Marie Jones
Community Development Director
416 N. Franklin Street
Fort Bragg, California 95437

Arcadis U.S., Inc.
100 Montgomery Street
Suite 300
San Francisco
California 94104
Tel 415 374 2744
Fax 415 374 2745
www.arcadis.com

Subject:
Coastal Development Permit Application Package

ENVIRONMENT

Dear Ms. Jones:

Arcadis U.S. (Arcadis) is pleased to provide the City of Fort Bragg this Coastal Development Permit (CDP) Application on behalf of Georgia-Pacific LLC (Georgia-Pacific) for the Remedial Action Plan (RAP) for Operable Units C and D (OU-C and OU-D) at the former Georgia-Pacific Wood Products Facility located at 90 West Redwood Avenue, Fort Bragg, Mendocino County, California. Please review and contact myself at 415-491-4530 x24, or justin.sobieraj@arcadis.com, should you have any questions.

Date:
December 17, 2015

Contact:
Justin Sobieraj

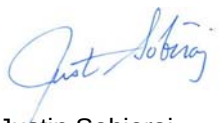
Phone:
415-491-4530 x24

Email:
justin.sobieraj@arcadis.com

Our ref:
B0066142.2015.ED771

Sincerely,

Arcadis U.S., Inc.



Justin Sobieraj

Project Manager

Enclosures:

Attachments

1 CDP Application
2 OU-C and OU-D RAP
3 OU-C and OU-D RAP, DTSC Approval Letter
4 Check for CDP Application Fees
5 (3) Sets of 24” x 36” Drawings pertaining to the OU-C and OU-D RAP

Print Form

CITY OF FORT BRAGG
COMMUNITY DEVELOPMENT DEPARTMENT
416 North Franklin Street
Fort Bragg, CA 95437
Tel: (707) 961-2827
Fax: (707) 961-2802
http//city.fortbragg.com

Case No(s) _____
Date Filed _____
Fee _____
Receipt No. _____
Received by _____
Office Use Only – December 2011

PLANNING APPLICATION FORM

Please complete this application thoroughly and accurately, and attach the required exhibits as indicated in the applicable brochure available from the Community Development Department. An incomplete application will not be accepted for processing. Please note that administrative permits may require additional fees if an interested party requests a public hearing. Public hearing expenses are borne by the applicant, owner, or agent.

APPLICANT

Name: Dave Massengill, Georgia-Pacific LLC
Mailing Address: 133 Peachtree Street NE Phone: 404-652-5054
City: Atlanta State: GA Zip Code: 30303 Email: dgmassen@gapac.com

PROPERTY OWNER

Name: Georgia-Pacific LLC
Mailing Address: 133 Peachtree Street NE Phone: 404-652-5054
City: Atlanta State: GA Zip Code: 30303 Email: dgmassen@gapac.com

AGENT

Name:
Mailing Address: Phone:
City: State: Zip Code: Email:

STREET ADDRESS OF PROJECT 90 W. Redwood Ave., Fort Bragg, CA 95437

ASSESSOR'S PARCEL NUMBER(S) see below in "Project Description"

PROPERTY SIZE Square Feet *or* 415 Acres

TYPE OF APPLICATION (Check all applicable boxes)

- [ ] Design Review/Site & Architectural Review
- [ ] Use Permit/Minor Use Permit
- [x] Coastal Development Permit
- [ ] Variance/Administrative Variance
- [ ] Lot Line Adjustment
- [ ] Subdivision (no. of parcels)
- [ ] Certificate of Appropriateness (COA)
- [ ] Planned Development Permit
- [ ] Certificate of Compliance
- [ ] General Plan Amendment
- [ ] Local Coastal Program Amendment
- [ ] Rezoning
- [ ] Annexation
- [ ] Preapplication Conference
- [ ] Limited Term Permit
- [ ] Permit Amendment (list permits)

PROJECT DESCRIPTION (Briefly describe project as shown on proposed plans.)

Remedial activities primarily comprised of hot spot excavation in Operable Units C and D - please see attached Remedial Action Plan.

APNs: 008-010-36-00, 008-020-13-00, 008-053-34-00, 008-151-22-00, 008-161-08-00, 008-010-67-00, 008-020-01-00, 018-030-42-00, 018-040-52-00, 018-120-44-00, 018-120-50-00, 018-430-13-00, and 018-430-16-00.

CERTIFICATION

I hereby certify that I have read this completed application and that, to the best of my knowledge, the information in this application and all attachments is complete and accurate. I understand that failure to provide requested information or misstatements submitted in support of the application shall be grounds for either refusing to accept the application, for denying the permit, for suspending or revoking a permit issued on the basis of such misrepresentations, or for seeking of such further relief as may seem proper to the City.

Signature of Applicant/Agent _____ Date _____ Signature of Property Owner _____ Date 12/14/15

INDEMNIFICATION AND HOLD HARMLESS AGREEMENT

ORDINANCE No. 771, adopted by the Fort Bragg City Council on September 26, 1994, requires applicants for discretionary land use approvals to sign the following Indemnification Agreement. Failure to sign this agreement will result in the application being considered incomplete and withheld from further processing.

As part of this application, the applicant agrees to defend, indemnify, release and hold harmless the City of Fort Bragg, its agents, officers, attorneys, employees, boards and commissions, as more particularly set forth in Fort Bragg Municipal Code Chapter 18.77, from any claim, action or proceeding brought against any of the foregoing individuals or entities, the purpose of which is to attach, set aside, void or annul the approval of this application or adoption of the environmental document which accompanies it. The indemnification shall include, but not be limited to, damages, costs, expenses, attorney fees or expert witness fees that may be asserted by any person or entity, including the applicant, arising out of or in connection with the approval of this application, whether or not there is concurrent, passive or active negligence on the part of the City, its agents, officers, attorneys, employees, boards and commissions.

Signature of Applicant _____ Date 12/14/15

SITE VIEW AUTHORIZATION

I hereby grant permission for City staff and hearing bodies to enter upon and site view the premises for which this application is made in order to obtain information necessary for the preparation of required reports and render its decision.

Property Owner/Authorized Agent _____ Date 12/14/15

*NOTE: If signed by agent, **owner** must sign "Authorization of Agent" below.*

DECLARATION OF POSTING

At the time the application is submitted for filing, the applicant must complete and post the "Notice of Pending Permit" form at a conspicuous place, easily read by the public and as close as possible to the project site. If the applicant fails to post the completed notice form and sign the Declaration of Posting, the Community Development Department cannot process the application.

I hereby certify that I or my authorized representative posted the "Notice of Pending Permit" form in a conspicuous place, easily seen by the public and as close as possible to the project site for:

Cypress Street Gate

(Describe location where notice is posted)

Property Owner/Authorized Agent _____ Date 12/14/15

*NOTE: If signed by agent, **owner** must sign "Authorization of Agent" below.*

AUTHORIZATION OF AGENT

I hereby authorize _____ to act as my representative and to bind me in all matters concerning this application.

Property Owner _____ Date _____

ARCADIS
Infrastructure · Water · Environment · Buildings

Georgia-Pacific LLC

Remedial Action Plan
Operable Units C and D

Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

December 2015

ARCADIS

Erik Mantor, PE
Environmental Engineer (CA# C82252)

Jeremie Maehr, PE
Program Manager, Principal Engineer (CA# C68970)

Remedial Action Plan
Operable Units C and D

Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Prepared for:
Georgia-Pacific LLC

Prepared by:
ARCADIS U.S., Inc.
100 Montgomery Street
Suite 300
San Francisco
California 94104
Tel 415 374 2744
Fax 415 374 2745

Our Ref.:
B0066142.2015.ED660

Date:
December 2015

Tables

Figures

Appendices

Acronyms and Abbreviations

1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
1,2-DCA	1,2-dichloroethane
1,2,4-TMB	1,2,4-trimethylbenzene
µg/l	micrograms per liter
ACM	asbestos-containing material
AOI	area of interest
AME	Acton•Mickelson•Environmental, Inc.
ARARs	applicable or relevant and appropriate requirements
ARCADIS	ARCADIS U.S., Inc.
AST	aboveground storage tank
B(a)P	benzo(a)pyrene
BCI	Blackburn Consulting, Inc.
bgs	below ground surface
BHHRA	baseline human health risk assessment
BLRA	baseline risk assessment
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CalEPA	California Environmental Protection Agency
CAM	California Assessment Manual
CCA	chromated copper arsenate
CEQA	California Environmental Quality Act
CERCLA	Federal Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
CHHSL	California Human Health Screening Level
cis-1,2-DCE	cis-1,2-dichloroethene
City	City of Fort Bragg, California
COI	chemical of interest
COC	chemical of concern
Complex	Franciscan Complex

COPC	compounds of potential concern
CSM	conceptual site model
CVOC	chlorinated volatile organic carbon
cy	cubic yards
dioxins/furans	polychlorinated dibenzo-*p*-dioxin/polychlorinated dibenzofuran
DTSC	Department of Toxic Substances Control
EPC	exposure point concentration
ERM	Environmental Resources Management
ESA	Environmental Site Assessment
EU	Exposure Unit
FS	Feasibility Study
FS Report	*Feasibility Study OU-C and OU-D* (ARCADIS, 2012a)
Georgia-Pacific	Georgia-Pacific LLC
GRA	General Response Action
HES	Hygienetics Environmental Services, Inc.
HHRA	human health risk assessment
HSC	Health and Safety Code
IC	institutional control
IRM	interim remedial measure
ISSS	in-situ stabilization/solidification
LBP	lead-based paint
LGW	leaching to groundwater
LPH	liquid-phase hydrocarbon
LUC	land use covenant
MCL	Maximum Contaminant Level
MES	Former Mobile Equipment Shop
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation

MNA Report	*Monitored Natural Attenuation Technical Report* (ARCADIS, 2013a)
MS	Machine Shop
MSDS	material safety data sheet
MTBE	methyl tertiary-butyl ether
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCRWQCB	North Coast Regional Water Quality Control Board
O&M	operation and maintenance
Order	Site Investigation and Remediation Order (Docket No. HAS-RAO 06-07-150)
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCP	pentachlorophenol
pg/g	picograms per gram
PRA	presumptive remedy area
RAO	remedial action objective
RAP	remedial action plan
RDIP	Remedial Design and Implementation Plan
RBSC	risk-based screening criteria
RBTL	risk based target levels
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI Report	*Remedial Investigation Operable Units C and D Report* (ARCADIS, 2011a)
Site-Wide RAWP	*Site-Wide Risk Assessment Work Plan* (ARCADIS BBL, 2008b)
SFRWQCB	San Francisco Bay Regional Water Quality Board
site	Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
SMP	Soil Management Plan

Soil Vapor Work Plan	*Follow-up Investigation and Soil Vapor Evaluation Work Plan* (ARCADIS, 2009c)
SSL	soil screening level
SVOC	semivolatile organic compound
TBC	to-be-considered
TCDD	tetrachlorodibenzo-p-dioxin
TEQ	toxic equivalent
TP Burner	Refuse Burner located in the Sawmill/Sorter Area
TPH	total petroleum hydrocarbons
TPHd	total petroleum hydrocarbons in the diesel range
TPHg	total petroleum hydrocarbons in the gasoline range
TPHmo	total petroleum hydrocarbons in the motor oil range
TRC	TRC Companies, Inc.
UCL	upper confidence limit
ULC	Union Lumber Company
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
WQO	water quality objective

Executive Summary

This document was prepared by ARCADIS U.S., Inc. (ARCADIS) on behalf of Georgia-Pacific LLC (Georgia-Pacific) and presents a Remedial Action Plan (RAP) to address soils and groundwater within Operable Units C and D (OU-C and OU-D) at the former Georgia-Pacific Wood Products Facility (site) located at 90 West Redwood Avenue, Fort Bragg, Mendocino County, California (Figure 1-1). This RAP is required by the Department of Toxic Substances Control (DTSC) under Section 5.11 of the Site Investigation and Remediation Order for the site (Docket No. HSA-RAO-06-07-150; the Order). An administrative record is included as Appendix A.

Background

OU-C and OU-D comprise 282 acres within the 415-acre site. These operable units were used for industrial activities, such as sawmill and planing operations. OU-C and OU-D include 32 areas of interest (AOIs; 20 in OU-C and 12 in OU-D) based on historical use and data derived from previous investigations (Figure 2-2). Eight AOIs received No Further Action (NFA) determinations in the *Remedial Investigation Operable Units C and D Report* (RI Report; ARCADIS, 2011a). Three AOIs (West IRM, IRM, and Riparian) were removed from OU-C and placed into OU-E because of similarities in environmental setting with OU-E and the possible day-lighting of Maple Creek. This RAP addresses the remaining 21 AOIs, proposing remedial actions for 10 AOIs and NFA for 11 AOIs. Table 2-2 summarizes the status of all AOIs in OU-C and OU-D.

The RI Report includes data collected through several investigations from 1998 to 2009. These investigations included: a lead-based paint investigation conducted in 1998 by TRC Companies, Inc. (TRC), a Phase I Environmental Site Assessment (ESA) performed between 2002 and 2004 by TRC, a Phase II ESA performed in 2003 and 2004 by TRC, additional site assessments conducted by TRC in 2004 and Acton•Mickelson•Environmental, Inc. in 2005, site investigation activities conducted between 2008 and 2010 by ARCADIS, and quarterly groundwater monitoring initiated in 2004 by TRC.

Four presumptive remedy areas (PRAs) were identified in the RI Report. The PRAs were identified prior to conducting a risk evaluation, as appropriate for remedial action based on factors that included the presence of hazardous waste or areas considered “hot spots.” These PRAs were excluded from the risk assessment, as they are considered areas that likely pose unacceptable risks or exhibit other criteria that would

require remedial action regardless of the results of any risk evaluations. PRAs are located in the following four AOIs: Former Dip Tank, Rail Lines East, Kilns, and Planer #2 (Figure 2-13). The RI recommended that these four PRAs be carried forward to the remedial planning process.

After establishing the PRAs, the RI Report estimated risks within OU-C and OU-D for both potential future human receptors and ecological receptors based on current industrial use and foreseeable land use scenarios, including child and adult residents, commercial/ industrial workers, construction workers and maintenance/utility workers, and recreational receptors, and plants, soil invertebrates, and representative wildlife receptors (birds and mammals). The risk assessment was conducted under the assumption that at the four soil PRAs would be managed via soil remediation. In the risk assessment, soil sample data within the PRA lateral and vertical boundaries were replaced with concentrations representative of post-remediation conditions (i.e., proxy values). For more information about the risk assessment, refer to Section 2.

The Feasibility Study OU-C and OU-D recommended remedial alternatives to address chemicals of concern (COCs) within soil, soil gas and/or groundwater in 11 areas of interest (AOIs) within OU-C and OU-D (FS Report; ARCADIS, 2012a). After the completion of the FS Report, a supplementary soil and groundwater investigation was conducted in June 2012 to address data gaps identified in the FS in the Former AST, Former Parcel 3 Mobile Equipment Shop (MES)/Pilot Study, Kilns, and Rail Lines East AOIs. During this supplemental investigation, groundwater samples were collected from 20 monitoring wells and analyzed for geochemical parameters to support the monitored natural attenuation evaluation completed in the MNA Report (ARCADIS, 2013a). Soil sample results from the supplementary investigation further delineated presumptive remedy areas (PRAs) identified in the RI for the Kilns and Rail Lines East AOIs and the nature and extent of petroleum hydrocarbons in the Former AST and Former Parcel 3 MES/Pilot Study AOIs. Petroleum hydrocarbons are primarily limited to smear zone soils and groundwater in the vicinity of the AOIs and are related to onsite and offsite sources.

AOIs Determined Not to Require Further Action during the Remedial Investigation Phase

In the OU-C and OU-D RI Report, an analysis of the nature and extent of COCs identified approximately 190 acres that required NFA. The following eight AOIs received NFA determinations:

1. Parcel 1

2. Truck Loading Shed
3. Former Green Chain
4. Construction Engineering
5. Scales
6. Clinker/Fill
7. Former Airstrip
8. Cypress Gate

All or part of 10 AOIs are recommended for NFA in the OU-C and OU-D RAP. These are:

1. Rail Lines West
2. Dry Sheds #4, #5
3. Former Planer #1, #50
4. Former Log Storage and Sediment Stockpile
5. Log Deck
6. Former Sheep Barn
7. Former Oil House
8. Miscellaneous
9. Transformer Pad
10. Parcel 6
11. Former Machine Shop (MS/IRM AOI) was determined not to require further action based on additional data collected and evaluation after the Feasibility Study was completed.

AOIs Evaluated in the Feasibility Study

The OU-C and OU-D FS Report evaluated remedial alternatives for the following 11 AOIs. This list includes the affected media and COCs identified in the RI Report for each AOI.

1. Parcel 2 AOI:
    - Groundwater: dioxin/furans and pentachlorophenol (PCP)

2. Former Aboveground Storage Tank (AST) AOI:
    - Soil: lead, total petroleum hydrocarbons (TPH)
    - Soil vapor: benzene, ethylbenzene, 1,2,4-trimethylbenzene (1,2,4-TMB), and naphthalene
    - Groundwater: benzene, naphthalene, total petroleum hydrocarbons in the gasoline range (TPHg), total petroleum hydrocarbons in the diesel range (TPHd), tetrachloroethene (PCE), and cis-1,2-dichloroethene (cis-1,2-DCE)
3. Former MES/Pilot Study AOI:
    - Soil vapor: benzene, ethylbenzene, 1,2,4-TMB, and naphthalene
    - Groundwater: benzene, naphthalene, TPHg, TPHd, PCE, and cis-1,2-DCE
4. Former Dip Tank AOI:
    - Soil: dioxins/furans and PCP
    - Groundwater: dioxins/furans and PCP
5. Rail Lines East AOI:
    - Soil: lead and benzo(a)pyrene (B[a])P)
6. Kilns AOI:
    - Soil: TPHd and B(a)P
7. Former Machine Shop (MS)/IRM AOI:
    - Soil: TPHd and lead
    - Soil vapor: benzene, bromomethane, 1,2,4-TMB, vinyl chloride
    - Groundwater: TPHd, benzene, and vinyl chloride
8. Former Planer #2 AOI:
    - Soil: TPHd and B(a)P
    - Soil Vapor: 1,1-dichloroethene (1,1-DCE), 1,2,4-TMB, PCE, vinyl chloride
    - Groundwater: 1,1-dichloroethane (1,1-DCA), 1,1-DCE, and naphthalene

9. Former Shipping Office and Truck Shop AOI:
    - Soil: TPHd
10. Sawmill//Sorter AOI:
    - Groundwater: arsenic
11. Greenhouse AOI:
    - Groundwater: atrazine

Remedial Action Objectives and Chemical-Specific Remedial Goals

Remedial action objectives (RAOs) are specific goals for protecting human health and the environment. RAOs are developed by evaluating applicable or relevant and appropriate requirements (ARARs) that are protective of human health and the environment and the results of the RIs, including human and ecological risk assessments. RAOs are used in the development of potential remedial action alternatives and selection of a proposed remedial action. The RAOs presented in the FS Report were developed based on the current environmental conditions and anticipated future use of the site. Remedial action proposed at the site is developed within the framing of the following objectives:

- Protect potential receptors from direct exposure to groundwater or soil that contains chemicals above the proposed site cleanup goals through direct contact and/or ingestion.
- For soil, protect human health and the environment under the reasonably foreseeable future land use scenarios.
- Implement a remediation alternative that will promote reduction of COCs in groundwater and protect future users of groundwater.
- Avoid direct exposure of potential receptors to volatile organic compound (VOC) vapors and implement a remedy that will reduce sources to soil vapor and will provide protective measures for soil vapor exposure.

Chemical-specific remedial action goals will be considered to evaluate remedial action effectiveness following implementation. Media-specific numeric remedial action goals

are presented in Tables 3-2 through 3-5 for COCs recommended for remedial action in the RI Report. Remedial goals were developed from several sources of screening levels and concentration thresholds to achieve RAOs, presented in Section 3.3.

Evaluation of Remedial Action Alternatives

In accordance with U.S. Environmental Protection Agency (USEPA) FS and DTSC RAP guidance, the nine criteria described below were used to evaluate remedial alternatives (USEPA, 1988; DTSC, 1995). For an alternative to be selected, it must meet the first two threshold criteria, which are 1) overall protection of human health and the environment, and 2) compliance with ARARs. Criteria 3 through 7 are the five primary balancing criteria that provide comparisons between the alternatives and identify tradeoffs between them; Criteria 8 and 9 are the two modifying criteria that consider acceptance by the state and local community.

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, or Volume through Treatment
5. Cost – 30-Year Present Worth
6. Short-Term Effectiveness
7. Implementability
8. State Support/Agency Acceptance
9. Community Acceptance

In addition to the remedial alternative comparison included in the FS Report, a separate evaluation was presented in the MNA Report to identify natural attenuation processes occurring in AOIs where groundwater remediation was recommended in the FS Report. The MNA Report evaluates site-specific conditions to determine whether chemicals of concern were naturally attenuating. A summary of the FS and comparison of the recommended remedial action to the nine criteria, for each AOI, is presented in Section 4.5. The summary of the alternatives comparison to the nine criteria is also shown in Table 4-1.

