**1,000** to **650** mg/kg									
		AOI 1 Pile 2	**2,100** mg/kg									
		AOI 2 Pile 1	**840** to 510 mg/kg									
TPHd	SL (mg/kg)		3,900	12,000	NV	NV	**100**	5,000	**83**	530		
	Concentration Range	**AOI 1 Pile 1**	**480** to 270 mg/kg									
		AOI 1 Pile 2	72 mg/kg									
		AOI 2 Pile 1	**130** to 57 mg/kg									
TPHmo	SL (mg/kg)		120,000	1,200,000	NV	NV	**500**	5,000	NV	NV		
	Concentration Range	**AOI 1 Pile 1**	**2,200** to **1,200** mg/kg									
		AOI 1 Pile 2	300 mg/kg									
		AOI 2 Pile 1	**550** to 210 mg/kg									

SL = Screening Level, NV = No Value provided; **bold** indicates concentration exceeds SL

Res. = Residential; Com./Ind. = Commercial/Industrial

TTLC = Total Threshold Limit Concentration

STLC = Soluble Threshold Limit Concentration

1. Screening Level values derived from San Francisco Bay Regional Water Quality Control Board Environmental Screening Level Workbook

2. California Environmental Protection Agency

APPENDIX 4

Cost Comparisons Table

LACO

Debris Pile ID	Source	Volume (yd^3)	Mass (tons)	Cost Estimate Alt 2A (AOI 1 to Class II, AOI 2 to Class I)	Cost Estimate Alt 2B (All debris to Class I)	Cost Estimate Alt 3A (25% AOI 1 to Class II, 25% AOI 2 to Class I, remainder on-site)	Cost Estimate Alt 3B (25% AOI 1 to Class II, 50% AOI 2 to Class I, remainder on-site)	Cost Estimate Alt 3C (25% AOI 1 to Class II, 75% AOI 2 to Class I, remainder on-site)
AOI 1 Pile 1	Recovery Boilers 1 and 2	1,182	1,546	$231,900	$386,500	$66,840	$66,840	$66,840
AOI 1 Pile 2	Imported Sand Pile	141	140	$21,000	$35,000	$6,308	$6,308	$6,308
AOI 2 Pile 1	Digester/ASTs	1,080	1,661	$415,250	$415,250	$111,913	$213,025	$314,138
	NCRWQCB Waste Discharge Permit			$0	$0	$20,000	$20,000	$20,000
	Humboldt County Grading Permit			$0	$0	$5,000	$5,000	$5,000
	On-site Disposal Analysis			$0	$0	$10,000	$10,000	$10,000
	TOTALS	2,403	3,347	**$668,150**	**$836,750**	**$220,060**	**$321,173**	**$422,285**

Appendix B

Debris Pile Sampling Results and Screening Levels

Table B-1
Observed Constituents in Debris Piles and Screening Levels
(Adapted from LACO 2014)

Constituent	Range	Location	Direct Exposure		Terrestrial Exposure		Ceiling		Leaching		TTLC[1]	
			Residential	Commercial /Industrial	Residential	Commercial /Industrial	Residential	Commercial /Industrial	Residential	Commercial /Industrial	TTLC	STLC[2]x10
Cadmium	Screening Level (mg/kg)[3]		78	1,000	12	12	1,000	2,500	NV[4]	NV	100	10
	Concentration Range (mg/kg)	AOI #1 Pile #1	3.8 to 6.9									
		AOI #1 Pile #2	0.75									
		AOI #2 Pile #3	1.0 to 2.7									
Chromium III	Screening Level (mg/kg)		120,000	1,500,000	750	750	1,000	2,500	NV	NV	2,500	**50**
	Concentration Range (mg/kg)	**AOI #1 Pile #1**	**180** to **740**									
		AOI #1 Pile #2	100									
		AOI #2 Pile #3	**61** to **110**									
Lead	Screening Level (mg/kg)		**80**	**320**	**200**	NV	**1,000**	**2,500**	NV	NV	**1,000**	**50**
	Concentration Range (mg/kg)	**AOI #1 Pile #1**	44 to **90**									
		AOI #1 Pile #2	29									
		AOI #2 Pile #3	**2,300** to **33,000**									
Nickel	Screening Level (mg/kg)		1,500	17,000	**150**	**150**	1,000	2,500	NV	NV	2,000	**200**
	Concentration Range (mg/kg)	**AOI #1 Pile #1**	**190** to **490**									
		AOI #1 Pile #2	72									
		AOI #2 Pile #3	50 to 85									
Zinc	Screening Level (mg/kg)		23,000	310,000	**600**	**600**	**1,000**	2,500	NV	NV	5,000	2,500
	Concentration Range (mg/kg)	**AOI #1 Pile #1**	**650** to **1,000**									
		AOI #1 Pile #2	**2,100**									
		AOI #2 Pile #3	510 to **840**									
TPHd	Screening Level (mg/kg)		3,900	12,000	NV	NV	100	5,000	**83**	**530**	NV	NV
	Concentration Range (mg/kg)	**AOI #1 Pile #1**	270 to **480**									
		AOI #1 Pile #2	72									
		AOI #2 Pile #3	27 to **130**									
TPHmo	Screening Level (mg/kg)		120,000	1,200,000	NV	NV	**500**	5,000	NV	NV	NV	NV
	Concentration Range (mg/kg)	**AOI #1 Pile #1**	**1,200** to **2,200**									
		AOI #1 Pile #2	300									
		AOI #2 Pile #3	210 to **550**									