Selected Remedial Actions

The following sections describe the selected Remedial Actions for OU-C and OU-D. General Response Actions were originally outlined in the FS Report as general categories of actions that, when implemented, would meet the RAOs for the site. In Section 4.5 the evaluation of Remedial Alternatives in the FS is summarized and proposed Remedial Actions for each AOI are identified.

No Action (No Further Action)

Current guidance by the National Contingency Plan and the United States Environmental Protection Agency (US EPA) for conducting RI/FS investigations requires that the "No Action" option be developed and examined as a potential remedial action for all sites. The "No Action" option is used as a baseline for comparison to other process options. After an evaluation of alternatives evaluated in the FS Report, including the "No Action" alternative or No Further Action, is recommended for the Machine Shop/Interim Remedial Measure (MS/IRM) AOI. The FS recommended a Land Use Covenant restricting use of the site; however, further evaluation of the past and more recent data determined that lead, TPHd, and B(a)P are below the Remedial Goals of the OU-C and OU-D RAP in soil at the MS/IRM AOI. Metals, TPH and VOCs are below groundwater remedial goals at the MS/IRM AOI. The OU-C and OU- D RAP recommends No Further Action (NFA) for 10 AOIs based on conclusions of the RI Report.

Soil Excavation and Disposal

Soil excavation and disposal is proposed to address COCs in soil at PRAs in the Former AST and MES/Pilot Study (TPHd), Former Dip Tank (dioxin and pentachlorophenol (PCP)), Rail Lines East (lead), Kilns (TPHd and B(a)P), and Planer #2 AOIs (TPHd and B(a)P) (Figures 2-15, 4-2, 4-3a, 4-4, and 4-6). At these AOIs, remaining soil will likely meet unrestricted soil remedial goals. If unrestricted remedial goals are not met, then other remedial actions including a Land Use Covenant, Operations and Maintenance, and possibly a cover or barrier will be necessary. Soil

will be removed using standard excavation practices and equipment. Excavated soil will be transported offsite and disposed of at an appropriately permitted landfill.

Covers and Barriers

A proposed remedial action for soil containing COCs above unrestricted soil remedial goals and remaining onsite is soil containment through the use of a cover or barrier to eliminate exposure and restrict the movement and transport of COCs. Existing soil covers that effectively eliminate the movement of COCs, including asphalt paving or the presence of at least two feet of clean soil, can provide an acceptable cover. Where acceptable covers do not exist, an appropriately designed cover shall be installed. An Operations and Maintenance Plan will specify procedures that will ensure the long term effectiveness of the covers, prevent erosion or transport of contaminants and the management of soil. A barrier Remedial Action is proposed to address lead in soil at the Former AST AOI. The Remedial Actions at AOIs with the cover or barrier remedial action also include a Land Use Covenant (LUC) and Operation and Maintenance.

Soil Vapor Mitigation

Soil Vapor Mitigation is the proposed remedial action for AOIs, including the Former AST, the Former MES/Pilot Study AOIs, and the Planer #2 AOI, where previous investigations have identified the presence of COCs (including benzene, ethyl benzene, 1,2,4-trimethylbenzene, naphthalene, vinyl chloride, 1,1-dichloroethane, 1,1-dichloroethene) in soil vapor that presents an unacceptable risk to public health. The existing conditions (open space) at the former Mill Site do not present an immediate need for the implementation of Soil Vapor Mitigation; however a change in use in these areas may require Soil Vapor Mitigation. At the Former AST and Former MES/Pilot Study AOIs, removal of contaminants in soil, which are the source of soil vapor contamination, is also included in the proposed remedial action for soil vapor. The design of the Soil Vapor Mitigation measures shall be submitted to and approved by DTSC prior to any future use of the AOIs. The Operations and Maintenance Plan will specify procedures that will ensure the long term effectiveness of the barriers if Soil Vapor Management is required. AOIs with the Soil Vapor Mitigation remedial action

also include a Land Use Covenant (LUC) and Operation and Maintenance as part of the remedial actions.

Groundwater Remedial Action: Source Removal and Treatment

The removal of contaminated soil, a source for contamination of groundwater, is proposed for the Former Dip Tank, Former AST, and Former MES/Pilot Study AOIs. At the Former AST and Former MES/Pilot Study AOIs, gypsum will be added to the clean backfill material to aid in the attenuation of petroleum hydrocarbons in groundwater.

Natural Attenuation

Natural attenuation with monitoring is the proposed Remedial Action for AOIs with contaminants in groundwater exceeding the remedial goals listed in Table 3-2, including the Parcel 2, Former Dip Tank, Former AST, Former MES/Pilot Study, Planer #2, Sawmill/Sorter, and Greenhouse AOIs. Natural attenuation will be used to remediate groundwater contaminants including petroleum hydrocarbons, PCP, dioxins, atrazine, arsenic, and VOCs. Monitoring of groundwater, specified in a DTSC approved O&M Plan, will verify whether contaminants in groundwater are declining and if groundwater remedial goals are achieved. Groundwater containing COCs exceeding remedial goals listed in Table 3-2 shall be restricted from use through the use of LUCs.

Operations and Maintenance

An O&M Plan for soil and soil vapor is included in the Remedial Action for all AOIs with residual soil contamination and/or contaminants in soil vapor above unrestricted remedial goals set forth in the OU-C and OU-D RAP including the Former AST, Former MES/Pilot Study, and Planer #2 AOIs. O&M Plans will ensure the long-term effectiveness of the Remedial Action and address soil management (e.g. Soil Management Plan), annual reports and Five-Year Reviews, inspections and maintenance of covers and soil vapor mitigation systems.

An O&M plan for groundwater will be developed for AOIs with natural attenuation as a selected remedial action, detailing monitoring requirements and trend and regression analysis to confirm that natural attenuation processes are occurring, and determine if groundwater remedial goals, listed in Table 3-2, have been met. Monitoring data will be evaluated for trends, spatial delineation and changes, and biogeochemical factors to verify the natural processes of degradation. The O&M Plan will define the groundwater

monitoring program, identifying wells to be sample, monitoring frequency and reporting schedules.

Land Use Covenant

AOIs with COCs in soil or soil vapor remaining in place above levels considered safe for unrestricted use, will also have use restriction placed upon them through a Land Use Covenant (LUC). The LUC will restrict residential and other sensitive land uses. Commercial and Industrial uses may be acceptable at AOIs with LUCs. LUCs remain in effect until they are formally removed or modified.

A LUC is a component of the proposed Remedial Action to address lead and TPH in soil at the Former AST AOI and Former MES/Pilot Study AOI. A LUC is also a component of the proposed Remedial Action to address COC in soil vapor at the Former AST, MES/Pilot Study, MS/IRM, and the Planer #2 AOIs.

Groundwater use shall be restricted, through a LUC, until groundwater remedial goals are met.

Proposed Remedial Actions for each AOI

Below is a summary table outlining the proposed remedial actions for each AOI, including NFA for the MS/IRM AOI described above.

Summary Table: Proposed Remedial Actions for each AOI
Parcel 2 AOI – Groundwater *Proposed Alternative:* • *Natural Attenuation to address dioxins/furans and pentachlorophenol* • *LUC restricting domestic use of groundwater above remedial goals* • *Operations and Maintenance Plan specifying groundwater monitoring requirements*

Summary Table: Proposed Remedial Actions for each AOI
Former AST and MES/Pilot Study AOIs – Surface Soil, Soil Vapor, and Groundwater *Soil Proposed Alternative: Former AST AOI and MES/Pilot Study AOI* • *LUC restricting residential or other sensitive land uses* • *Operations and Maintenance Plan, including soil management requirements* • *Excavation and disposal of TPHd contaminated soil* *Soil Vapor Proposed Alternative: Former AST and MES/Pilot Study AOIs* • *Source Removal: Excavation and disposal of TPHd contaminated soil* • *LUC restricting residential or other sensitive land uses* • *Soil Vapor Mitigation* • *Operations and Maintenance Plan* *Groundwater Proposed Alternative: Former AST and MES/Pilot Study AOIs* • *Source Removal: Excavation and disposal of TPHd contaminated soil* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater above remedial goals*
Former Dip Tank AOI – Soil and Groundwater *Soil and groundwater Proposed Alternative:* • *Source Removal: Excavation and Disposal of dioxin and PCP contaminated soil* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements*
Rail Lines East AOI – Surface and Shallow Subsurface Soils *Proposed Alternative:* • *Excavation and disposal of lead contaminated soil*
Kilns AOI – Soil *Proposed Alternative:* • *Excavation and Disposal of TPHd and B(a)P contaminated soil*
Former MS/IRM AOI – Soil and Groundwater • *No Further Action as TPHd, lead and B(a)P concentrations are below soil unrestricted remedial goals and TPHd and VOCs are below groundwater remedial goals*

Summary Table: Proposed Remedial Actions for each AOI
Planer #2 AOI – Soil, Soil Vapor and Groundwater *Soil Proposed Remedial Action:* • *Excavation and disposal of TPHd and B(a)P contaminated soil* *Soil Vapor Proposed Remedial Action:* • *Soil Vapor Mitigation* • *LUC restricting residential or other sensitive land uses* • *Operations and Maintenance* *Groundwater Proposed Remedial Action:* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater*
Former Shipping Office and Truck Shop AOI – Soil *Soil Proposed Alternative:* • *LUC restricting residential or other sensitive land uses* • *Operations and Maintenance, including soil management*
Sawmill and Sorter AOI – Groundwater *Proposed Alternative:* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater*
Greenhouse AOI – Groundwater *Proposed Alternative:* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater*

Reporting and Scheduling

The proposed schedule for the activities related to the RAP includes a 45-day public review period. A public meeting will be held during the public review period to present the draft RAP and receive public comments. DTSC will respond to all public comments prior to making a final decision on the RAP.

Implementation of the removal activities at the excavations planned for the Former AST, MES/Pilot Study, Dip Tank, Kilns, Rail Lines East, and Planer #2 AOIs are anticipated to last a total of approximately 1 to 2 weeks. Remedial construction activities will proceed after all require permits are acquired. A separate Remedial Design and Implementation Plan will be submitted for DTSC review and approval for the planned excavations and for covers or barriers that are part of the selected remedial action. A design for a soil vapor mitigation system will be submitted to DTSC for review and approval if and when future use will create unacceptable risk to potential receptors.

A LUC and a O&M Plan will be developed and implemented following approval of this RAP. A draft O&M Plan shall be submitted to DTSC for review and approval.

The groundwater O&M Plan will include a schedule for natural attenuation monitoring and reporting.

A Completion Report describing implemented soil excavation activities, installed covers, and installation of replacement groundwater monitoring wells shall be submitted to DTSC for review and approval.

Public Participation

The public participation requirements for the RAP process include the following:

- Developing a Public Participation Plan.
- Holding a minimum 30-day public comment period.
- Publishing a public notice of the availability of the draft RAP for public review and comment in a local newspaper of general circulation.
- Posting a notice of the availability of the draft RAP for public review and comment at the Site.
- Distributing a fact sheet to parties on the site mailing list describing the proposed remedy and the availability of the draft RAP for public comment.
- Making the draft RAP and other supporting documents (i.e., California Environmental Quality Act [CEQA] document) available for public review at the DTSC office and in the local information repositories.
- Conducting a public meeting during the public comment period.

- Responding to public comments received on the draft RAP and CEQA documents.

California Environmental Quality Act

CEQA requires environmental review of project impacts prior to project approval. A CEQA review is required if a project has potential for resulting in a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. CEQA applies to all discretionary projects proposed to be carried out or approved by California public agencies, unless an exemption applies.

In accordance with CEQA, DTSC had prepared an Initial Study and a draft Mitigated Negative Declaration for public review to satisfy CEQA requirements. The final Initial Study and Negative Declaration are included in Appendix D. DTSC responses to public comments will be provided in the Responsiveness Summary included in Appendix E of the Final RAP.

1. Introduction

This document was prepared by ARCADIS U.S., Inc. (ARCADIS) on behalf of Georgia-Pacific LLC (Georgia-Pacific) and presents a Remedial Action Plan (RAP) to address soil and groundwater within Operable Units C and D (OU-C and OU-D) at the former Georgia-Pacific Wood Products Facility (site) located at 90 West Redwood Avenue, Fort Bragg, Mendocino County, California (Figure 1-1). This RAP is required by the Department of Toxic Substances Control (DTSC) under Section 5.11 of the Site Investigation and Remediation Order for the site (Docket No. HSA-RAO 06-07-150; the Order). An administrative record is included as Appendix A.

1.1 Regulatory Framework

This RAP has been prepared pursuant to California Health and Safety Code (HSC) Section 25356.1 and in accordance with DTSC Guidance Document No. EO-95-007-PP, *Remedial Action Plan Policy* (DTSC, 1995). Consistent with HSC Section 25356.1, the RAP will be made available for review and comment by the public and regulatory agencies.

The California Environmental Quality Act document will also be circulated for public review simultaneously. In accordance with CEQA, DTSC had prepared an Initial Study and a draft Mitigated Negative Declaration for public review to satisfy CEQA requirements. The final Initial Study and Negative Declaration are included in Appendix D. DTSC responses to public comments will be provided in the Responsiveness Summary included in Appendix E of the Final RAP.

1.2 Objectives

Based on the analysis presented in the *Feasibility Study OU-C and OU-D* (FS Report; ARCADIS, 2012a), remedial alternatives were recommended to address chemicals of concern (COCs) within soil, soil gas and/or groundwater for 11 areas of interest (AOIs) within OU-C and OU-D. After the completion of the FS Report, the monitored natural attenuation (MNA) groundwater remedial alternative was further evaluated and soil data gaps in OU-C and OU-D were investigated. Further evaluation of MNA as a remedial alternative was presented in the *Monitored Natural Attenuation Technical Report* (MNA Report; ARCADIS, 2013a) for select AOIs. The results of the data gap investigation were presented in *OU C/D Data Gaps Soil Investigation Results* (ARCADIS, 2012b). Interpretation of the data gap investigation is included in this RAP. This RAP further outlines proposed remedial actions recommended in the FS Report

and proposes No Further Action (NFA) for areas of OU-C and OU-D not already included in the NFA determination in the *Remedial Investigation Operable Unites C and D Report* (RI Report; ARCADIS, 2011a).

Based on the Order and site-specific information, the objectives of this RAP are as follows:

- Summarize background information and findings from the remedial investigation (RI) pertinent to the evaluation and selection of remedial alternatives.
- Summarize the FS Report alternatives considered for each AOI and evaluated using the nine evaluation criteria described in Section 4.3.
- Summarize remedial action objectives (RAOs).
- Summarize results of the data gaps investigation performed following FS Report submittal and previously reported to DTSC on November 12, 2012.
- Detail proposed remedial actions, based on the analysis presented in the FS Report and subsequent data gaps investigation.
- Provide a preliminary schedule for implementation of proposed remedial actions.

1.3 Report Organization

This RAP presents information regarding environmental conditions at the site and proposed remedial actions to address site-related risk to human health and the environment. The remainder of this RAP is organized as follows:

- Section 2 presents background information relevant to the scope of this RAP and describes subsequent investigation activities conducted since the submittal of the RI Report and FS Report for OU-C and OU-D. This section also presents the justification for NFA, based on information presented in the RI Report, for all or part of 10 AOIs not included in the RI Report NFA determination.
- Section 3 summarizes RAOs and chemical-specific cleanup levels defined in the FS Report for remedial actions in AOIs addressed in this RAP.

- Section 4 describes the alternatives evaluated, summarizes the evaluation criteria, provides a summary of the MNA Report, provides the recommended alternatives, and details remedy implementation for AOIs in OU-C and OU-D.

- Section 5 summarizes the reporting and schedule prior to, during, and following RAP implementation.

- Section 6 identifies references cited throughout this RAP.

- Appendix A provides a listing of the Administrative Record.

- Appendix B provides a detailed description of the development process for site-specific risk based target levels (RBTLs).

- Appendix C provides additional analysis of total petroleum hydrocarbon (TPH) leachate data to support the selected TPH leaching to groundwater remedial goal.

- Appendix D provides the CEQA Initial Study and Mitigated Negative Declaration.

- Appendix E provides the response to public comments on the draft RAP and Initial Study and Mitigated Negative Declaration in a Responsiveness Summary.

- Appendix F provides the Statement of Reasons and the Nonbinding Preliminary Allocation of Responsibility.

2. Background Information

This section provides a summary of background information as well as a summary of findings from the RI and FS Reports for OU-C and OU-D (ARCADIS, 2011a; ARCADIS, 2012a). Additional detail regarding the site history, background, setting, investigation results, and selection of remedial alternatives is provided within the RI and FS Reports.

2.1 Site Setting

2.1.1 Geology and Hydrogeology

Fort Bragg is located along the northern California coastline within the Coast Range geomorphic province. The regional geology consists of complexly folded, faulted, sheared, and altered bedrock. The bedrock of the region is the Franciscan Complex (Complex) and consists of a variety of rock types. In the north coast region, the Complex is divided into two units: the Coastal Belt and the Melange. In Mendocino County, the Melange lies inland and is an older portion of the Complex, ranging in age from the Upper Jurassic to the late Cretaceous. The Coastal Belt consists predominantly of greywacke sandstone and shale.

Relative to the site, the San Andreas Fault is offshore approximately 9 miles. The Coastal Belt has undergone weak to intensive deformation, which has included folding, uplifting, tilting, and overturning. Also of importance to the seismicity of the region is the Mendocino Triple Junction, the terminus of the San Andreas Fault, which is located in the Cape Mendocino area approximately 80 miles to the north-northwest of Fort Bragg. This boundary represents the point at which the San Andreas Fault, the Mendocino Fracture Zone, and the Cascadia Subduction Zone meet. It is an active tectonic and seismic zone and earthquakes have occurred frequently in the area.

Other geologic units present in Fort Bragg and the vicinity include surface geologic units, including deposits of beach and dune sands, alluvium, and marine terrace deposits. The most important of these at the site are the marine terrace deposits of Pleistocene age, which cut bedrock surfaces along the coast and form much of the coastal bluff material overlying bedrock. The marine terrace deposits are massive, semi-consolidated clay, silt, sand, and gravel, ranging from 1 to 140 feet in thickness.

The site is underlain by Quaternary (less than 1.5 million years old) terrace sediments (Blackburn Consulting, Inc. [BCI], 2006). The terrace deposits consist of poorly to

moderately consolidated marine silts, sands, and gravels and are overlain by a 3- to 4-foot-thick mantle of topsoil. The terrace soils are underlain by Tertiary-Cretaceous marine sediments (approximately 65 million years old) of the Coastal Belt Franciscan Formation, composed of well consolidated sandstone, shale, and conglomerate. Currently, the bluffs at the site range from 0 to 80 feet in height (BACE Geotechnical, 2004).

The topsoil, terrace deposits, and Franciscan Formation are each exposed within the bluff face throughout the site. The topsoil is dark brown to black silty and clayey sand. The terrace soils consist of partly cemented, tan and orange-brown, sandy silt, with occasional lenses of cemented pebbly sand. The total thickness of the topsoil and terrace units typically varies from about 5 to 30 feet; in places, up to 20 feet of this can consist of emplaced fill (BACE Geotechnical, 2004).

The marine terraces contain strong, northwesterly trending structural features, including an unnamed, concealed fault south of the site. These features are parallel to the more regional fault traces, such as the San Andreas Fault west of the site (BACE Geotechnical, 2004; BCI, 2006). Several inactive faults and one potentially active fault have been observed in the bluffs at the site. The potentially active fault crosses a small, narrow peninsula within the northern bluffs; however, there is no evidence of movement along the fault within the past 11,000 years.

The regional hydrogeologic setting of the Mendocino County coast has been described in the *Mendocino County Coastal Ground Water Study* (California Department of Water Resources, 1982). The site is in the western coastal area of the county, which was divided into five subunits in the study: Westport, Fort Bragg, Albion, Elk, and Point Arena; these areas are separated by major rivers that discharge to the Pacific Ocean. The site is located within the Fort Bragg subunit, which extends from Big River on the south to Ten Mile River on the north.

The principal natural hydrological sources for the site are precipitation, surface runoff from adjacent lands, and stormwater discharge from the City of Fort Bragg, California (City). Most of the hydrological features at the site are manmade; the natural hydrology has been significantly changed by over a century of mill operations.

In general, groundwater flows southwesterly in OU-C and northwesterly in OU-D under average horizontal hydraulic gradients of 0.025 foot per foot. On a more local level, however, groundwater flows nearly westerly in the northern portion of OU-C and in the southern portion of OU-D. In the eastern portion of OU-D, groundwater flows nearly

northerly. This bifurcation of flow results from the presence of a topographic high in Parcel 9, where groundwater heads are greatest and flow paths tend to radiate from this location.

2.1.2 Biological Setting

Most of the site, including the majority of OU-C and portions of OU-D, is developed industrial land, characterized by large areas that are covered by asphalt, with occasional weedy ruderal vegetation such as sow thistle *(Sonchus asper)*, wild radish *(Raphanus sativa)*, and Italian ryegrass *(Lolium multiflorum)*. Where no concrete is present, soils are highly compacted and sometimes mixed with wood chips, with some areas dominated by subterranean clover *(Trifolium subterraneum)*, Italian ryegrass, and white clover *(Trifolium repens).* The only other plant habitat found to occur within OU-C is associated with a wetland seep located just west of Pond 9. Plant communities that occur within OU-D include planted coniferous woodland, north coast riparian scrub, riparian wetland, seasonal wetland and wetland ditch, and drainages. Most of these are primarily located along the eastern perimeter of the OU and include a riparian area with a small ephemeral drainage. This area is within the Riparian AOI and is now contained within OU-E.

Although the site supports a variety of birds and mammals that may be observed within the boundaries of OU-C, these wildlife likely do not use the significant portions of the upland areas of OU-C for foraging, nesting, or meeting other critical needs, as OU-C provides little to no habitat for these potential receptors. Portions of the upland areas of OU-D do provide suitable habitat for foraging, burrowing, and resting. The upland areas of OU-D are not known to be used by potential avian receptors for nesting. A few special status species may occasionally be observed onsite, but are not frequently observed and are not considered as residents. Because of the lack of suitable habitat, these species are unlikely to occur within OU-C and OU-D.

2.1.3 Cultural Resources

TRC Companies, Inc. (TRC; TRC, 2003; Undated #1; Undated #2) conducted archival research and archeological surveys of the site and found that portions of the site are considered likely to contain intact prehistoric deposits, as well as historic sites and areas that are likely to contain historic deposits important in understanding the early settlement and development of the local community, as well as the lumber operations onsite.

TRC identified a moderate potential for subsurface prehistoric resources in the northern and eastern areas of OU-C and moderate to high potential for subsurface historic resources over most of OU-C.

Within OU-D, the area identified by TRC that is considered to have a high potential to contain prehistoric cultural remains is the wooded area (Riparian AOI) on the eastern side of the site adjacent to the nursery. This AOI has been largely untouched by the industrial development that occurred on the other portions of the site and has been moved into OU-E. The areas within OU-D that were identified by TRC as having a high potential for containing historic resources include the Planer #2 AOI, the Former Sheep Barn AOI, the Former Sediment Stockpile AOI, and the Former Airstrip AOI. Areas within OU-D that are considered to have a moderate potential for containing historic resources include all areas where former mill activities occurred, including all areas that contained the former rail lines.

2.2 General Site History

According to historical records, Union Lumber Company (ULC) began sawmill operations at the site in 1885. Georgia-Pacific acquired the site in 1973 and ceased lumber operations on August 8, 2002. Most of the equipment and structures associated with the lumber production have since been removed. Industrial operations at the site included lumber production and power generation by burning residual bark and wood.

As defined in the Order. OU-C (the northern area) and OU-D (the southern area) are within the Upland Zone (OU-1). The Upland Zone is the elevated land beginning from the inland edge of the Coastal Trail and Parkland Zone (OU-A described below) and moving inland, which includes the following Assessor's Parcel Numbers: 008-010-26-00, 008-020-09, 008-053-32, 008-053-33, 008-053-34-00, 008-151-22, 008-161-08, 018-010-67-00, 018-020-01, 018-030-42-00, 018-040-52-00, 018-120-43, 018-120-44, 018-430-01-00,018-430-02-00, 018-430-07-00, and 018-430-08-00. OU-A forms the western boundary of OU-C and OU-D; OU-A received closure from the DTSC in December 2009 and was transferred to the City in January 2010. The Interim Remedial Measure (IRM) and West of IRM AOIs have been removed from OU-C and the Riparian Area AOI has been removed from OU-D; these are reclassified as OU-E for inclusion in future documents due to their proximity to aquatic features. The total revised acreages for OU-C and OU-D are approximately 105 and 159 acres, respectively (Figure 2-1).

Based on a review of historical information, the COCs potentially associated with the former industrial activities at OU-C and OU-D are primarily lead, TPH and other fuel-related hydrocarbons, volatile organic compounds (VOCs), dioxin/furans, pentachlorophenol (PCP) and polycyclic aromatic hydrocarbons (PAHs). In isolated areas of the site chlorophenols and polychlorinated dibenzo-p-dioxin/polychlorinated dibenzofuran (dioxins/furans; associated with limited wood treating activities) as well as herbicides (near the nursery area) are also present.

2.2.1 OU-C and OU-D Areas of Interest

OU-C and OU-D have been subdivided into 32 AOIs (20 in OU-C and 12 in OU-D) based on historical use and data derived from previous investigations (Figure 2-2). This RAP addresses 21 AOIs, proposing Remedial Actions for 10 AOIs and NFA for 11 AOIs. Eight AOIs received NFA determinations in the RI Report. Three AOIs (West IRM, IRM, and Riparian) were removed from OU-C and placed into OU-E because of similarities in environmental setting with OU-E. Table 2-2 summarizes the status of all AOIs in OU-C and OU-D

AOIs with No Further Action Determination during Remedial Investigation

In the RI Report, an analysis of the nature and extent of COCs in AOIs identified approximately 190 acres within 14 AOIs required NFA. Eight of the 14 AOIs received complete NFA determinations, while 6 of the 14 received only partial NFA determinations because of a need to establish buffers from contaminated areas. The following 8 AOIs received NFA determinations for the entire area within the AOI.

1. Parcel 1
2. Truck Loading Shed
3. Former Green Chain
4. Construction Engineering
5. Scales
6. Clinker/Fill
7. Former Airstrip
8. Cypress Gate

AOIs Recommended for NFA based on information in the RI Report

All or portions of 10 AOIs not included in the RI Report NFA determination are recommended for NFA in this OU-C and OU-D RAP. All or portions of 10 AOIs were not include in the RI Report NFA determination because of the need to establish buffers from AOIs with known contamination, or because the former Consolidation Cell was planned within the AOI. The determination for NFA is based on information presented in the RI Report. The Parcel 6 AOI is also recommended for NFA in this RAP. The Parcel 6 AOI was not investigated in the RI, because there is no history of operations that used hazardous substances at the AOI. The following AOIs are recommended for NFA.

1. Rail Lines West
2. Dry Sheds #4, #5
3. Former Planer #1, #50
4. Former Log Storage and Sediment Stockpile
5. Log Deck
6. Former Sheep Barn
7. Former Oil House
8. Miscellaneous
9. Transformer Pad
10. Parcel 6

AOIs Evaluated in the Feasibility Study

The OU-C and OU-D Feasibility Study (FS) evaluated remedial alternative for the following 11 AOIs. This list includes the affected media and COCs identified in the RI Report for each AOI.

1. Parcel 2 AOI:
    - Groundwater: dioxin/furans and PCP
2. Former Aboveground Storage Tank (AST) AOI:
    - Soil: lead, TPH

- Soil vapor: benzene, ethylbenzene, 1,2,4-trimethylbenzene (1,2,4-TMB), and naphthalene
- Groundwater: benzene, naphthalene, total petroleum hydrocarbons in the gasoline range (TPHg), total petroleum hydrocarbons in the diesel range (TPHd), tetrachloroethene (PCE), and cis-1,2-dichloroethene (cis-1,2-DCE)

3. Former Mobile Equipment Shop (MES)/Pilot Study AOI:
   - Soil vapor: benzene, ethylbenzene, 1,2,4-TMB, and naphthalene
   - Groundwater: benzene, naphthalene, TPHg, TPHd, PCE, and cis-1,2-DCE
4. Former Dip Tank AOI:
   - Soil: dioxins/furans and PCP
   - Groundwater: dioxins/furans and PCP
5. Rail Lines East AOI:
   - Soil: lead and benzo(a)pyrene (B[a]P)
6. Kilns AOI:
   - Soil: TPHd and B(a)P
7. Former Machine Shop (MS)/IRM AOI:
   - Soil: TPHd and lead
   - Soil vapor: benzene, bromomethane, 1,2,4-TMB, vinyl chloride
   - Groundwater: TPHd, benzene, and vinyl chloride
8. Former Planer #2 AOI:
   - Soil: TPHd and B(a)P
   - Soil Vapor: 1,1-dichloroethene (1,1-DCE), 1,2,4-TMB, PCE, vinyl chloride
   - Groundwater: 1,1-dichloroethane (1,1-DCA), 1,1-DCE, and naphthalene
9. Former Shipping Office and Truck Shop AOI:
   - Soil: TPHd

10. Sawmill//Sorter AOI:
    - Groundwater: arsenic
11. Greenhouse AOI:
    - Groundwater: atrazine

Background information for the AOIs evaluated in the FS is presented in the following sections.

2.2.1.1 Parcel 2 AOI (OU-C)

The 7-acre parcel was part of the land ULC purchased from the City in 1949. The parcel contained a high-ceiling, wooden warehouse divided into four areas: Resaw #6, the Breezeway, Dry Shed #2, and the Glue Lam. Resaw #6 was used to reduce lumber thickness from 2 inches to 1 inch. The Breezeway and Dry Shed #2 were primarily used for lumber storage. In the Glue Lam, lumber was bonded to create beams.

Resins used in the glue lamination process may have included small percentages of phenol and formaldehyde (ARCADIS BBL, 2007a; ARCADIS, 2008a). ARCADIS and Georgia-Pacific personnel reviewed historical site-specific material safety data sheets (MSDSs), but could not locate company records on the glues. Parcel 2 features and sample locations associated with RI activities are shown on Figure 2-3.

The warehouse was constructed in phases from 1958 to 1963. Although the concrete area outside the warehouse is known to have been used for the temporary, aboveground storage of used/empty underground storage tanks (USTs; TRC, 2004a), current site staff have confirmed that there was no UST in this area.

Prior to completion of the warehouse, the parcel was primarily used for log storage (from 1949 to 1958); prior to that, the land was owned by the City. Pacific Marine Farms leased the warehouse from 2000 to 2003 in an attempt to establish an abalone farm. Holmes Lumber Company and Rossi Building Materials leased a portion of the warehouse for lumber storage until early 2013.

Parcel 2 also contains a former Helicopter Pad directly north of Dry Shed #2 and a network of firewater lines. Formerly, rail lines were present in the eastern portion of the parcel. According to the Phase I Environmental Site Assessment (ESA; TRC, 2004a), one 10,000-gallon AST containing jet fuel for helicopters was present near the

Helicopter Pad until 1996; however, Mr. Paul Johnson (Johnson and Heitmeyer, 2008) indicated that this statement was incorrect. Rather, mobile fueling units were used to refuel helicopters. No ASTs or USTs were associated with the Helicopter Pad and, hence, no regulatory agency documentation of "removals" would exist.

The remaining structures associated with the Parcel 2 AOI (Glue Lam, Resaw #6, Breezeway, and Dry Shed #2) were demolished in 2013.

2.2.1.2 Former AST/Former Mobile Equipment Shop/Pilot Study AOI/Exposure Unit (OU-C)

The Former AST AOI is located in the northeastern portion of Parcel 3, along the property boundary with the City and the Mendocino Railroad (also known as the Skunk Train) operation. Little historical information exists for these tanks. However, it is likely these tanks were removed at or prior to the time the Former MES was demolished (late 1980s). According to Kennedy/Jenks Consultants (1995), one gasoline AST and one diesel-fuel AST surrounded by a containment wall were located in this area. Kennedy/Jenks Consultants (1995) also indicated that a second diesel-fuel AST was formerly located in this area.

The Georgia-Pacific and Mendocino Railroad property boundary run between the former Georgia-Pacific gasoline AST and the existing Skunk Train AST. The Skunk Train AST is located offsite, upgradient and directly adjacent to the Georgia-Pacific property boundary. Petroleum hydrocarbons migrating from the Skunk Train Depot represents an offsite source.

The Former MES/Pilot Study AOI is located east of Dry Shed #4 and north of Dry Shed #5. Two buildings were located in the AOI. The northern building operated as the lube bay (main building area) and included fuel dispensing (north side of the building) and equipment washing (south side of the building). The southern building was used for equipment storage and washing. According to the Phase I ESA (TRC, 2004a), degreasers were used in both equipment wash areas. The exact former locations of the degreasers are unknown; it is known that wastewater from equipment washing was directed to a concrete catch basin located immediately south of the southern building. A concrete sump was located immediately east of the catch basin. Both buildings had concrete floors and were constructed in the late 1960s to early 1970s. The foundations of these buildings were removed in 2006, including a pipe from the southern building with asbestos-containing material (ACM).

Under DTSC oversight, a pilot study involving the excavation and onsite bioremediation of affected soils from the Former MES/Pilot Study area was completed in 2007 (ARCADIS BBL, 2007b). The results of the pilot study are reported in Appendix B of the Interim Remedial Measures Workplan. Affected soils and the remaining sump were removed, and clean, treated soils, having met screening levels established for the pilot study, were backfilled into this area (ARCADIS, 2008a). The pilot study screening levels are below the OU-C and OU-D RAP unrestricted TPHd remedial goals. Features and sample locations associated with RI activities are shown on Figure 2-4.

2.2.1.3 Former Dip Tank AOI (OU-C)

A dip tank was previously located outside the northwestern corner of Dry Shed #4 in the Former Dip Tank AOI; it was set flush with the ground surface, used between approximately 1964 and 1968, and abandoned in place. The tank held a PCP-based wood preservative (Johnson and Heitmeyer, 2008). Treated wood was stored specifically near this location for only a short period of time prior to being loaded out. Features and sample locations associated with RI activities in the Former Dip Tank AOI are shown on Figure 2-5.

2.2.1.4 Rail Lines East AOI (OU-C)

Several rail lines formerly ran from the Former AST AOI through this AOI to the southern part of the site. The rail lines were used to load and unload supplies and lumber. Although a section of rail line is still present in the northern corner of the AOI, most of the rail lines have been removed. Rail lines were installed and removed throughout the active use of the site. If the earlier rail lines used treated wood, it most likely would have been creosote-based. Rail lines installed more recently mainly consisted of metal installed in asphalt surfaces, but some rails were installed on wooden ties, which may have possibly been treated offsite with chromated copper arsenate (CCA). Features and sample locations associated with RI activities in the Rail Lines East AOI are shown on Figure 2-6.

2.2.1.5 Kilns AOI, Southern Portion (OU-C)

Three kilns were located just east of the Construction Engineering building. Historically, lumber passed through all three buildings in the drying process. A lube oil storage shed was located between the kilns, and transformer boxes were located on the south side of the kilns. The kilns were elevated structures, and a raised roadway is located south

of the kilns. Features and sample locations associated with RI activities in the Kilns AOI are shown on Figure 2-6.

The remaining structures associated with the Kilns AOI were demolished in 2013.

2.2.1.6 Former Machine Shop/IRM AOI (OU-C)

This AOI comprises the Former MS/IRM, Former Sheet Metal/Plumbing and Plant Supply Building, and Former Covered Shed.

The southeastern corner of Parcel 3 contained the Former MS, which can be seen in the 1898 Sanborn map; however, the original building burned down in 1908 and was replaced with a structure that was subsequently demolished in the summer of 2007. The recently demolished structure was a wood building with a concrete floor (the original floor in the building was wood, but was replaced with concrete in the 1950s). Substances used and/or stored in the shop (at the time of the Phase I ESA; TRC, 2004a) included petroleum solvent (northern portion of the building), oxygen, acetylene (southern portion of the building), solvents, lube oil, used oil, coolant, and paint. According to the Phase I ESA, a 1.5-foot by 1.5-foot sump filled with absorbent pads was located in the center of the floor and drained directly to the ground. Additionally, machinery, tools, and other mechanical equipment were stored in the Former MS. A Storage Shed with wood walls and an asphalt floor was located just north of the Former MS. This structure historically stored heating oil, lube oil, cutting fluid, and used oil. The Former Storage Shed was also demolished during the summer of 2007.

The Sheet Metal/Plumbing and Plant Supply Building was located directly south of the Former MS and was constructed in 1978. The Sheet Metal/Plumbing section of the building contained mechanical equipment and was also used to store miscellaneous tools and parts. The Plant Supply section was a large warehouse. Another storage shed, constructed of wired fence with a corrugated metal roof, was located outside this building. A more substantial Covered Shed with a metal roof, concrete floor, and no walls was located near the Plant Supply section of the building. The Covered Shed was constructed in the 1980s or 1990s and has been used to store metal parts, large piping, and motors. Some drum storage, which included lubricants and paint thinner, also reportedly occurred in this area. The Sheet Metal/Plumbing and Plant Supply Building and Covered Shed were demolished during the summer of 2007.

An interim action involving the excavation of affected soils contaminated with TPH, metals and polychlorinated biphenyl (PCBs) from the Former MS/IRM AOI (ARCADIS,

2008a) was completed in 2009. Affected soils were removed, and clean, treated soils, meeting unrestricted standards, were backfilled into this area (ARCADIS, 2010a). Results from confirmation borings collected at the conclusion of interim remedial activities are presented on Figures 2-7a and 2-7b.

Note that just offsite of this AOI is the Unocal 76/Tosco Gasoline Station No. 2211, located at 225 North Main Street. Investigations have identified methyl tertiary-butyl ether (MTBE) and other petroleum compounds emanating from Unocal 76/Tosco Gasoline Station No. 2211. Investigation and remediation at the site is ongoing under the oversight of the North Coast Regional Water Quality Control Board (NCRWQCB). Chemicals of interest (COIs) were not detected in groundwater during additional investigation activities related to the Unocal station performed in 2012. The Unocal station represents an offsite source.

2.2.1.7 Former Planer #2 AOI (OU-D)

During plant operations, lumber was stored and processed as plywood in the Planer #2 AOI by Louisiana Pacific (until the early 1980s) and Georgia-Pacific (from the 1980s until 2002 (TRC, 2004a). The smaller, northwestern portion of Planer #2 was constructed in the 1950s. The ULC site map (ULC, 1962) labeled this structure as the Veneer Plant and noted the presence of a concrete floor. A review of site documentation during the Phase I ESA (TRC, 2004a) revealed a hazardous waste storage room in the northwest corner of the Veneer Plant. Materials stored in this room included waste oil, absorbents, used paint thinners, saw grindings, oils containing PCBs, and asbestos. The ULC map further depicted an area labeled “Log Haul” connecting the western end of the Veneer Plant and Pond 8. A concrete slab was located east of the Veneer Plant; this concrete slab is still present today. East of this slab was an area labeled “300 Gallon Gasoline Tank Buried.” The tank was removed and closed under Mendocino County oversight in September 2008 (ARCADIS, 2009a). A small compressor house north of the former Veneer Plant was also depicted on the 1960s facility map.

The remaining larger section of Planer #2 was constructed in the late 1960s/early 1970s. Several hydraulic oil ASTs were observed throughout the facility during the Phase I ESA (TRC, 2004a). In addition, an air compressor, old motors, pieces of transformers, former paint storage areas, and lube oil and hydraulic oil were observed to be stored in the central portion of the facility. NCRWQCB staff also observed the use of antifungal/antistain spray treatment in this area. The area believed to contain the antifungal/antistain spray treatment booth was identified by Georgia-Pacific staff during

a November 4, 2008 site visit and is shown on Figure 2-8. MSDSs provided by Georgia-Pacific for the chemicals used in the spray booth list propiconazole as an active ingredient. In 2008/2009 ARCADIS collected soil and groundwater samples at the spray booth and analyzed for propiconazole, which was not detected (ARCADIS, 2011a). The Planer #2 building, with the exception of the Veneer Plant area, was demolished in July 2008. The remaining structures were demolished in August 2013.

Lumber storage areas were located east of Planer #2. These areas are asphalt-paved and undeveloped. The asphalt was reportedly placed in the late 1980s, and the area was consistently used for lumber storage (TRC, 2004a). Rail lines formerly ran though the northern area of this AOI, between Pond 8 and the Sawmill #2 building. The rail lines were presumably used to transport logs and untreated lumber.

An underground pipe leads from Planer #2 to a depression (Planer Pipe Depression Area) southwest of the building. The purpose of the pipe is unknown. Soil in the vicinity was excavated and samples of soil and water were collected and analyzed for COCs. Additional step-out sampling was subsequently performed. The results of sampling and associated risk assessment were presented in the RI Report and no additional action was recommended. The depression also received water from Pond 3 via an underground pipe. Once the water in the depression attains a sufficient level, it flows into a pipe in the north side of the depression and is conveyed to Pond 8 (Acton•Mickelson•Environmental, Inc. [AME], 2006a).

Features and sample locations associated with RI activities in the Former Planer #2 AOI are shown on Figure 2-8.

2.2.1.8 Former Shipping Office and Truck Stop AOI (OU-D)

The Shipping Office was constructed in the mid-1990s on a pre-existing reinforced concrete foundation that was part of the Former Vehicle Maintenance Shop (Figure 2-9). The maintenance shop operated from the 1960s until the 1980s. Trailers were present on the concrete pad in the interim between the presence of the maintenance shop and the construction of the Shipping Office. TRC (2004a) noted that this area previously contained one transformer located east of the Shipping Office, as shown on Figure 2-9. Plant personnel recollect a fuel pump and fuel tank were located at or near the Former Vehicle Maintenance Shop. TRC discovered an undated site map indicating a 25,000-gallon diesel AST was located east of the Former Vehicle Maintenance Shop.