1. TTLC: Total Threshold Limit Concentration 2. STLC: Soluble Threshold Limit Concentration 3. mg/kg: milligrams per kilogram 4. NV: No Value
Items in **bold** indicate concentration above the screening level.
Screening Level values derived from San Francisco Bay Regional Water Quality Control Board Environmental Screening Level Workbook

Appendix C

Cost Estimates

Table C-1 Estimated Costs for Alternative 2	
Remove Sand from Cell	$ 10,000
Design Final Cover System	$ 30,000
Restore and Reconstruct Final Cover System	$ 100,000
Disposal Analysis	$ 10,000
Permitting	$ 150,000
Total	**$ 300,000**

Table C-2
Preliminary Cost Estimate for Alternatives 3 and 4

Debris Pile ID	Source	Volume (yd^3)	Mass (tons)	Full Class I Disposal	AOI #1 to Class II, AOI II to Class I	25% AOI I to Class II, 25% AOI II to Class I	25% AOI I to Class II, 50% AOI II to Class I	25% AOI I to Class II, 75% AOI II to Class I
AOI #1 Pile 1	Recovery Boilers 1 and 2	1,182	1,546	$ 425,200	$ 264,000	$ 66,000	$ 66,000	$ 66,000
AOI #1 Pile 2	Imported Sand Pile	141	140	$ 39,000	$ 24,000	$ 6,000	$ 6,000	$ 6,000
AOI #2 Pile 1	Digester/ASTs	1,080	1,661	$ 456,800	$ 457,000	$ 114,500	$ 228,500	$ 311,500
	NCRWQCB Waste Discharge Permit			$ -	$ -	$ 22,000	$ 22,000	$ 22,000
	Humboldt County Grading Permit			$ -	$ -	$ 5,500	$ 5,500	$ 5,500
	On-Site Disposal Analysis			$ -	$ -	$ 11,000	$ 11,000	$ 10,000
	Totals	**2,403**	**3,347**	**$ 921,000**	**$ 745,000**	**$ 225,000**	**$ 339,000**	**$ 421,000**

Table C-3 Preliminary Cost Estimate for Alternative 4						
Budget Categories	**Task 1. Prepare Plans**	**Task 2. Implement Plans**	**Task 3. Coordinate Disposal**	**Task 4. Engage Community**	**Task 5. Manage Project**	**Totals**
* District Personnel	$4,800	$1,200	$2,400	$1,200	$1,200	$10,800
* Consultant Personnel	$9,600	$4,800	$3,600	$2,400	$2,400	$22,800
* Contractual—General Contractors		$7,500	$10,000			$17,500
* Contractual—Analytical Lab, Petroleum		$4,750				$4,750
* Contractual—Analytic Lab, Metals and Solvents		$2,125				$2,125
Contractual—Transport and Disposal Class I			$137,500			$137,500
Contractual—Transport and Disposal Class II			$97,500			$97,500
Total Federal Funding, not to exceed $200,000			$200,000			$200,000
* Cost Share, minimum 20% of requested Federal funds	$14,400	$20,375	$51,000	$3,600	$3,600	$92,975
Total Budget						$292,975