The area immediately west of the Shipping Office formerly contained Fiber Plant #8. This building is depicted on the ULC site map (ULC, 1962), which noted that it had a concrete floor and was connected to a bark dust collector to the west using elevated steel blow pipe. The map also showed a warehouse adjoining the eastern portion of Fiber Plant #8 (where the Shipping Office was located) and elevated steel blow pipe leaving the southwest corner of the building to go to a refuse burner (TP Burner) located in the Sawmill/Sorter Area. In the middle of this pipe route was a chip loading bin. A Bark Shelter with concrete floor was noted north of Fiber Plant #8, and an Oil House was documented northwest of the Fiber Plant #8. The Georgia-Pacific firewater system map notes “Transformers on Wood Poles” north of the Fiber Plant #8 building.

A former Truck Shop area was located at the southern end of the AOI. The Truck Shop and adjoining equipment storage building were present in aerial photographs from 1963 through 1982. Review of these photographs indicated that previous documents identified the Truck Shop as being east of where it was actually located. A vehicle parking area was located in the eastern portion of this AOI and was visible in aerial photographs beginning in the late 1950s (TRC, 2004a).

Rail lines formerly ran though the center of this AOI in a north/south direction and through the northern portion of this AOI in an east/west direction. The rail lines were presumably used to transport logs and untreated lumber. Sanitary sewer and plant drain system lines also ran through this AOI.

Features and sample locations associated with RI activities are shown on Figure 2-9.

2.2.1.9 Sawmill and Sorter AOI (OU-D)

A review of aerial photographs indicated that, prior to the construction of the Sawmill #2 building, the Sawmill/Sorter AOI was occupied by native vegetation until it was converted to lumber storage in the late 1950s (TRC, 2004a). The construction of Sawmill #2 proceeded in three stages. The westernmost portion was constructed in the early 1960s and was labeled “Gang Mill” on the ULC (1962) site map. The Gang Mill had a concrete floor and a ramp leading up to it made of earthen fill. A building referred to in the ULC (1962) map as the Oil House was located south of the Gang Mill. A transformer was located immediately north of the Gang Mill.

Sawmill #2 construction continued in the early 1980s, and the southernmost part of the structure was added in the late 1980s (TRC, 2004a). Sawmill #2 contained hydraulic equipment for loading logs onto chains and saws for cutting the logs. A Green Chain

extended roughly east from the south side of Sawmill #2. The barks and cuttings from the sawmill operations were sent to the Power House (Parcel 4; OU-E) through a series of overhead conveyors (TRC, 2004a). Sawmill #2 was demolished in 2008, but the earthen ramp is still present.

The former Sorter Building was located east of Sawmill #2 and was built in the early 1990s. It was used for sorting lumber from Sawmill #2 (TRC, 2004a). The Sorter Building was demolished sometime between 2003 and 2005.

A stacker area was located on the north end of the Sorter Building, at the end of the conveyor system that ran north/south through the building. A wood storage area with a conveyor system was located on the east side of the Sorter Building.

Two hazardous materials storage areas were located within the Sawmill #2 building. Additionally, hydraulic oil storage areas have been documented within the Sawmill #2 building and the Sorter Building. These oil storage areas were secondarily contained and provided hydraulic oil for the conveyors. The exact storage location within the Sorter Building is not known.

Between the Sawmill #2 and the Sorter Building were a diesel fuel AST and a piece of equipment used for burning scrap materials (identified as a TP Burner by TRC [2004a] and as a Beehive Burner by AME [2006b]). The diesel AST was removed in the early 1970s. Two transformers, installed on concrete pads in the early 1990s, were previously located in the Sawmill/Sorter AOI. This AOI also contained the chipper/shaker and oil/water separator that were associated with the Sorter Building.

Emergency Response Plan maps provided in the Hazardous Materials Business Plan (Georgia-Pacific, 2003) show a large bark pile outside the southwest corner of Sawmill #2 and an empty oil drum storage area outside the southeast corner. Large electrical transformers were observed in two areas north of the building on concrete/asphalt pads. According to site personnel, these transformers were present since plant construction, but they are no longer there. The Emergency Response Plan maps also show an unidentified line or conveyor extending west of Former Sawmill #2 to the barker.

A Barker Building was formerly located west of the Sawmill #2 building. According to TRC (2004a) and site personnel (Johnson and Heitmeyer, 2008), the building housed small aboveground hydraulic oil tanks that supplied oil directly to the machinery. A Mill Hog was formerly located near the northwest corner of Sawmill #2. A Mill Hog is a

machine used to grind wood debris and bark down to suitable sizes for burning, which is called “hog fuel.” Wood debris (or hog fuel) is not actually burned in a Mill Hog (it is a piece of machinery and not a boiler or burning device). Therefore, no dioxins/furans would be associated with this machinery.

Features and sample locations associated with RI activities in the Sawmill and Sorter AOI are shown on Figure 2-8.

2.2.1.10 Greenhouse AOI (OU-D)

The Greenhouse AOI (Figure 2-10) was historically used for tree nursery activities and contains two major areas: the nursery and the Former Scrap Metal Area. Reviews of available historical information suggest that the majority of this AOI was not utilized for the sawmill operations until the early 1970s, when the nursery was constructed (TRC, 2004a). The nursery contained the following structures:

- Five adjoining greenhouses
- Main Packing Shed
- Pump House and water tank
- Two storage and mixing sheds
- Water filtration and purifier system.

The first two greenhouses were built in 1973, the third greenhouse was built in 1975, and the last two greenhouses were built in 1978. The Main Packing Shed, a chemical mixing shed, and an asphalt parking area were constructed in the late 1970s. A sump was located inside the greenhouse adjacent to the chemical mixing shed. The water filtration and purifier systems were installed in 1994, and the chemical storage shed, pump house, and water tank were constructed in 1996 (BBL, 2006).

Nursery operations reportedly began in the mid-1970s, though there is some anecdotal evidence that operations dated back to 1922. During operation of the nursery, fungicides, herbicides, and insecticides were stored, mixed, and used onsite.

An area along the western boundary of the Greenhouse AOI was used to store scrap metal. The scrap metal was reportedly removed in 1996 (TRC, 2004a). The remaining structures associated with the Greenhouse AOI were demolished in 2013.

Features and sample locations associated with RI activities in the Greenhouse AOI are shown on Figure 2-10.

2.3 Conceptual Site Model

The conceptual site model (CSM) describes the relationship between chemical sources, migration pathways, exposure routes, and possible exposure pathways for human and ecological receptors potentially present in AOIs within OU-C and OU-D selected for remedial activity evaluation in the RI Report.

2.3.1 Potential Sources of Chemicals

2.3.1.1 OU-C

The primary sources of site-related chemicals at OU-C consist of historical facility operations, specifically lumber and log storage, and industrial operations that had the potential to release hazardous substances. These include operational equipment used to move lumber and logs, equipment used to cut and process logs and lumber, operations that involved cleaning and maintaining equipment, refueling and fuel storage activities, and equipment and chemical storage areas, as well as limited wood treatment areas.

OU-C contained numerous industrial and storage buildings. Railroad spurs located throughout the OU were used to load and unload supplies and lumber. Dip tanks were used and spraying of a wood preservative was conducted in specific areas to treat lumber for a short period of time. Various glues and adhesives were used to bond plywood. The Former MES/Pilot Study AOI was used for equipment repair, storage, and washing. Some electric transformers contained PCB insulating oils. ASTs were formerly located on the eastern property boundary, and the Skunk Train is located offsite to the east. Substances used and stored included drums of oil, petroleum solvent, heating oil, lube oil, used oil, dielectric oil (a petroleum-based electrical insulating oil) coolant, paint, oxygen, and acetylene. Lead-based paint (LBP) has been detected on various buildings within OU-C.

As the site was primarily used as a redwood sawmill, limited wood treatment and/or chemical use to support industrial processes occurred historically. Limited treatment of wood occurred using fungicides (only some of which were PCP-based) at dip tanks in the Former Dip Tank AOI. The only other treated wood located onsite is associated with railroad ties, possibly impregnated with CCA or creosote (finished products only, not manufactured onsite), that make up various rail lines and spurs.

2.3.1.2 OU-D

The primary sources of site-related chemicals at OU-D consist of historical facility operations, which are lumber processing, storage, and transport; chemical storage (primarily petroleum); some vehicle maintenance; ash/sediment storage and drying; industrial equipment usage; and nursery activities.

The vast majority of OU-D is undeveloped land that was used for untreated log and lumber storage. Due to the wood being untreated (and the storage in this area mainly being associated with virgin/uncut logs), the wood storage activity from these areas is not considered to be a significant source, except for some potential sources from the former rail lines that ran through these areas.

Industrial operations occurred in the northern portion of OU-D, which includes the Planer #2 AOI, Former Shipping Office and Truck Shop AOI, and Sawmill/Sorter AOI. These AOIs consist primarily of paved surfaces and the foundations of some office and industrial buildings. Former commercial vehicle and equipment operation and maintenance areas are potential sources of TPH. Former chemical and petroleum storage locations are additional potential sources of metals, VOCs, semivolatile organic compounds (SVOCs), PAHs, and TPH.

Rail lines and spurs were previously located throughout OU-D to load and unload supplies and lumber. Railroad ties were possibly impregnated with creosote (finished products only, not manufactured onsite). In addition, LBP has been detected on various buildings within the Planer #2 AOI.

TP/refuse burners were also located in specific areas of OU-D. Sediment and ash were stored in the former sediment stockpile area and are potential sources of dioxins/furans. (ARCADIS BBL, 2008a).

OU-D also receives direct surface water discharge from offsite via a culvert that runs under the road bordering the site on the east (Main Street/Highway 1). The culvert

discharges into a small drainage that runs along the north side of the Riparian AOI, which then flows via another culvert into Pond 8. The source of the water to the first culvert is unknown, but it is likely city stormwater.

2.3.2 Chemicals of Interest

COIs are chemicals that could potentially be associated with the products, materials, and wastes used or generated at the facilities discussed above in Section 2.3.1. The chemical products most frequently used in OU-C and OU-D are petroleum related. Tanks and drums onsite stored gasoline, diesel, motor oil, fuel oil, lube oil, hydraulic oil, and dielectric oil (a petroleum-based electrical insulating oil). Materials containing petroleum and metals were used around rail lines present onsite and are used during ongoing Skunk Train operations that currently occupy rail lines both on and off of the Mill Site. Other chemicals used onsite included antifreeze and transmission fluids for vehicle servicing, water treatment chemicals, small quantities of acids/bases, solvents, and paint and paint thinners. Lead based paint was used in some buildings. Some electrical transformers contained PCB insulating oils. PCP was used (the Former Dip Tank AOI, and one area of the Green Chain AOI), and at one location where propiconazole was used (the dip tank in Dry Shed #5). There was some historical use of pesticides and herbicides within the greenhouse area.

Based on the site history and chemical uses identified, the COIs potentially associated with the sources described above are in the categories of metals, TPH, VOCs, PAHs, SVOCs, PCP, dioxins/furans, and herbicides. Investigations for the COIs within these categories were performed at potential sources in each AOI in OU-C and the results and evaluations of human health and ecological risk were presented in the RI Report. Refer to Section 2.8 for a discussion of the compounds of potential concern (COPCs) and COCs. COPCs are compounds that were selected to be carried through the baseline risk assessment (BLRA) process included in the RI (ARCADIS, 2011a). COCs are compounds identified by the risk assessment as the primary contributors to potentially unacceptable ecological and/or human health exposure risks and are carried forward into the FS and this RAP.

2.3.3 Fate and Transport Mechanisms

Fate and transport mechanisms evaluated in the FS are briefly discussed in the following section. Refer to Section 2.7.3.1 for a discussion of potential and complete exposure pathways evaluated in the BLRA (ARCADIS, 2011a).

2.3.3.1 OU-C

In OU-C, the primary potential migration pathways are direct releases to surface and subsurface soil, infiltration of rainwater and percolation of groundwater, surface water runoff, and volatilization from soil and groundwater to air, as well as dust generation. Because a significant portion of OU-C is paved (and was paved for significant periods of time historically), contamination of surface soils via direct releases and infiltration is not expected to be significant, except in unpaved areas or in areas where the pavement is cracked or compromised. Releases from subsurface features such as USTs or sumps are directly to the subsurface soil. Impacts in the subsurface soil can affect shallow groundwater beneath the site.

2.3.3.2 OU-D

In OU-D, the primary potential migration pathways are direct releases to surface and subsurface soil, infiltration and percolation of rain water and groundwater, surface water runoff, and volatilization from soil and groundwater to air, as well as dust generation. Because a significant area of the northern portion of OU-D is paved (and has been paved for significant periods of time historically), contamination of surface soils via direct releases and infiltration is not expected to be significant, except in unpaved areas or in areas where the pavement is cracked or compromised. Releases from subsurface features such as USTs, pipelines, pits, or sumps are directly to the subsurface soil. Impacts in the subsurface soil can percolate to shallow groundwater beneath the site. Dissolved constituents can be transported downgradient as a result of advective groundwater flow. Transport via dust and vapor is not likely to be a significant transport pathway because the areas where there may be impacts from chemical use during site operations were historically and are currently paved.

2.4 Remedial Investigation Activities (Presented in RI and FS Reports)

The data discussed in the RI Report and evaluated in the FS include data collected through several investigations from 1998 to 2009. Data collected prior to January 1998 were excluded from quantitative assessment in the RI Report because they were not formally validated and have limited quality assurance/quality control information. A brief summary of investigation activities is presented in the following subsections. Concentrations of COPCs in various media in each AOI detected in samples collected during RI activities are presented on Figures 4-1 through 4-7.

2.4.1 1998 Lead-Based Paint Investigation

In January 1998, TRC conducted a preliminary investigation of surface and shallow subsurface soil to evaluate paint on select buildings for elevated lead levels and to evaluate if chemicals associated with site operations were present in subsurface soil in the areas scheduled for demolition in Parcels 3, 4, and 5 (TRC,1998).

2.4.2 Phase I Environmental Site Assessment

TRC performed a Phase I ESA of the site between 2002 and 2004 (TRC, 2004a). The Phase I ESA included visual inspections of each parcel performed on August 11, September 12, October 16, and November 5, 2002; a site history survey, including historical Sanborn maps, historical U.S. Geological Survey maps, and aerial photograph review; personal, telephone, and written communication with local and county regulatory agencies; interviews with current and past Georgia-Pacific employees with historical operational knowledge of the site; and a computer database search of sites with known environmental concerns within a 1-mile radius of the site.

The Phase I ESA also included a preliminary visual survey of the buildings for the presence of ACMs and LBP. The survey was conducted by Hygienetics Environmental Services, Inc. (HES; HES, 2003) in late 2002, soon after industrial operations were discontinued at the site.

2.4.3 Phase II Environmental Site Assessment

TRC conducted a Phase II ESA to characterize site soils and groundwater in the AOIs identified in the Phase I ESA, and to refine the understanding of the nature and extent of affected media. Preliminary Phase II activities were conducted in March and April 2003. Supplemental Phase II activities were conducted in December 2003 and January 2004. The results were presented in the Phase II ESA report (TRC, 2004b).

2.4.4 2004 Additional Site Assessment

TRC conducted additional assessment activities pursuant to recommendations for follow-up assessment presented in TRC's Phase I and Phase II ESAs. The additional site investigation included the completion of potholes, geophysical investigation, and soil borings for the purpose of collecting additional soil samples, and to investigate surface anomalies and potential waste deposit areas. The results of the additional site assessment were presented in the *Additional Site Assessment Report* (TRC, 2004c).

2.4.5 2005 Additional Site Assessment

In the mid-2000s, AME conducted additional site assessment work, including additional soil and groundwater sampling, geophysical surveys, and the installation of additional groundwater monitoring wells. Activities were conducted from September 1, 2005, through May 31, 2006, in general accordance with the *Work Plan for Additional Site Assessment* (AME, 2005a). Analytical data were reported in the *Data Transmittal Report* (AME, 2006b) and the *Dioxin Sampling and Analysis Report* (AME, 2006c).

2.4.6 Site Investigation Activities: 2008- 2010

The purpose of the site investigation work conducted between 2008 and 2010 was to collect additional data needed to prepare the RI Report. Data gaps were identified in the OU-C and OU-D work plans (ARCADIS, 2008b; 2009b) using historical data collected from January 1998 to March 2005. In some areas, there was a lack of sampling in a particular location or depth or for a particular analytical suite. Other data gaps consisted of areas where additional chemical analyses were needed in areas that had been previously tested. Soil vapor and geochemical studies were also necessary to further investigate areas affected by COPCs. Sample location maps from the RI for AOIs included in the scope of this RAP are presented on Figures 2-3 through 2-10.

2.4.7 Quarterly Groundwater Monitoring

Quarterly groundwater monitoring at the site was initiated by TRC (TRC, 2004d) in 2004. Wells have been added and removed since. The comprehensive groundwater monitoring dataset for the site, including data collected through the first quarter of 2013 from actively sampled monitoring wells, is presented in the *First Quarter 2013 Groundwater Monitoring Report* (ARCADIS, 2013b).

2.5 Supplementary Remedial Investigations

Following the submittal of the RI and FS Reports, supplementary RIs were conducted in June 2012. Soil and grab groundwater samples were collected within the Former AST, Former Parcel 3 MES/Pilot Study, Kilns, and Rail Lines East AOIs to further delineate the nature and extent of COPCs. In addition, groundwater samples were collected from selected monitoring wells and analyzed for geochemical parameters to support natural attenuation evaluation of COPCs in several AOIs.

2.5.1 Former Parcel 3 MES/Pilot Study, Kilns, and Rail Lines East Investigation

Soil samples and grab groundwater samples were collected at various locations through the Former Parcel 3/MES Pilot Study, Kilns, and Rail Lines East AOIs to eliminate data gaps identified following the completion of the RI and FS Reports. A summary of investigation activities was previously described in a letter submitted to DTSC on November 12, 2012 and the following subsections (ARCADIS, 2012b). Results of the supplemental RIs are discussed below and shown on Figures 2-14 through 2-17.

2.5.1.1 Summary of Field Activities

In June 2012, ARCADIS conducted additional soil and groundwater sampling for selected COPCs in OU-C and OU-D to support quantity estimates for remediation planning. ARCADIS collected samples from 17 locations on the Georgia-Pacific Mill Site between June 19 and 22, 2012. Samples were collected from the Former AST and MES/Pilot Study AOIs (13), the Rail Lines East AOI (1), and Kilns AOI (3). In addition, Georgia-Pacific supported the Skunk Train's proposed investigation by collecting samples from seven locations on the adjacent Skunk Train property as specified in the *RCRA Facility Investigation Work Plan – Skunk Train, Fort Bragg, CA* (Environmental Resources Management [ERM], 2011). A total of 72 soil samples at discrete depth intervals and 10 grab-groundwater samples were collected as a part of this investigation.

Soil samples were collected using a Geoprobe direct push rig at all locations in the Former AST and Parcel 3 MES/Pilot Study AOIs, as well as locations on Skunk Train property. Surface samples in the Kilns and Rail Lines East AOIs were collected manually with a hand auger. Grab groundwater samples were collected using a peristaltic pump and down-hole tubing. Samples were sealed, placed on ice, and shipped to TestAmerica Laboratories in Pleasanton, California. Samples were analyzed by one or more of the following methods:

- TPHg; benzene, toluene, ethylbenzene, total xylenes (BTEX), di-isopropyl ether; ethyl tertiary butyl ether; MTBE; tertiary amyl methyl ether; tertiary butyl alcohol; ethanol; 1,2-dibromomethane; and 1,2-dichloroethane (1,2-DCA) by USEPA Method 8260B

- TPHd and TPH in the motor oil range (TPHmo) by USEPA Method 8015D

- PAHs by USEPA Method 8270

- Copper, lead, and zinc by USEPA Method 6010

Sampling locations, laboratory analytical reports, daily field notes, and tabulated data are provided in *Operable Units C/D Data Gaps Soil Investigation Results* (ARCADIS, 2012b). Sampling results are discussed below and presented on Figures 2-14 through 2-17.

Field activities also included geophysical investigation of an underground pipeline leading from the Skunk Train diesel AST in the vicinity of groundwater and soil affected by diesel fuel.

2.5.1.2 Summary of Results

Results for COPCs detected in soil and groundwater were compared to screening levels developed in the RI to further evaluate the extent of COPCs. Screening levels are used for discussion and to identify areas for further evaluation.

2.5.2 Former AST AOI and Former MES/Pilot Study AOI (OU-C)

Sixty-eight soil samples were collected from 13 locations onsite within the Former AST and Former MES/Pilot Study AOIs and 7 locations at the adjacent Skunk Train Facility. Samples were analyzed for TPHg, TPHd, and TPHmo, as well as benzene, toluene, ethylbenzene, and xylenes and fuel oxygenates. Additional surface samples were also collected at the Skunk Train's facility by ERM and were reported to DTSC in a Resource Conservation and Recovery Act (RCRA) Facility Investigation Report dated April 10, 2013 (ERM, 2013). Groundwater was typically encountered at soil boring locations from 9 to 11 feet below ground surface (bgs).

TPHd was detected above leaching to groundwater (LGW) screening levels at locations west and downgradient, determined through groundwater investigations, of the Skunk Train diesel AST and former 12,000-gallon gasoline AST with the exception of one location (OUC-DP-1003). TPHd concentrations were below direct contact and protection of indoor air screening levels. TPHg was detected above protection of indoor air screening levels in at least one depth interval (typically between 9 and 12 feet bgs) at locations downgradient of the Skunk Train diesel AST and former 12,000-gallon gasoline AST with the exception of one location (OUC-DP-1003). TPHg concentrations were below direct contact screening levels. TPH screening levels from Appendix D of

the RI were used to develop TPH remedial goals and are presented in Table 3-4. TPHg results are presented on Figures 2-14 and 2-16, and TPHd results are presented on Figures 2-15 and 2-17. TPHd was detected in soil at approximately 10 to 12 feet bgs, where groundwater was first observed, at concentrations between 440 and 9,600 milligrams per kilogram (mg/kg; C10-C24 range). Concentrations in shallower soil were below the LGW screening level with the exception of OUC-DP-1009 (5,900 mg/kg). TPHg was detected in soil at the groundwater interface at concentrations between 0.59 and 470 mg/kg and in shallower soil between 4.1 and 72 mg/kg. TPHg and TPHd concentrations generally decrease with distance south of the AST and west of the property line. Concentrations immediately cross gradient and upgradient of the ASTs (STF-DP-018, STF-DP-019, and OUC-DP-1013) were below screening levels.

Grab groundwater samples were collected at three locations onsite and seven locations on the Skunk Train property. Groundwater samples collected exceeded groundwater risk-based screening criteria (RBSC) for TPHg and TPHd (1.22 milligrams per liter [mg/L]), with the exception of STF-DP-1019 (upgradient of ASTs) and STF-DP-1024 (cross gradient). Significant turbidity was observed in grab groundwater samples. Total TPH reported in groundwater is likely biased high due to sorbed TPH on silt particles in the sample matrix.

Soil samples were analyzed for BTEX and fuel oxygenates. Concentrations of benzene and all oxygenates are reported in Table 2-1 and samples collected during the investigation were below unrestricted screening levels established in the RI Report. Ethylbenzene was detected most frequently (13 of 39 samples collected) with concentrations ranging from 0.0011 mg/kg to 4.4 mg/kg. Toluene (2 of 39 samples) and xylenes (3 of 39 samples) were also detected, with maximum concentrations of 0.0017 mg/kg and 0.22 mg/kg, respectively. Concentrations of detected analytes were located primarily in soil from 9 to 10 feet bgs, where groundwater is first encountered. No analytes were detected in the deepest sample at each location, indicating that detections are potentially attributed to residual smear zone mass. Concentrations for VOC analytes detected during investigation activities were below screening levels of the RI (5,000 mg/kg for toluene, 5.4 mg/kg for ethylbenzene, 630 mg/kg for xylenes).

TPHg and TPHd detected in soil downgradient of the fuel ASTs and the Skunk Train Roundhouse at concentrations above LGW and RBSC screening levels are primarily within the saturated interval and the interval of historical groundwater table fluctuation (in the “smear zone”). TPHg has been detected during this and previous investigations above screening levels at depths shallower than approximately 8 feet at two locations

immediately west of the Skunk Train Roundhouse. TPHd has been detected during this and previous investigations at depths shallower than approximately 8 feet at four locations, three immediately west of the Skunk Train Roundhouse (including the two TPHg locations) and one location south of the AST containment.

Concentrations of COPCs in borings collected upgradient and cross gradient of the ASTs are primarily below screening levels and several orders of magnitude below concentrations detected immediately downgradient of the ASTs. Data collected during the additional field investigation further supports indications of an offsite source present on the adjacent Skunk Train facility discussed in the RI Report.

A geophysical survey was conducted as part of the underground utility location prior to the investigation. The survey indicated an out-of-service offsite subsurface fuel pipeline leading from an offsite AST to the Skunk Train Roundhouse and trackside locomotive fueling areas. A subsurface drain pit and oil/water separator is also present in the Skunk Train Roundhouse.

A discussion of site conditions and proposed remedial actions in these AOIs is discussed in Section 4.5.2.

2.5.3 Former Rail Lines East AOI (OU-C)

As summarized in Table 2-1, one surface soil sample was collected at one location within the Rail Lines East AOI and analyzed for lead to further delineate the lateral extent of the presumptive remedy area (PRA). As discussed in Section 2.7.2, a PRA as defined in the RI is a “hot spot” area that likely poses an unacceptable risk or exhibits other criteria that would require remedial action. Lead has been detected at concentrations greater than 10 times the screening level (80 mg/kg) in surface soil (0 to 0.5 foot bgs) samples at sample location OUC-SS-061. Step-out sampling has been performed to the north, south, and west at this location; however, no sampling had previously been performed to the east of OUC-SS-061. Sample OUC-SS-1017 was collected approximately 20 feet east of OUC-SS-061 and analyzed for lead. Analytical results indicate the concentration of lead in OUC-SS-1017 (42 mg/kg) is below the screening level. Further discussion of remedial action and proposed excavation areas and volumes is presented in Section 4.5.4.

2.5.4 Kilns AOI (OU-C)

As summarized in Table 2-1, three surface soil samples were collected from three locations within the Kilns AOI and analyzed for TPHd and TPHmo to further delineate the lateral extent and depth interval required for remediation. Surface samples were collected at two step-out locations from the original sample exceeding screening levels within the AOI (OUC-SS-058) to delineate the aerial extent of the PRA delineated in the RI Report. An additional sample (OUC-SS-1016) was collected adjacent OUC-SS-058 from 1.5 to 2 feet bgs to delineate the depth of excavation required as recommended in the FS Report.

Analytical results indicate that concentrations of TPHg and TPHd were below LGW screening levels and RBSC for all samples collected within the Kilns AOI. The extent of screening level exceedances has been delineated within the AOI. Further discussion of remedial action and proposed excavation areas and volumes will be presented in Section 4.5.5.

2.5.5 Geochemical Investigation and Monitored Natural Attenuation Report

During the June 2012 supplemental RI, additional groundwater samples were collected from 20 monitoring wells and analyzed for geochemical parameters to support the natural attenuation evaluation presented in the MNA Report.

2.5.5.1 Summary of Field Activities

The supplementary RI was conducted concurrently with routine groundwater sampling using a bladder pump and low-flow methodology consistent with the standard operating procedure presented in the *Quality Assurance Project Plan* (ARCADIS BBL, 2007c).

Collected samples were sealed, placed on ice, and shipped to TestAmerica Laboratories in Pleasanton, California. Samples were analyzed by the following methods:

- Carbon dioxide and methane by Method RSK-175
- Anions (nitrate and sulfate) by USEPA Method 300.1
- Dissolved California Assessment Manual (CAM) 17 metals by USEPA Method 6020/7470A

- Total organic carbon by Standard Method 5310C

Field parameters were collected using a down-hole multi-parameter meter, including dissolved oxygen, oxidation-reduction potential, pH, and turbidity. In addition, ferrous iron readings were collected in the field using a Hach Ferrous Iron test kit.

2.5.5.2 Summary of Results

Analytical results for geochemical indicators are summarized in the MNA Report. Further discussion of the findings of the MNA Report is provided in Section 4.2.

2.6 Previous Remedial Activities

Previous removal and interim remedial actions in OU-C and OU-D are discussed in the subsections below.

2.6.1 UST Removal

A 100-gallon UST was removed from the northeast corner of the Former Planer #2 building (Former Planer #2 AOI) on September 4, 2008. Prior to tank removal, an excavator was used to remove the overlying concrete slab, along with the pipes extending from the tank. Confirmation soil samples were collected from the bottom and three sides of the excavation and analyzed for TPHg, VOCs, and lead. The north side of the tank location was open due to the tank being above grade, so no samples were collected there. The UST removal and analytical results were presented in a letter to the Mendocino County Environmental Health Division (ARCADIS, 2009a).

2.6.2 Interim Remedial Measures

IRM activities as described in the *Interim Action Remedial Action Plan* (ARCADIS, 2008a) and *Interim Action Completion Report* (ARCADIS, 2010b) were initiated in 2008 and completed in 2009. Excavation activities completed in 2009 include:

- Excavation and offsite disposal of soil containing metals and PCBs from the Former MS/IRM AOI

- Excavation and onsite treatment of TPH-affected soil from the Former MS/IRM AOI, Miscellaneous AOI, IRM AOI and West of IRM AOI

- In-situ groundwater treatment for TPH (biosparging and addition of oxygen-releasing material before backfilling)

- Confirmation sampling

- Backfilling of excavated areas with treated soil meeting unrestricted screening levels.

TPH-affected soil was also removed from the Former MES/Pilot Study AOI in Parcel 3 in 2007 (ARCADIS BBL, 2007b; 2007d). Affected soil and the remaining sump were removed and soil was treated and used as backfill in the same area.

Excavation boundaries for the MS/IRM AOI are presented on Figures 2-7 and 2-7b. Because soil was removed, data for soil and groundwater grab samples collected from within the areas that were later excavated were not used to evaluate the nature and extent of COPCs or for the risk assessment.

2.7 Summary of Baseline Risk Assessment

As noted above, the RI Report identified approximately 190 acres within OU-C and OU-D that require no further remedial action and 14 specific AOIs within the OUs that required further evaluation. Three of those 14 AOIs (IRM, West of IRM, and Riparian Area) will be evaluated in the forthcoming OU-E FS. As such, the following subsections focus on the risk assessment conducted for the 11 AOIs outlined in Section 2.2.1.

2.7.1 Exposure Units

The spatial area over which exposure to COPCs may occur is defined as an Exposure Unit (EU). EUs were developed for the BLRA to account for proposed or likely future land use, known historical uses, and the spatial distribution of COPCs relating to the degree of homogeneity or heterogeneity of the chemical distribution. EUs were identified based on the AOI boundaries previously developed and based on the proposed future land uses outlined in the *Draft Mill Site Specific Plan* (City, 2011). These future uses are reflected in a Land Use Plan map developed as part of the *Draft Mill Site Specific Plan*. Development of the EUs was discussed with DTSC (including a draft map of EUs) prior to development of associated datasets. As shown on Figure 2-12, the eleven AOIs that are considered in this RAP were each treated as a separate EU. Parcel and AOI boundaries are also shown on Figure 2-12. The proposed future land uses for the Mill Site are shown on Figure 2-11. All 11 EUs were evaluated for

potential current and future human exposures in the BLRA. In one out of the 11 EUs identified for this RAP in OU-D (Greenhouse)[1], suitable terrestrial ecological habitat for ecological receptors is present and could remain in the future. Suitable habitat is not available in OU-C, and plans for future land use indicate that habitat will not be present in the future in OU-C and many areas of OU-D.

2.7.2 Treatment of PRAs in the Baseline Risk Assessment

Prior to conducting the risk assessment, four PRAs were identified in four EUs based on a comparison of soil data with conservative human health risk-based screening levels. These PRAs were not included in the risk assessment, because it was assumed that these areas would require remedial action based on soil concentrations present in those areas compared to relevant screening levels. As shown on Figure 2-13, the PRAs are located in: 1) the Former Dip Tank AOI/EU in OU-C (dioxin/furans and PCP), 2) the Rail Lines East AOI/EU in OU-C (lead), 3) the Kilns AOI/EU in OU-C (TPHd and PAHs), and 4) the Former Planer #2 AOI/EU in OU-D (TPHs and PAHs). The RI recommended that these four areas be carried forward to the remedial planning process.

The BLRA was conducted under the assumption that at the four soil PRAs will be managed via soil remediation. In the risk assessment, soil sample data within the PRA lateral and vertical boundaries were replaced with concentrations representative of post-remediation conditions (i.e., proxy values). The proxy values for organic constituents are zero, while inorganic proxy values were all below were all below unrestricted screening levels. For example, the proxy value for lead is 4.5 mg/kg and zero B(a)P and TPHd (ARCADIS, 2011a).

2.7.3 Receptors

Consistent with the *Site-Wide Risk Assessment Work Plan* (Site-Wide RAWP; ARCADIS BBL, 2008b), the BLRA (ARCADIS, 2011a) evaluated the potential human and ecological receptors described in the following subsections. Human and ecological receptors were identified based on current and foreseeable land uses, considering a reasonable and conservative reuse scenario within both OU-C and OU-D.

[11] The IRM and West of IRM AOIs have been removed from OU-C and the Riparian Area AOI has been removed from OU-D; these are reclassified as OU-E for inclusion in future documents due to their proximity to aquatic features.

2.7.3.1 Human Receptors and Relevant Exposure Pathways

Human receptors were identified based upon current and potential future uses of OU-C and OU-D, including residential, commercial/industrial, and recreational uses. Related construction and maintenance activities are expected to occur within the two OUs as well. Based on the current and foreseeable land uses described in the RI Report, the following receptors were identified as potential receptors in OU-C and OU-D and evaluated in the BLRA.

- Child/Adult Resident: This combined child and adult receptor was evaluated to assess future development of areas of OU-C and OU-D for residential use.

- Commercial/Industrial Worker: This adult receptor was evaluated to assess future commercial or industrial uses occurring in OU-C and OU-D, including exposure to indoor air in future buildings in these areas.

- Construction Worker: This adult receptor was evaluated to assess exposures during future soil intrusive activities occurring at either OU-C or OU-D during or after site development.

- Utility/Trench Worker: This adult receptor was evaluated to assess exposures during potential short-term maintenance activities and to address potential repair activities on underground utilities in OU-C and OU-D.

Potential land uses in OU-C include parks within residential areas for recreational use. Because these will be within areas designated for potential residential use, the recreator exposure scenario was not evaluated separately from the higher exposure residential scenario in OU-C. Foreseeable land use in OU-D includes open space and could include recreational uses not associated with residential development. Therefore, in OU-D, the following additional receptor was evaluated in the BLRA:

- Recreational Visitor: Two separate recreational visitor scenarios were evaluated: an occasional visitor and a frequent visitor (such as a jogger) living near the site. The occasional visitor was evaluated as both a child and an adult and was assumed to engage in mainly passive recreational activities (e.g., walking).

Potential exposure pathways for human receptors are presented on Figure 2-18. After development at the site, the surface soil may be mildly disturbed or possibly graded with subsurface soil. Resident adults and children and commercial workers may

potentially be exposed to soils from 0 to 2 feet bgs and from 0 to 10 feet bgs via incidental soil ingestion, soil particulate inhalation, and direct dermal contact. Therefore, for both soil depth intervals, incidental soil ingestion, inhalation of airborne soil particulates, and dermal contact with soil are considered potentially complete exposure pathways for adult and child residents and commercial workers. Inhalation of vapors from soil or groundwater migrating to indoor air is also a potentially complete exposure pathway for future residents and commercial workers in areas where VOCs are present.

During development of the site, construction workers may be exposed to soils in either the 0 to 2 feet bgs or the 0 to10 feet bgs depth interval via incidental soil ingestion, soil particulate inhalation, and direct dermal contact. Maintenance/utility workers may be exposed to soils within the 0 to 2 feet bgs or the 0 to 10 feet bgs depth intervals as well during trenching or other maintenance activities via incidental soil ingestion, soil particulate inhalation, and direct dermal contact. Therefore, for both soil depths, incidental soil ingestion, inhalation of airborne soil particulates, and dermal contact with soil are considered potentially complete exposure pathways for construction workers. Inhalation of vapors emanating from soil or groundwater migrating to ambient air is also a potentially complete exposure pathway for trench workers in areas where VOCs are present.

Because groundwater at the site has multiple designated beneficial uses, including municipal and domestic supply (i.e., drinking water), domestic and commercial groundwater use was evaluated in the risk assessment to estimate cumulative risk from exposure to all media. Exposure pathways for residents from domestic use of site groundwater include ingestion and direct dermal contact, as well as inhalation of VOCs (during bathing) if they are present. The primary exposure pathway for commercial workers from use of site groundwater is ingestion.

As further discussed below, inhalation of vapors in indoor air and in ambient air were evaluated in the BLRA (ARCADIS, 2011a) using soil vapor data in the following AOIs considered in this RAP: Former AST, Former MES/Pilot Study, Former MS/IRM, and Planer #2.

2.7.3.2 Ecological Receptors and Relevant Exposure Pathways

As discussed in Section 2.1.2, habitat within OU-C is not considered suitable to sustain or significantly contribute to the sustainability of populations of ecological receptors. Future uses of OU-C include potential development, with the only “green spaces”

consisting of landscaped city parks and/or ball fields. Plants, invertebrates, and wildlife (mammals and birds) in identified terrestrial and aquatic habitats are the primary ecological receptors in OU-D, although the northwestern portions of OU-D as well as other portions of OU-D are identified for potential commercial/industrial development. Only those areas that currently contain ecological habitat are considered as potential future ecological habitat areas.

Consistent with the Site-Wide RAWP, the representative species selected for terrestrial receptors of interest in the terrestrial areas of OU-C and OU-D are: plants, soil invertebrates, herbivorous birds (California quail), invertivorous birds (killdeer), carnivorous birds (American kestrel), herbivorous mammals (mule deer), carnivorous mammals (red fox), and invertivorous mammals (ornate shrew).

Potential exposure pathways for ecological receptors are presented on Figure 2-19. Ecological receptors may be directly exposed to chemicals through the following exposure pathways in the terrestrial portions of OU-D considered in this RAP:

- Plant and invertebrate direct exposure to soil
- Wildlife incidental ingestion of constituents in soil
- Wildlife consumption of prey items (i.e., plants, invertebrates, and wildlife) through the food web

Based on the foraging habits of the identified receptors, the 0 to 0.5 foot depth profile is appropriate for all receptors evaluated in the BLRA (ARCADIS, 2011a), with the exception of the shrew and possibly plants. For burrowing ecological receptors (i.e., the shrew) and plants, the intervals between 0 to 0.5 foot bgs, 0 to 2 feet bgs, and 0 to 6 feet bgs were evaluated.

2.7.4 COPC selection and Exposure Point Concentrations

As part of the BLRA, soil, groundwater, and soil vapor/indoor air data were compiled into EU-specific datasets. In accordance with the methods presented in the Site-Wide RAWP, COPCs were identified in soil and groundwater in each EU for further evaluation. Soil vapor COPCs were identified in four EUs (Former AST, Former MES/Pilot Study, Former MS/IRM, and Planer #2) identified as having areas of potential concern for vapor intrusion based on a screening evaluation presented in the *Follow-up Investigation and Soil Vapor Evaluation Work Plan* (Soil Vapor Work Plan;

ARCADIS, 2009c) and the *Response to DTSC Comments, Follow-Up Investigation and Soil Vapor Evaluation Work Plan, OU-C and OU-D* (ARCADIS, 2009d). The soil vapor COPCs were used in the BLRA to evaluate potential indoor air impacts for future buildings in these EUs.

Generally, chemicals were selected as COPCs in the BLRA if they were detected at concentrations exceeding background levels. For additional details of the COPC selection process for the BLRA, refer to the RI Report.

An exposure point concentration (EPC) was calculated for each COPC. The EPC is the concentration of a COPC in an environmental medium to which a hypothetical receptor might be exposed. EPCs equivalent to the 95% upper confidence limit (UCL) on the mean (as recommended by ProUCL Software) were used to estimate residual risks. For smaller datasets (less than eight samples or less than five detects) the maximum detected concentration was used to represent the EPC. Soils down to 10 feet bgs were assessed, with the higher concentrations generally in the 0- to 0.5-foot bgs interval.

EPC are used, in comparison to the soil remedial goals (Table 3-5), to determine if an unacceptable risk is present and a remedial action is necessary to protect public health. Table 2-3 list the EPCs for each COC associated within an AOI.

As part of the BLRA, soil, groundwater, and soil vapor/indoor air data were compiled into EU-specific datasets. In accordance with the methods presented in the Site-Wide RAWP, COPCs were identified in soil and groundwater in each EU for further evaluation. Soil vapor COPCs were identified in four EUs (Former AST, Former MES/Pilot Study, Former MS/IRM, and Planer #2) identified as having areas of potential concern for vapor intrusion based on a screening evaluation presented in the Soil Vapor Work Plan and associated response (ARCADIS, 2009c,d). The soil vapor COPCs were used in the BLRA to evaluate potential indoor air impacts for future buildings in these EUs.

Generally, chemicals were selected as COPCs in the BLRA if they were detected at concentrations exceeding background levels. For additional details of the COPC selection process for the BLRA, refer to the RI Report.

An EPC was calculated for each COPC at each EU. The EPC is the concentration of a COPC in an environmental medium to which a hypothetical receptor might be exposed. EPCs equivalent to the 95% UCL on the mean were used to estimate residual risks. For smaller datasets (less than eight samples or less than five detects) the maximum

detected concentration was used to represent the EPC. Soils down to 10 feet bgs were assessed, with the higher concentrations generally in the 0- to 0.5-foot bgs interval.

EPCs were compared to soil remedial goals (Table 3-5), to determine if an unacceptable risk is present and a remedial action is necessary to protect public health. Table 2-3 lists the EPCs for each COC within an AOI.

2.7.5 Key Findings of the Risk Assessment

The human health risks are associated with potential soil and soil vapor/indoor air exposures. Exposure to groundwater was not evaluated in the risk assessment because concentrations of contaminants were compared to groundwater remedial goals to determine if a remedial action, including use restrictions, were necessary. Groundwater will be controlled via use restrictions as discussed in Section 4.4.2.3. There were 22 AOIs or EUs identified for evaluation in the risk assessment: 15 in OU-C and 7 in OU-D.

The following bullets discuss AOIs or EUs identified in the health risk assessment as posing increased risks and/or hazards because of elevated concentrations of COPCs in soil and/or soil vapor. These AOIs/EUs were recommended in the risk assessment to be carried forward for further evaluation in the RAP. Issues with respect to specific COPCs are also discussed.

2.7.5.1 Human Health Risk Assessment

<u>Soil</u>

- At Dry Sheds #4/#5 in OU-C, the risk from potential exposure to PAHs in soil is slightly elevated in a residential land use scenario.

- At the AOI identified as North of IRM in OU-C, the risk from potential exposure to dioxin toxic equivalent (TEQs) in soil is slightly elevated in a residential land use scenario.

- At Former Parcel 3 MES/Pilot Study in OU-C, the presence of cobalt and arsenic pose a slight increase in the Hazard Index or cancer risk for the construction worker or utility/trench worker.

- At the EU identified as OU-D South, dioxins pose slightly elevated risks to potential residents and commercial/industrial workers.

- **Arsenic:** The majority of arsenic concentrations in soil detected in OU-C and OU-D soil were within the site-specific background concentration; therefore, the human health risk assessment did not include risk from exposure to arsenic in soil, with the exception of arsenic at the Former MES/Pilot Study and Former Dip Tank. The human health risk evaluation for the Former MES/Pilot Study and Former Dip Tank EUs includes arsenic in the shallow depth interval, and the arsenic EPC was adjusted to exclude the background concentration (10 mg/kg).

- **Lead:** Using the UCL on the mean, as requested by DTSC, the soil lead EPC at the former AST EU exceeded soil screening levels (SSLs) for the residential child, the construction worker, and the utility worker receptors. The risk assessment recommended that lead concentrations in the Former AST EU be carried forward to the FS. Refer to Table 2-4 for a comparison of lead EPCs in soil at the Former AST EU to site-specific SSLs established in the risk assessment. The UCL soil lead EPC at the North of IRM exceeded SSLs for the residential adult/child, and construction/utility/trench workers. The risk assessment concluded that these elevated concentrations are due to sources from the nearby public roadway. Maximum soil lead concentrations exceeded SSLs at the Former Parcel 3 MES/Pilot Study, Dry Sheds #4/5, former Dip Tank, Construction Engineering and North of IRM EUs, but it was concluded in the risk assessment that these concentrations do not reasonably represent potential exposure at these EUs.

- **TPHd:** TPHs were not identified as contaminants contributing to human health risks or hazards at any EU. Therefore, soil TPH concentrations were evaluated elsewhere based on the protection of groundwater from leaching of TPHs from soil to groundwater.

<u>Soil Vapor</u>

- At Former AST in OU-C, the risks and hazards from potential exposure to VOCs (benzene, ethyl benzene, 1,2,4-TMB, and naphthalene) intruding indoors from subsurface soil are significantly elevated for both the residential and commercial land use scenarios.

- At Former Parcel 3 MES/Pilot Study in OU-C, the risks and hazards from potential exposure to VOCs (benzene, ethylbenzene, 1,2,4-TMB, and naphthalene)

intruding indoors from subsurface soil are significantly elevated for the residential and commercial land use scenarios.

- At Planer #2 in OU-D, the risks and hazards from potential exposure to VOCs (vinyl chloride, PCE, 1,2,4-TMB, and 1,1-DCE intruding indoors from subsurface soil are significantly elevated for the residential land use scenarios.

2.7.5.2 Ecological Health Risk Assessment

An ecological health risk assessment was carried out for all AOIs or EUs. The only AOI showing an unacceptable ecological risk is the Riparian AOI sediments within the drainage because of potential exposure by ecological receptors to metals, PAHs and dioxins/furans. This AOI was moved to OU-E for further evaluation, since it is related to the predominant features of OU-E, including the man-made ponds, and will likely be designated as open space.

Groundwater

As stated above, groundwater was not evaluated in the risk assessment. Below is a summary of COPCs of interest detected in groundwater in the various AOIs.

- Parcel 2 – dioxins and furans
- Former AST/Former MES/Pilot Study – TPHs VOCs, lead
- Former MS/IRM – TPHs, VOCs, arsenic
- At Former MS/IRM – TPHs, VOCs, arsenic
- IRM and West of IRM – TPHs
- Former Planer #2 – VOCs
- Former Sawmill/Sorter – arsenic
- Greenhouse – atrazine

Isolated Elevated Soil Concentrations

Isolated elevated soil concentrations of PAHs were detected at Dry Shed #4 and Parcel 2. Isolated elevated soil TPHd concentrations were detected in North of IRM, Rail Lines West, and Sawmill/Sorter. The RI Report concluded that these exceedances are minor and do not warrant further consideration.

2.8 No Further Action AOIs, based on information in the RI Report

All or portions of ten of the AOIs listed below were not included in the RI Report NFA determination, but are now recommended for NFA in this RAP (Figure 2-2). Support for the NFA recommendation is presented in this section.

1. Rail Lines West
2. Dry Sheds #4, #5
3. Former Planer #1, #50
4. Former Log Storage and Sediment Stockpile
5. Log Deck
6. Former Sheep Barn
7. Former Oil House
8. Miscellaneous
9. IRM West
10. Parcel 6

2.8.1 Rail Lines West Pan Handle Section –OU-D

Several railroad spurs that were formerly used to load and unload supplies and lumber are located between the Truck Loading Shed and Former Planer #1. Portions of these railroad spurs have been removed. A NFA determination was made for a large portion of the AOI in the RI Report. The pan handle section of the AOI was not included in the NFA determination because plumes from Parcel 2 and the Former Dip Tank may migrate onto this AOI. Any groundwater contamination within the Rail Lines West AOI shall be addressed in the remedial actions for Parcel 2 AOI and the Dip Tank AOI. NFA is recommended for the Rail Lines West AOI.

2.8.2 Dry Sheds #4 and #5 area west of Rail Lines Ease

Dry Sheds #4 and #5 were historically used primarily for lumber storage. Based on the evaluation of nature and extent, as well as the risk evaluations provided in RI Report, a large portion of this AOI was included in the RI Report NFA determination. However, the plume from the Former Parcel 3 MES/Pilot Study crosses over this AOI boundary to the east and the eastern part of the Dry Sheds #4 and #5 AOI was not included in the NFA determination. Any groundwater contamination within the Dry Sheds #4 and #5 AOI shall be addressed in the remedial action for the Former MES/Pilot Study AOI. NFA is recommended for the Former Planer #1 and Planer #50 AOI.

2.8.3 Former Planer # 1 and #50 area south of Rail Lines West Pan Handle

Former Planer #1 and Planer #50 are located north of the Yard Office. Planer #50 is a wood building with asphalt flooring constructed between 1957 and 1963. Historically, it was used only for planer operations, and as such, housed heavy equipment such as trim saws.

Based on the evaluation of nature and extent, as well as the risk evaluations provided in the OU-C and OU-D RI Report, this AOI has no unacceptable risks or water quality exceedances. However, the plume from the Former Dip Tank crosses over this AOI boundary to the east. Therefore, only a portion of this AOI was included in the RI Report NFA determination. Any groundwater contamination within the Former Planer #1 and Planer #50 AOI shall be addressed in the remedial action for the Former Dip Tank AOI. NFA is recommended for the Former Planer #1 and Planer #50 AOI.

2.8.4 Former Oil House

The 1919 Sanborn map indicates that the Former Oil House measured approximately 10 feet by 20 feet (AME, 2005b). Initial characterization of the soil in the Former Oil House area identified TPHd impacts only in deep soil (1,820 mg/kg at 7 feet bgs). In 2008, ARCADIS collected two rounds of step-out soil samples to better define the extent. A total of 11 samples were collected from 6 locations. All samples were analyzed for TPHd and PAHs.

Samples from locations OUC-DP-032 through OUC-DP-034 were also analyzed for metals. Samples collected from the deepest interval (between 5.5 and 10 feet bgs) were also analyzed for dioxins/furans based on the observation of a sedimentary layer.

TPHd was detected below the groundwater leaching screening level of 2,730 mg/kg in 17 samples within the deepest interval (8 to 10 feet bgs). Only in boring OUC-DP-033 (total TPHd of 6,017 mg/kg) do TPHd concentrations exceed the groundwater leaching remedial goal. The one TPHd detection above the groundwater leaching goal is below the human health direct contact remedial goal.

Concentrations of arsenic, lead, and B(a)P TEQ were detected at concentrations slightly exceeding screening levels, but at levels below remedial goals in this RAP. The 2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD] TEQ in samples from OUC-DP-032 and OUC-DP-033 exceeded the California Human Health Screening Level (CHHSL) (4.6 picograms per gram [pg/g]) but not the CDRG (50 pg/g), with concentrations ranging from 5.90 to 21.6 pg/g.

Based on the evaluation of nature and extent, as well as the risk evaluations provided in the RI Report, this AOI has no unacceptable risks or water quality exceedances and is recommended for NFA.

2.8.5 Miscellaneous

A review of Sanborn maps indicates that the Miscellaneous AOI, although largely paved, had no specific industrial use. The Sanborn map of 1941 shows a bunkhouse and boarding house in the area north of Pond 5. Pond 8 historically extended into the western boundary of this AOI. This AOI also includes the Training Center Building, which is located in the same area as the Sheet Metal/Plumbing and Plant Supply Building. The Training Center Building is a wooden building constructed in the early 1990s that has been and still is used exclusively for employee training and meetings; a portion of it fronts a city street.

The interim action (ARCADIS, 2010a) completed in 2009 extended into the southern part of this AOI. Soils contaminated with TPHd were removed, and clean, treated soils, meeting unrestricted screening levels, were backfilled into this area (ARCADIS, 2010b). A review of the dataset for non-excavated soil and groundwater in the Miscellaneous AOI indicates that both soil and groundwater are relatively unimpacted.

Based on the evaluation of nature and extent, as well as the risk evaluations provided in the RI Report, this AOI has no unacceptable risks or water quality exceedances and is recommended for NFA.

2.8.6 Transformer Pad

The Transformer Pad AOI is located adjacent to and northeast of Pond 5. The Transformer pad first appears on a Sanborn map from 1941. There are currently no transformers present in this location, but transformers were historically located on this pad.

During previous investigations, 13 soil samples were collected from 7 locations. All samples were analyzed for TPHd, TPHmo, and total PCBs, with the exception of three samples which were analyzed for Aroclor® 1260 only. Soil samples were collected from the shallow subsurface (0.5 foot bgs) down to 5.8 feet bgs. TPHd, TPHmo, and PCB concentrations were below unrestricted screening levels.

Based on the evaluation of nature and extent, as well as the risk evaluations provided in the RI Report, this AOI has no unacceptable risks or water quality exceedances and is recommended for NFA.

2.8.7 Parcel 6

The Parcel 6 AOI is located south of the IRM AOI. The AOI is vacant and there were no soil or groundwater samples collected within the AOI as part of the RI investigation. Parcel 6 AOI was excluded from the RI Report NFA determination because the AOI is adjacent to the IRM AOI and West of IRM AOI, where groundwater contamination is present. The IRM and West of IRM AOIs have been moved to OU-E. Any groundwater contamination extending onto Parcel 6 AOI shall be addressed in the remedial action for the IRM AOI and the West of IRM AOI. NFA is recommended for the Parcel 6 AOI.

2.8.8 Former Log Storage and Sediment Stockpile Area South of Parcel 6 AOI

Lumber was previously stored in this area from the early 1970s to the early 1980s. The area was then converted into a sediment storage and drying area. The sediment originated from the aeration and settling ponds (Ponds 1 and 4). Once dry, the sediments were sent offsite for soil amendment at the McGuire Ranch Property, Little Valley, and other locations. An ash stockpile was present in the sediment drying area when the mill closed in 2002. This ash pile was removed and appropriately disposed of during the summer of 2006 (ARCADIS BBL, 2007a). A sanitary sewer line traverses the north end of this AOI.

Based on the evaluation of nature and extent, as well as the risk evaluations provided in the RI Report, a large portion of this AOI was included in the NFA determination. However, a portion at the northern part of this AOI is between AOIs (Riparian AOI in OU-E and the Former Shipping Office and Truck Shop AOI) which required evaluation in the FS.

There are no groundwater plumes migrating onto the AOI and COCs in soil in the Riparian and Former Shipping Office and Truck Shop are well characterized. The Former Log Storage and Sediment Stockpile AOI is recommended for NFA.

2.8.9 Former Log Deck Consolidation Cell Area

The Log Deck AOI encompasses a significant portion of the southern half of OU-D and was used primarily for raw log and finished lumber storage. Several historical rail lines ran through the central portion of this AOI. The rail lines were presumably used to transport logs and untreated lumber, and are no longer present in this area.

COIs in soil and groundwater either had concentrations below screening levels or were not detected. Based on the evaluation of nature and extent, as well as the risk evaluations provided in the RI Report, this AOI was included in the NFA determination. However, the former Consolidation Cell was located within this AOI in an area otherwise suitable for NFA. The Consolidation Cell area was excluded from the NFA determination for this AOI.

The Consolidation Cell, originally constructed within OU-D for the storage of dioxin contaminated soil from OU-A excavations, was removed in 2011. Dioxin contaminated soil from OU-A was removed and disposed of prior to the removal of the bottom liner materials. The liner was inspected for potential breaches and native marine sediments underlying the potential breaches were investigated for releases to soil by visual means. The nature of the constituents (low solubility) and the distinctive dark color of the ash material indicated that visual observation of the dark ash material or differences in lithology would be sufficient to evaluate potential release. No visual signs of releases were observed. As a result of the cell removal and appropriate waste and soil disposal activities, agreements and land use covenants (LUCs) previously required by DTSC are no longer needed. The land formerly occupied by the cell has been restored (i.e., graded and revegetated) to approximate pre-cell conditions (ARCADIS, 2012c). DTSC approved the *Final OU-A Consolidation Cell Removal Completion Repor*t on April 11, 2012 (DTSC, 2012). Therefore, NFA is recommended for the entire Former Log Deck AOI.

2.8.10 Former Sheep Barn Consolidation Cell Area

The Former Sheep Barn is situated within the Log Deck AOI. This building was referred to as the Post and Pole Plant on the ULC (1962) site map. The sheep barn was used to house sheep that grazed in the area. Formerly, rail lines were present across the northern and eastern sides of this AOI.

The RI Report reported that concentrations of COCs in soil were below screening levels or were not detected. Based on the evaluation of nature and extent, as well as the risk evaluations provided in the RI Report the AOI was included in the NFA determination. However, a small portion of the Consolidation Cell may have extended onto this AOI. The Consolidation Cell area was excluded from the NFA determination for this AOI.

As mentioned above in Section 2.8.9, the Consolidation Cell was removed in 2011, approximate pre-cell conditions have been restored, and associated LUCs are no longer required; DTSC approved the *Final OU-A Consolidation Cell Removal Completion Report* on April 11, 2012 (DTSC, 2012). Therefore, No Further Action is recommended for the entire Former Sheep Barn AOI.

2.9 Summary of COCs and AOIs evaluated in the Feasibility Study

COCs are 1) compounds in soil and soil vapor identified as the primary contributors to potential unacceptable risk in the BLRA (See Section 2.7 for a summary of the BLRA), 2) compounds that were identified as PRAs in the BLRA, or 3) TPH concentrations that exceed the site-specific LGW criteria. For groundwater, COCs were defined as compounds with concentrations that exceed NCRWQCB water quality objectives (WQOs) and were evaluated in the FS Report. Based on preliminary point-by-point screening and identification of PRAs in the RI, results of the risk assessment, and an evaluation of groundwater concentrations, the following AOIs within OU-C and OU-D and their respective compounds of concern were identified in the RI Report and evaluated in the FS Report.

The following is a list of the AOIs evaluated in the FS and includes the media addressed and COCs.

1. Parcel 2 AOI:
    - Groundwater: dioxin/furans and PCP

2. Former AST AOI:
   - Soil: lead, TPH
   - Soil vapor: benzene, ethylbenzene, 1,2,4-TMB, and naphthalene
   - Groundwater: benzene, naphthalene, TPHg, TPHd, PCE, and cis-1,2-DCE
3. Former MES/Pilot Study AOI:
   - Soil vapor: benzene, ethylbenzene, 1,2,4-TMB, and naphthalene
   - Groundwater: benzene, naphthalene, TPHg, TPHd, PCE, and cis-1,2-DCE
4. Former Dip Tank AOI:
   - Soil: dioxins/furans and PCP
   - Groundwater: dioxins/furans and PCP
5. Rail Lines East AOI:
   - Soil: lead and B(a)P
6. Kilns AOI:
   - Soil: TPHd and B(a)P
7. Former MS/IRM AOI:
   - Soil: TPHd and lead
   - Soil vapor: benzene, bromomethane, 1,2,4-TMB, vinyl chloride
   - Groundwater: TPHd, benzene, and vinyl chloride
8. Former Planer #2 AOI:
   - Soil: TPHd and B(a)P
   - Soil Vapor:1,1-DCE, 1,2,4-TMB, PCE, vinyl chloride
   - Groundwater: 1,1-DCA, 1,1-DCE, and naphthalene
9. Former Shipping Office and Truck Shop AOI:
   - Soil: TPHd

10. Sawmill//Sorter AOI:
    - Groundwater: arsenic
11. Greenhouse AOI:
    - Groundwater: atrazine

3. Remedial Action Objectives

RAOs are specific goals for protecting human health and the environment. RAOs are developed by evaluating applicable or relevant and appropriate requirements (ARARs) that are protective of human health and the environment and the results of the RIs, including the human and ecological risk assessments. Chemical specific numerical remedial goals are used to evaluate site conditions following remediation to confirm that site conditions are protective of human and ecological receptors.

Laws and regulations (ARARs) that may apply to the remediation were identified in the FS Report.

3.1 Applicable or Relevant and Appropriate Requirements

The Federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and its regulations (40 Code of Federal Regulations [CFR] 300 et seq., referred to as the National Oil and Hazardous Substances Pollution Contingency Plan [NCP]) provide an established, and generally accepted, framework for evaluating and remediating industrial sites (USEPA, 1990). Under the NCP, remedial actions must attain (or justify the waiver of) any federal or more stringent state environmental standards and facility citing laws that are “applicable or relevant and appropriate.” These regulatory requirements are known as the ARARs.

ARARs have been compiled for the soil and groundwater in the AOIs addressed in this RAP using federal, state, and local statues, regulations, and guidance as outlined in the FS Report. ARARs establish the criteria for remedial action and can be chemical-specific, action-specific, or location-specific. Some requirements applicable to AOIs addressed in this report may not meet the definition of an ARAR, but may still be useful in determining what degree of action is necessary. These requirements are called to-be-considered (TBC) criteria. The TBC requirements are non-promulgated advisories or guidance issued by federal, state, or local government that may not be legally binding, but may provide useful information or recommend procedures for remedial action. TBC factors will be used as guidance documents but not as requirements for the remedial action. ARARs are included in Table 3-1.

ARARs for groundwater at the site are based on the Water Quality Control Plan for the North Coast Region (“Basin Plan”, North Coast RWQCB, 2011). The Basin Plan establishes Water Quality Objectives (WQOs) which are chemical specific requirements that, as stated in the Basin Plan, “form the basis for establishment of

waste discharge requirements, waste discharge prohibitions, or maximum acceptable cleanup standards for all individuals and dischargers." These WQOs are considered to be necessary to protect present and probable future uses and to protect existing high quality waters of the State.

The Basin Plan provides that "[w]henever the existing quality of water is better than the water quality objectives established herein, such existing quality shall be maintained unless otherwise provided by the provisions of the State Resources Control Board Resolution No. 68-16, 'Statement of Policy with Respect to Maintaining High Quality of Waters in California', including any revisions thereto." State Water Resources Control Board Resolution No. 68-16 (State Board Resolution 68-16) contains the state Antidegradation Policy that applies to both groundwater and surface waters whose quality meets or exceeds (is better than) WQOs. As such, MCLs established for Drinking Water represent minimum cleanup standards. State Water Resources Control Board Resolution No. 92-49 (State Board Resolution No. 92-49) requires cleanup and abatement of discharges and threatened discharges of waste to the extent feasible. As specified in State Board Resolution 92-49, cleanup and abatement activities are to provide attainment of background levels of water quality or the best water quality which is reasonable if background levels of water quality cannot be restored. Alternative cleanup levels less stringent than background concentrations shall be permitted only if the discharger demonstrates that: it is not feasible to attain background levels; the alternative cleanup levels are consistent with the maximum benefit to the people of the State; alternative cleanup levels will not unreasonable affect present and anticipated beneficial uses of such water; and they will not result in water quality less than that prescribed in the Basis Plan and Policies adopted by the State and Regional Water Boards.

3.2 Remedial Action Objectives

RAOs are guidelines used in the development of potential remedial action alternatives and selection of a proposed remedial action. The RAOs presented in the FS Report were developed based on the current environmental conditions and anticipated future use of the site. Remedial action proposed at the site is developed within the framing of the following objectives:

1. Protect potential receptors from direct exposure to groundwater or soil that contains chemicals above the proposed site cleanup goals through direct contact and/or ingestion.

2. For soil, protect human health and the environment under the reasonably foreseeable future land use scenarios.

3. Implement a remediation alternative that will promote reduction of COCs in groundwater and protect future users of groundwater.

4. Avoid direct exposure of potential receptors to VOC vapors and implement a remedy that will reduce sources to soil vapor and will provide protective measures for soil vapor exposure.

The relevant human exposure pathways are dermal contact or ingestion of groundwater and soil, and inhalation of vapors emanating from groundwater and soil.

3.3 Chemical-Specific Remedial Goals

Chemical-specific remedial goals will be used to evaluate remedial action effectiveness following implementation and identify appropriate foreseeable future land use. Consistent with DTSC guidance for risk-based cleanups, chemical-specific remedial action goals will be applied based on a conservative estimate of the average concentration (e.g., 95% UCL on the mean) of a COC across an exposure area. This concentration is referred to as the EPC.

Media-specific numeric remedial goals for are presented in Tables 3-2 (groundwater), 3-3 (soil), 3-4 (TPH in soil), and 3-5 (soil vapor) for the COCs recommended for remedial action within the scope of the RAP.

As shown in Table 3-2, the remedial goals for groundwater at the site are based on Water Quality Objectives (WQOs) set forth in the Water Quality Control Plan for the North Coast Region (“Basin Plan”; North Coast RWQCB, 2011). For some volatile organic chemicals, the remedial goals are below detection limits typically achieved by analytical laboratories. When a remedial goal is below the detection limit for a volatile organic chemical, the detection limit, listed in footnote 1 of Table 3-2, will be used to determine compliance with the remedial goal. In addition, the background level of arsenic at this site is above the WQO for arsenic. Therefore, the background concentration for arsenic for the Former Georgia-Pacific Mill Site is the Remedial Goal for this COC (ARCADIS, 2010c).

In areas where VOCs are present in groundwater at levels that may pose an indoor air inhalation risk exists, the remedial goals listed in Table 3-2 are considered to be

protective of the soil vapor/indoor air pathway. Table 3-2 lists the screening levels for evaluation of potential vapor intrusion from groundwater calculated by the San Francisco Bay Regional Water Quality Board (SFRWQCB, 2013) and shows that selected groundwater remedial goals are also protective of vapor inhalation risk.

The primary remedial goals for soil COCs within the OU-C and OU-D AOIs are protective of residential users and support the unrestricted use of an AOI. Alternative goals are included for the commercial, construction, and utility worker; and for passive and the occasional recreator. Table 3-3 lists the primary (unrestricted/residential receptor) ant the alternative remedial goals. The primary remedial goals for soil COCs are discussed below.

Dioxins

A residential dioxin soil remedial goals of 50 pg/g was selected based on the DTSC Human Health Risk Assessment (HHRA) Note 2 (DTSC, 2009a). The DTSC HHRA note presents a suite of suggested dioxin-TEQ soil remedial goals that have been developed for consideration at mitigation sites in California for the protection of human health.

PCP

ARCADIS relied on the exposure parameters and toxicity values approved in the Site-Wide RAWP (ARCADIS BBL, 2008b) to calculate soil remedial goals for PCP and for B(a)P. A PCP soil remedial goal of 12 mg/kg was calculated for unrestricted residential use.

B(a)P TEQs

The residential B(a)P soil of 0.40 mg/kg (applicable to B[a]P TEQs for carcinogenic PAHs) remedial goal was selected based on the UCL of urban background levels of PAHs converted to B(a)P TEQ concentrations in northern California (DTSC, 2009b).

Lead

Lead remedial goals were previously derived and presented in the Section 9.6 of the approved RI Report. ARCADIS reviewed the lead screening levels derived in Section 9.2 of the RI Report and selected the child resident value of 102 mg/kg for unrestricted

residential use, which represents the soil lead screening value of 80 mg/kg, plus the background lead soil value.

TPHd

Two remedial goals for TPHd in soil have been selected; one for the protection of groundwater and a second for the protection of human health (Table 3-4). The TPHd soil remedial goal, for the protection of groundwater, 2,730 mg/kg, is based on the data and statistical analyses discussed in the *Site-Specific TPH Leaching Evaluation* dated April 2010 (ARCADIS, 2010c) and follow up review of the discrete sample dataset presented in Appendix C. Based on the 95% UCL for the discrete sample data set used during the leaching evaluation there is less than 5% probability that soil leachate concentrations exceed the 0.1 mg/L taste and odor threshold WQO when soil concentrations are less than 2,730 mg/kg.

To further support selection of 2,730 mg/kg as the remedial goal, the soil results for the discrete sample data set were rank ordered and samples were classified based on sample depth and hydrocarbon type as interpreted from laboratory chromatographs. Appendix C presents the rank order data with depth and hydrocarbon classifications. The nine highest soil sample results were from samples collected at depths consistent with smear zone soil and chromatographs typically exhibited characteristics of diesel or motor oil. The eight lowest soil sample results were collected at or near the surface and chromatographs typically exhibited characteristics of lube or hydraulic oils. This indicates two distinctive datasets are present. Within the group of top nine soil sample results, from which leaching would be most likely, the soil concentration at which a leachate concentration was first observed above the WQO of 0.1 mg/L was 3,330 mg/kg. The next lowest soil sample value of 2,730 mg/kg is also the 95% UCL.

Based on these two lines of evidence, a concentration of 2,730 mg/kg total TPHd in soil is justified as a remedial goal that would result in leachate concentrations less than 0.1 mg/L and is conservatively recommended for use in the AST, MES Pilot Study, Kilns, and Planer #2 AOIs for evaluating the leaching to groundwater pathway. Soil confirmation sampling data and results of additional DI-WET leachate testing performed on confirmation samples will be compared to WQOs to evaluate the successful completion of TPHd remediation.

Soil TPHd remedial goals for the protection of human health are presented in Table 3-4 for aliphatic and aromatic gasoline and diesel. The investigation of sites with TPHs in OU-C and OU-D included BTEX and PAHs, so the TPH remedial goals are derived

from hazards posed by the presumed remaining aliphatic and aromatic TPHs. These remedial goals are used to determine if human health hazards exist from direct contact and indoor air exposure.

The soil TPHd (aliphatic) direct contact remedial goal (14,066 mg/kg) and indoor air remedial goal (10,772 mg/kg) are based on unrestricted use of property (Table 3-4). TPHd concentrations of TPHd below 10,772 mg/kg meet the unrestricted land use criteria. Soil excavations meeting the 2,730 mg/kg remedial goal, for TPHd, are also protective of potential residential receptors and support unrestricted land use.

VOCs

Remedial goals for VOCs in soil vapor are presented in Table 3-5. Both residential and commercial remedial goals are presented to illustrate soil vapor levels that are protective of either residential or commercial uses. The target indoor air concentrations were obtained from the most recent Regional Screening Levels published by the U.S. Environmental Protection Agency (USEPA, 2014) modified for specific chemicals as described in (HHRA Note 3 (DTSC, 2014). The target cancer risk for each chemical is one-in-a-million (10^{-6}), and the target Hazard Index is one. The soil vapor remedial goals were calculated using the target indoor air concentrations for residential and commercial use and dividing these by the residential or commercial site-specific attenuation factor taken from the RI Report.

4. Remedial Alternatives and Proposed/Selected Remedial Actions

This section presents a summary of the evaluation criteria utilized to compare alternatives in the FS Report, the conclusions of the MNA Report, a summary of the alternatives evaluated for each AOI, and a description of the recommended alternatives. Proposed and selected Remedial Actions detailed within the scope of this RAP to address chemically affected media at the site are based on Remedial Alternatives presented in the FS Report and the associated MNA Report.

4.1 Feasibility Study Summary

4.1.1 General Response Actions

The OU-C and OU-D FS included an evaluation and screening of General Response Actions (GRAs). GRAs are general categories of actions that, when implemented, will meet the RAOs for a site. These GRAs were refined throughout the FS process to develop appropriate cleanup alternatives. Combinations of GRAs may be used to meet the RAOs. GRAs for groundwater, soil, and soil vapor considered for OU-C and OU-D in the FS are summarized below:

1. No action: no additional action is taken to remediate the site

2. Institutional controls: enforceable land use restrictions, contained in a LUC, that limit they type of acceptable land uses and activities such as groundwater use and soil movement at a remediated site

3. Natural attenuation: reliance on natural attenuation processes (including biodegradation, dispersion, sorption, and chemical transformation) to reduce the concentration of target compounds; no human intervention is involved

4. Physical containment: process options that employ barriers to restrict human or environmental (e.g., wind and rain) access to chemicals or to restrict their movements without changing their inherent nature

5. In-situ treatment and/or removal of contaminants: process options that destroy contaminants in the ground or transfer the contaminants to another medium (i.e., water or air) in the ground with subsequent possible extraction and aboveground treatment

6. Removal, ex-situ treatment, replacement, and/or offsite disposal: process options that remove affected media and treat the contaminants in aboveground reactors or dispose of media offsite

4.1.2 Process Options

Process Options are remedial approaches and technologies that have a potential to address contamination at an AOI and meet the RAOs. Specific process options that fit into each of the GRA categories listed above were initially screened in the FS for effectiveness, implementability, and cost-effectiveness. Retained Process Options were then screened, using the same criteria, for each AOI. Process Options that were retained after the AOI specific evaluation were then evaluated further using the nine evaluation criteria described in Section 4.3.

4.1.2.1 Retained Soil and Soil Vapor Process Options

The following Process Options for soil were retained after the evaluating effectiveness, implementability, and cost-effectiveness for each AOI.

No Action

Current guidance by the NCP and USEPA for conducting RI/FS investigations requires that the “No Action” option be developed and examined as a potential remedial action for all sites. The “No Action” option is used as a baseline for comparison to other process options.

Restricted Use/Institutional Controls

Institutional controls (ICs) affect site management and/or future activities occurring at the site. The primary objective of an IC is to limit potential for exposure to COIs, remaining at a site, by restricting use and/or access to impacted areas. A LUC is the legal document establishing use restrictions. As a remedial action, Use Restrictions established through a LUC are necessary at sites where remedial action includes covers and or barriers, consolidation cells, and Operation and Maintenance (O&M).

Deed Notifications and Restrictions

Deed notifications are descriptions of the property contained in the property deed to convey information about the land to future buyers. The deed notification would, in

perpetuity, notify any potential purchaser that historic activities at the site included the use and storage of hazardous materials. Deed restrictions are provisions built into a property deed prohibiting, limiting, or controlling certain uses of or activities at the property.

Capping – Barriers and Covers

A barrier or cover is a containment process option that prevents exposure of potential receptors to affected media. A cover can be constructed of pavement materials such as concrete or asphalt, clean soil protected from erosion by vegetative growth or other erosion control measures, or an engineered cap or structure that may include low permeability materials or liners. The cover layer may consist of clean material that is already in place above affected media and is restricted from being removed. The cover layer may limit potential direct contact with affected soils, migration of vapors, or infiltration of water. O&M is required for sites with a cap, cover and/or barrier remedial action.

Consolidation Cell

A consolidation cell is a containment process option that prevents exposure of potential receptors to affected media that has been excavated from multiple locations and placed in a central location. A consolidation cell consists of an excavated pit containing a liner and a cover to limit infiltration and exposure to receptors. A cover can be constructed of pavement materials such as concrete or asphalt, liners, low permeability materials, or a combination plastic liners and clays. O&M is required for consolidation cells.

In-Situ and Ex-Situ Chemical Treatment – Solidification/Stabilization

In-Situ Stabilization/Solidification (ISSS) technologies can be used to immobilize organic and inorganic compounds in saturated and vadose zone soil, using reagents to produce an inert, geotechnically strong, and relatively less permeable material.

Ex-Situ Soil Remediation

Ex-situ soil remediation can be combined with soil excavation to provide an alternative to offsite disposal for VOCs and other COIs at the site, which are amenable to biological degradation. For this FS, land farming and biopiling are the ex-situ soil remediation alternatives.

Soil Vapor Extraction

Soil vapor extraction, also known as soil venting or vacuum extraction, is a process option commonly used to remove VOCs and SVOCs in vapor from vadose zone soils. A typical soil vapor extraction system consists of vapor extraction wells, a vacuum blower or pump, air/water separator, and, if necessary, a vapor treatment system.

Excavation and Disposal

Excavation involves the physical removal of soil using standard excavation practices and equipment. Typical equipment used includes excavators, backhoes, drag lines, clamshells, vacuum trucks, and front-end loaders. Excavated soil is transported offsite and is required to meet federal and state transportation and disposal regulations.

4.1.2.2 Retained Groundwater Process Options

No Action

Current guidance by the NCP and USEPA for conducting RI/FS investigations requires that the “No Action” option be developed and examined as a potential remedial action for all sites. The “No Action” option was retained and examined as a baseline to which other remediation technologies were compared.

Groundwater Use Restriction

Groundwater use restrictions are established through a LUC and may limit the locations and types of allowable groundwater use at the site. Groundwater use restrictions do not physically alter conditions at the site and do not, or are not intended to, reduce the mobility, toxicity, or volume of COCs at the site as part of the remedial process option. The primary objective of groundwater restrictions is to eliminate potential for exposure to COCs by restricting access to affected groundwater. As a remedial action, groundwater use restrictions are used in concert with other groundwater remedial actions described below and the restrictions may be removed after groundwater remedial goals are met.

Monitored Natural Attenuation

MNA entails monitoring to confirm that COC concentrations are attenuating over time via natural subsurface processes such as dilution, dispersion, volatilization, biodegradation, adsorption, and abiotic chemical reactions. Intrinsic biodegradation is generally the dominant attenuation mechanism. O&M is required for sites with MNA groundwater remedial actions.

Natural Attenuation Analysis

Natural attenuation relies on natural subsurface processes to remediate COCs overtime. The predominant mechanism contributing to the attenuation is biodegradation (both aerobic and anaerobic depending on ambient biogeochemical conditions). Consideration of this alternative requires a biogeochemical assessment and evaluation of COC degradation rates and pathways; however, additional data collection may not be needed to demonstrate natural attenuation as an appropriate remedy for a given site.

Groundwater Extraction and Treatment

Groundwater extraction and treatment is primarily used as a containment strategy, although some benefit of mass removal can be realized for dissolved contaminants. Groundwater extraction wells can be used to control the migration of COCs in groundwater by altering the hydraulic gradient of the aquifer; they can also be used to withdraw groundwater for ex-situ treatment or offsite disposal. Extraction wells are screened at an appropriate depth to capture groundwater. Groundwater is then treated prior to discharge.

Air Sparge

Air sparging is an in-situ groundwater treatment process option in which air is injected into the subsurface. Injected air moves horizontally and vertically in channels through the soil column, removing COIs by volatilization and stripping. Injected air flushes volatile COIs into the unsaturated zone, where a vapor extraction system is usually implemented to remove vapors.

Enhanced Aerobic Bioremediation

Aerobic bioremediation degrades COCs in the subsurface by enhancing the natural microbial biodegradation processes by delivering oxygen to the subsurface through sparging or diffusing gases such as air or pure oxygen or by injection of reagents containing dissolved oxygen or oxygen releasing compounds. This process option increases the ambient amount of oxygen available in the saturated zone to better facilitate bacterial respiration, and in turn, expedites naturally occurring biodegradation processes.

Anaerobic Bio-Oxidation

Anaerobic bio-oxidation is a collection of processes where a microorganism uses a chemical other than oxygen for respiration in order to metabolize a carbon source. Anaerobic bio-oxidation can use non-metals, metals, and even other carbon sources to serve as terminal electron acceptors.

In-situ Chemical Oxidation

In-situ chemical oxidation involves the addition of oxidant(s) into the subsurface to facilitate the conversion of organic compounds to carbon dioxide and water or to more biodegradable intermediates.

4.2 Monitored Natural Attenuation Evaluation

Although MNA was evaluated in the FS and identified as the preferred alternative for groundwater remediation, the FS did not provide a technical evaluation of the mechanisms, historical trends, and expected time frames for the natural attenuation at each AOI. Therefore, a MNA Report was prepared as an addendum to the FS to identify natural attenuation processes occurring in AOIs where groundwater remediation was recommended in the RI Report. The MNA Report provides assessments of the various natural attenuation processes in each AOI and supports the recommendations presented in the FS Report. The MNA Report compared proven attenuation mechanisms with site-specific data, evaluated geochemical indicators, and conducted a regression of analytical data to demonstrate trends in the selected AOIs. A summary of the methods employed to assess natural attenuation is provided below.

4.2.1 Natural Attenuation Mechanisms

Possible natural attenuation mechanisms relevant to each of the COCs at the site were evaluated in the MNA Report and site-specific analytical and geochemical data were assessed to identify the most likely natural attenuation mechanism(s). The COCs and their respective potential natural attenuation mechanisms are identified in the MNA Report and summarized below.

- Chlorinated hydrocarbons: Anaerobic and aerobic biodegradation, abiotic degradation
- Chlorinated phenols: Anaerobic and aerobic biodegradation
- Petroleum hydrocarbons: Anaerobic and aerobic biodegradation
- Dioxin-like compounds: Anaerobic and aerobic biodegradation, precipitation, sorption, dispersion
- Atrazine: Anaerobic and aerobic biodegradation (limited), dispersion

4.2.2 Natural Attenuation Investigation Results

Results of the natural attenuation investigation are presented in the MNA Report and are discussed for each relevant AOI in Section 4.4.

4.3 Evaluation Criteria

The retained Process Options, listed above, were evaluated in comparison to the nine criteria presented below in accordance with USEPA FS and DTSC RAP guidance for each AOI. The nine criteria described were used to evaluate remedial alternatives (USEPA, 1988; DTSC, 1995). For an alternative to be selected, it must meet the first two threshold criteria, which are 1) overall protection of human health and the environment, and 2) compliance with ARARs. Criteria 3 through 7 are the five primary balancing criteria that provide comparisons between the alternatives and identify tradeoffs between them; Criteria 8 and 9 are the two modifying criteria that consider acceptance by the state and local community. The results of the criteria evaluation for each AOI are included in Section 4.4 and summarized in Table 4-1.

4.3.1 Overall Protection of Human Health and the Environment

This criterion addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls (ICs).

4.3.2 Compliance with ARARs

Compliance with ARARs is evaluated based on whether a remedy will meet all appropriate federal, state, and local environmental laws and regulations. Site-specific ARARs are summarized in Table 3-1.

4.3.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have initially been met.

4.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, and volume through treatment refers to the ability of a remedy to reduce the toxicity, mobility, and volume of the hazardous substances or constituents present at the site.

4.3.5 Cost – 30-Year Present Worth

Cost criterion is used to evaluate the estimated 30-year present worth capital and operation and maintenance costs of each alternative.

The level of accuracy of the costs estimated is “Order of Magnitude,” as defined by the American Association of Cost Engineers. The accuracy of an Order of Magnitude estimate is plus 50% and minus 30%. Construction cost estimates at this level may be used to compare alternatives, but should not be used to plan, finance, or develop projects.

4.3.6 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to complete the remedy, and additional risk to human health and the environment that may be posed during the construction and implementation period, until the cleanup standards are achieved.

4.3.7 Implementability

Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

4.3.8 State Support/Agency Acceptance

This criterion indicates whether, based on current knowledge of regulations and agency mandates, the applicable regulatory agencies would agree with the preferred alternative. The rankings listed in the sections below are based on preliminary input from agency meetings and knowledge of regulatory mandates. Actual assessment of regulatory agency acceptance is dependent on comments received during the agency review and public comment periods.

4.3.9 Community Acceptance

This criterion indicates whether community concerns are addressed by the remedy, and whether the community has a preference for a remedy. Each alternative is evaluated in terms of currently available public input and the anticipated public reaction to the alternative. However, actual assessment of community acceptance is dependent on comments received during the public comment period of the draft RAP.

4.3.10 Other Criteria

California HSC Section 25356.1(d) also outlines the following six additional criteria that must be addressed for the recommended remedial alternative.

1. Health and Safety risk posed by conditions at site.

2. The effect of contamination upon present, future, and probable beneficial uses of contaminated, polluted, or threatened resources.

3. The effect of alternative remedial action measures on the reasonable availability of groundwater resources for present, future, and probable beneficial uses.

4. Site-specific characteristics, including the potential for offsite migration of hazardous substances, the surface or subsurface soil, and the hydrogeologic conditions, as well as preexisting background contamination levels.

5. Cost-effectiveness of alternative remedial action measures, including short-term and long-term costs.

6. The potential environmental impacts of alternative remedial action measures, including, but not limited to, land disposal of the untreated hazardous substances as opposed to treatment of the hazardous substances to remove or reduce its volume, toxicity, or mobility prior to disposal.

An evaluation of these criteria is discussed in the Statement of Reasons in Appendix F.

4.4 Selected Remedial Actions – General Descriptions

The following sections describe the selected Remedial Actions for OU-C and OU-D. The descriptions of the Remedial Action are general and not specific to any AOI. The Remedial Actions are based on the evaluation of Process Options and Remedial Alternatives presented in the FS. The proposed Remedial Actions for each AOI will incorporate one or more of the Remedial Actions described in this Section. In Section 4.5 the evaluation of Remedial Alternatives in the FS is summarized and proposed Remedial Actions for each AOI are identified.

4.4.1 Soil and Soil Vapor

4.4.1.1 No Further Action

A NFA determination results in no remedial action and the AOI is then available for unrestricted use. This OU-C and OU-D RAP recommends NFA for one AOI, the MS/IRM AOI. Lead, TPHd and B(a)P were found to be below the remedial goals of this RAP at the MS/IRM AOI. NFA is also proposed for 10 AOIs based on conclusions in the RI Report. The NFA justification for these 10 AOIs is presented in Section 2.8.

4.4.1.2 Soil Excavation and Disposal

Soil excavation and disposal is proposed to address COCs in soil at the Former AST and MES/Pilot Study (TPHd), Former Dip Tank (dioxin and PCP), Rail Lines East (lead), Kilns (TPHd and B[a]P), and Planer #2 AOIs (TPHd and B[a]P) (Figures 2-15, 4-2, 4-3a, 4-4, and 4-6). Soil will be removed using standard excavation practices and equipment. Excavated soil will be transported offsite and disposed of at an appropriately permitted landfill.

For all of these AOIs, the post excavation EPC of COCs are expected to meet the unrestricted remedial goals. If unrestricted remedial goals are not met, then other remedial actions, including covers, O&M and LUC may be required. In the RI Report, three areas within OU-C and one area within OU-D were identified as PRAs (Former Dip Tank, Rail Lines East, Kilns, and Planer #2 AOIs). A PRA is defined as an area that likely poses an unacceptable risk or exhibits other criteria that would require remedial action. Excavation and offsite disposal is the proposed Remedial Action for the PRA. The RAP uses the terminology ‘excavation area’ instead of PRA to describe the areas in the AOIs were excavation is proposed.

Estimated earthwork quantities for these four excavations are presented in Table 4-2 and include 170 cubic yards (cy) to be excavated from Former Dip Tank AOI, 40 cy from Rail Lines East AOI, 7.5 cy from Kilns AOI, and 140 cy from Planer #2 AOI. Earthwork quantities presented in Table 4-2 are based on quantities established in the RI Report. Confirmation sampling will be conducted following the excavation to determine if remedial goals (Table 3-5) have been met. Actual soil quantities excavated from these four sites may differ from the quantities listed in Table 4-2.

In addition to the four excavations at the Former Dip Tank, Rail Lines East, Kilns, and Planer #2 AOIs, approximately 750 to 1500 cy of soil from areas shown in Figure 2-15 will be excavated and disposed from the Former AST and MES/Pilot Study AOIs.

4.4.1.3 Covers

A proposed Remedial Action for soil containing COCs above unrestricted soil remedial goals and remaining onsite is soil containment through the use of a cover to restrict the movement of COCs to the surface. Existing soil covers that effectively eliminate the movement of COCs, including asphalt paving or the presence of at least two feet of clean soil, can provide an acceptable cover. Where acceptable covers do not exist, an appropriately designed cover shall be installed. An O&M Plan will specify procedures

that will ensure the long-term effectiveness of the covers. AOIs with the cover remedial action also include a LUC and O&M.

4.4.1.4 Soil Vapor Mitigation

Soil vapor mitigation is the proposed Remedial Action for AOIs with contaminants in soil vapor, including the Former AST AOI, the Former MES/Pilot Study AOI, and the Planer #2 AOI. Previous investigations at these AOIs have identified the presence of COCs in soil vapor (including benzene, ethyl benzene, -1,2,4-TMB, naphthalene, vinyl chloride, 1,1-DCA, 1,1-DCE) at concentrations that present an unacceptable risk to public health. The existing conditions (open space) at the former Mill Site do not present an immediate need for the implementation of soil vapor mitigation; however a change in use in these areas may require soil vapor mitigation. At the Former AST and Former MES/Pilot Study AOIs, removal of contaminants in soil, which are the source of soil vapor contamination, is also included in the Remedial Alternative for soil vapor. A design for a soil vapor mitigation system will be submitted to DTSC, for review and approval, if and when future use will create unacceptable risk to potential receptors. The O&M Plan will specify procedures that will monitor the long-term effectiveness of the barriers if soil vapor mitigation is required. AOIs with the soil vapor mitigation remedial action also include a LUC and O&M as part of the remedial actions.

4.4.1.5 Operation and Maintenance

An O&M Plan is included in the Remedial Action for all AOIs with residual soil contamination and/or contaminants in soil vapor above unrestricted remedial goals set forth in this RAP. O&M plans will confirm the long-term effectiveness of the Remedial Action and address soil management (e.g. Soil Management Plan [SMP]), annual reports and Five-Year Reviews, inspections and maintenance of covers and soil vapor mitigation systems.

4.4.1.6 Land Use Covenants

AOIs with residual contaminants, above levels considered safe for unrestricted use, will also have use restriction placed upon them through a LUC. The LUC will restrict residential and other sensitive land uses unless special conditions, identified in the LUC, are met.

A LUC is a component of the proposed Remedial Action to address lead in soil in the Former AST AOI. A LUC is also proposed to address soil vapor at the Former AST and Former MES/Pilot Study AOI, and the Planer #2 AOI.

4.4.2 Groundwater

4.4.2.1 Source Area Removal and Treatment

The removal of contaminated soil, which is a source for groundwater contamination, is proposed for the Former Dip Tank, Former AST, and Former MES/Pilot Study AOIs. At the Former AST and Former MES/Pilot Study AOIs, gypsum will be added to the clean backfill material to aid in the attenuation of petroleum hydrocarbons in groundwater.

4.4.2.2 Natural Attenuation with Monitoring

Natural attenuation with monitoring is the proposed Remedial Action for AOIs with contaminants in groundwater exceeding the remedial goals listed in Table 3-2, including the Parcel 2, Former Dip Tank, Former AST, Former MES/Pilot Study, Planer #2, Sawmill/Sorter, and Greenhouse AOIs. Natural attenuation with monitoring will be used to remediate groundwater contaminants including petroleum hydrocarbons, PCP, dioxins, atrazine, arsenic, and VOCs. Monitoring of groundwater, specified in a DTSC approved O&M Plan, will verify whether contaminants in groundwater are declining and if groundwater remedial goals are achieved.

4.4.2.3 Groundwater Use Restrictions through a Land Use Covenant

Groundwater containing COCs exceeding remedial goals listed in Table 3-2 shall be restricted from use through a LUC.

4.4.2.4 Groundwater Operation and Maintenance Plan

A groundwater O&M plan will be developed for AOIs with natural attenuation with monitoring as a selected Remedial Action, detailing monitoring requirements and trend and regression analysis to confirm that natural attenuation processes are occurring, and determine if groundwater remedial goals, listed in Table 3-2, have been met. Monitoring data will be evaluated for trends, spatial delineation and changes, and biogeochemical factors to verify the natural processes of degradation. The O&M Plan will define the groundwater monitoring program, identifying wells to be sampled, monitoring frequency and reporting schedules.

4.5 Evaluation of Remedial Alternatives and Proposed Remedial Actions for Each AOI

The evaluation presented in the FS Report combined several process options to form remedial alternatives that meet RAOs, control exposure pathways, and address media identified as requiring remediation. Alternatives and evaluation of the each alternative against the nine criteria were presented in the FS Report. The recommended remedies are summarized in the following subsections.

4.5.1 Parcel 2 AOI (OU-C)

Remedial alternatives were evaluated in the FS Report to address PCP and dioxins/furans in groundwater.

4.5.1.1 Summary of Alternatives Evaluation

Dioxins/furans and PCP have been detected in groundwater at MW-2.3 at concentrations below their respective Maximum Contaminant Levels (MCLs) but above their respective WQOs. Remedial alternatives evaluated in the FS for groundwater at Parcel 2 AOI include:

- No Action - A baseline to which other remedial technologies are compared.
- Natural Attenuation Analysis - Demonstrated natural degradation of contaminants without long term monitoring. This alternative includes restrictions on the use of groundwater through a LUC.
- Natural Attenuation with Monitoring and Use Restrictions - Demonstrated natural degradation of contaminants with long term monitoring. O&M and restrictions on the use of groundwater are included in this alternative.
- Groundwater Extraction and Treatment - Removal of groundwater through extraction wells and treatment of groundwater to reduce contaminants.

Based on analysis presented in the FS, Natural Attenuation with Monitoring ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, state support/agency acceptance, and reduction of toxicity, mobility, or volume through treatment receive high rankings because monitoring and analysis

associated with the remedy would show that natural attenuation mechanisms including active physical, biological, and geochemical reactions are successfully reducing COC concentrations and WQOs would be achieved in a reasonable time frame. Short-term effectiveness was ranked high because minimal exposure to affected media would be required. Implementability also received a high ranking. Community acceptance was ranked moderate because COCs are currently below drinking water standards, but may be present above WQOs in a potentially residential area beyond the timeframe for redevelopment. Full discussion of the remedial alternative selection process is provided in the FS Report.

Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.1.2 Summary of MNA Report Evaluation

Following the FS Report, the MNA Report was prepared to provide an assessment of the various natural attenuation processes in each AOI and support the recommendations presented in the FS Report. Trend analysis of concentrations of COCs in groundwater was conducted within the scope of the MNA Report. Evaluation presented in the MNA Report indicates that concentrations of dioxins/furans and PCPs within Parcel 2 are below detection limits, or, where trend analysis could be completed, exhibit stable to decreasing trends. Geochemical conditions within Parcel 2 indicate aerobic to mildly reducing conditions that are conducive to biodegradation of PCP and lesser-chlorinated dioxin-like compounds. The combination of stable to decreasing COC concentrations trends and geochemical conditions conducive to biodegradation indicate that natural attenuation, coupled with monitoring and a LUC, is an appropriate response for COCs in groundwater in the Parcel 2 AOI.

4.5.1.3 Proposed Groundwater Remedial Action for Parcel 2 AOI

Based on historical groundwater monitoring data, comparison of alternatives with evaluation criteria, and analysis presented in the MNA Report, natural attenuation with monitoring and use restrictions is recommended to address PCP and dioxins/furans in groundwater in the Parcel 2 AOI. A LUC will restrict the use of groundwater exceeding remedial goals. Groundwater monitoring and natural attenuation verification will be described in a groundwater O&M Plan.

4.5.2 Former AST AOI and Former MES/Pilot Study AOI (OU-C)

Remedial alternatives were evaluated in the FS Report to address lead in surface soils and TPH in smear-zone soils (soil just above the groundwater table) and groundwater. Remedial alternatives within the Former AST and Former MES/Pilot Study AOIs were combined within the FS evaluation process due to physical proximity and similarities in the nature and extent of COCs in soil and groundwater at the two AOIs. Separate remedial alternatives were selected for three affected areas within the AOIs.

4.5.2.1 Lead-Affected Surface Soils

4.5.2.1.1 Summary of Alternatives Evaluation

Lead in soil is found at both the Former MES/Pilot Study AOI and the Former AST AOI. At the Former MES/Pilot Study AOI, TPH contaminated soil was excavated in the vicinity of the Former MES South in spring 2007 (Figure 4-1). Lead exceeds the 102 mg/kg remedial goal at five locations in the Former AST AOI and ranges from 110 mg/kg to 260 mg/kg in the top 2 feet of soil. Lead in the Former AST AOI is found where the former AST was once located and is in an area that is within an active rail yard used by the California Western Railroad. Remedial alternatives evaluated in the FS for surface soil at the Former AST AOI/Former MES/Pilot Study AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- LUCs, ICs and O&M, including a Soil Management Plan (SMP) – A LUC is a legal mechanism restricting the future use of a property from residential and other sensitive uses. ICs are non-engineered instruments, such as administrative and legal controls, that help eliminate human exposure to contamination. A SMP is an aspect of O&M and specifies soil management procedures.
- Capping – Barrier and Covers – Physical barriers that contain and restrict the movement on contaminants.
- ISSS – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.
- Excavation and Disposal – Removal of contaminated soil and transport of soil to offsite disposal facility.

Based on analysis presented in the FS, LUCs and ICs and O&M including a SMP ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, long-term effectiveness and permanence, short-term effectiveness, implementability, compliance with ARARs, and state support/agency acceptance receive high rankings because exposure pathways to affected media would be interrupted and uncontrolled contact with soil would not be permitted. Reduction of toxicity, mobility, or volume through treatment received a low ranking because COCs would remain in place. In soil, natural attenuation mechanisms including active physical, biological, and geochemical reactions would reduce concentrations of degradable COCs such as hydrocarbons, but would have little to no effect on compounds such as lead. Community acceptance was ranked moderate. Implementability received a high ranking.

The FS stated that this alternative may be used in conjunction with a future active remedial alternative and that the SMP, a component of the O&M Plan, would control and limit movement of soil and exposure of soil to users of the site. An active remedial alternative could include excavation or an installed cover or barrier.

Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.2.1.2 Proposed Soil Remedial Action to address lead at the Former AST and Former MES/Pilot Study AOIs

A LUC and O&M is the proposed remedial action to address surface soil containing lead above unrestricted remedial goal of 102 mg/kg in the Former AST and Former MES/Pilot Study AOIs. The LUC will restrict sensitive use such as residential, schools, hospitals, and day cares and require the use of an O&M Plan and SMP during soil disturbing activities. This soil remedial action is appropriate because the lead contaminated area is within an industrial/commercial area and active rail yard. Access to the contaminated area at the Former AST AOI rail yard is currently restricted and must remain restricted. O&M shall limit erosion and transport of contaminated soil away from the AOIs. Additional remedial actions, including the placement of a cover or barrier, may be required by DTSC if the land use of the AOIs change from a rail yard and industrial uses, and potential future receptors require further protection. Access to the contaminated area must remain restricted through appropriate controls.

4.5.2.2 Petroleum Hydrocarbon- Affected Smear Zone Soils

4.5.2.2.1 Summary of Alternative Evaluation

The periodically saturated smear zone identified in the RI Report is located between approximately 7 and 13 feet bgs. Concentrations of petroleum hydrocarbons at 28 locations between 7 and 13 feet bgs were above screening levels for TPH. Remedial alternatives evaluated in the FS for smear zone soil at the Former AST AOI/Former MES/Pilot Study AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- Ex-Situ Soil Remediation – Bioremediation of soil in Biopiles.
- Ex-Situ Soil Remediation – Bioremediation of soil through Land Farming.
- ISSS – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.
- Excavation and Disposal – Removal of contaminated soil and transport of soil to offsite disposal facility.

Based on analysis presented in the FS, hotspot Excavation and Disposal along with LUC, O&M and a SMP ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, reduction of toxicity, mobility, or volume through treatment, long-term effectiveness and permanence, and state support/agency acceptance receive high rankings because affected media would be removed from the site. Short-term effectiveness received a moderate ranking because of construction activities associated with the excavation. Community acceptance was ranked moderate. The removal of affected soil from the site is offset by community concerns related to the implementation of this alternative, such as truck traffic and fugitive dust. Implementability received a moderate ranking compared to the implementability of other alternatives for this media. Full discussion of the remedial alternative selection process is provided in the FS Report. Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.2.2.2 Proposed Soil Remedial Action to address Petroleum Hydrocarbons at the Former AST and Former MES/Pilot Study AOIs

Since the FS Report was submitted in January 2012, additional site investigation activities described above were completed in the Former AST and MES/Pilot Study AOIs. Based on new data, soil removal is the proposed remedial actions for petroleum hydrocarbon affected smear zone soils in the Former AST and MES/Pilot Study AOIs.

Remedial action within these AOIs will include source removal in areas where TPH is present above the smear zone and LUCs. Confirmation sampling will be conducted as to evaluate if further source removal is necessary to meet remedial goals. The possible extent of excavation shown on Figure 2-15 may expand past the limits shown in the figure. The estimated soil excavation volume range is between approximately 750 and 1,500 cy.

Contingency Remedy: If the unrestricted remedial goals are not met due to physical or engineering constraints, then a contingency remedial action would be implemented that includes a Land Use Covenant restricting sensitive uses and an Operations and Maintenance Plan that addresses soil management and operation and maintenance of a cover, if required. A cover (i.e., asphalt, concrete, or clean fill material) will be required, if contaminants in soil remain above commercial remedial goals, or if contaminant transport could result in an unacceptable risk to public health or to other environmental receptors.

4.5.2.3 Soil Vapor

4.5.2.3.1 Summary of Alternatives Evaluation

Soil vapor sampling performed in 2008 and reported in the RI Report indicates a potential vapor intrusion risk based on VOC concentrations in soil vapor above screening levels in the Former AST AOI and the eastern portion of the MES/Pilot Study AOI. The Recommended Alternative in the FS included soil vapor monitoring in order to confirm the elimination of the soil vapor exposure pathway. Remedial alternatives for soil vapor were evaluated concurrently in the alternative evaluation for soil in FS Report.

4.5.2.3.2 Proposed Soil Vapor Remedial Action at the Former AST and Former MES/Pilot Study AOIs

The proposed remedial action to address soil vapor risks are source removal, soil vapor mitigation, LUC, and O&M. Soil removal may address potential sources of soil vapor and is a component of the proposed soil vapor remedial action. Post soil removal soil vapor sampling will confirm whether a LUC, O&M and additional soil vapor mitigation is necessary at the Form AST and MES/Pilot Study AOIs. The existing conditions (open space) at the former Mill Site do not present an immediate need for the implementation of soil vapor mitigation; however, future construction and use in these areas may require soil vapor mitigation. The design of the soil vapor mitigation measures shall be submitted to and approved by DTSC prior to any future use of the AOIs. The O&M Plan will specify procedures that will ensure the long-term effectiveness of the covers.

4.5.2.4 Petroleum Hydrocarbon-Affected Groundwater

4.5.2.4.1 Summary of Alternative Evaluation

Samples collected from monitoring wells in this AOI have contained concentrations of TPHg, TPHd, benzene, naphthalene, 1,2-DCE and PCE at concentrations exceeding screening levels. Liquid-phase hydrocarbon (LPH) has also been occasionally detected in nearby monitoring well MW-3.2; generally detections of LPH have corresponded with times of relatively low water levels, suggesting the presence of pockets of residual LPH in the smear zone. Remedial alternatives to be implemented following the hot spot soil removal evaluated in the FS for groundwater at the Former AST AOI/Former MES/Pilot Study AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- Natural Attenuation Analysis – Demonstrated natural degradation of contaminants without long term monitoring.
- Natural Attenuation with Monitoring and Use Restriction – Demonstrated natural degradation of contaminants with long term monitoring. O&M and restrictions on the use of groundwater are included in this alternative.
- Groundwater Extraction and Treatment – Removal of groundwater through extraction wells and treatment of groundwater to reduce contaminants.

- In-Situ Anaerobic Bio-Oxidation – Bioremediation of contaminants in groundwater.

- Direct Push In-Situ Chemical Oxidation with MNA – Use of oxidants to reduce contaminant levels followed by natural attenuation.

- Repeated In-Situ Chemical Oxidation Injections – Successive additions of oxidants into groundwater until remedial goals are met.

Based on analysis presented in the FS, Natural Attenuation with Monitoring ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, state support/agency acceptance, and reduction of toxicity, mobility, or volume through treatment receive high rankings because monitoring and analysis associated with the remedy would show that natural attenuation mechanisms including active physical, biological, and geochemical reactions are successfully reducing COC concentrations and WQOs would be achieved in a reasonable time frame. Short-term effectiveness was ranked high because minimal exposure to affected media would be required. Implementability also received a high ranking. Community acceptance was ranked moderate because COCs are currently below drinking water standards, but may be present above WQOs in a potentially residential area beyond the timeframe for redevelopment. Full discussion of the remedial alternative selection process is provided in the FS Report. Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.2.4.2 Summary of MNA Report Evaluation for the AST and MES/IRM AOIs

Following the FS Report, the MNA Report was prepared to provide an assessment of the various natural attenuation processes in each AOI and support the recommendations presented in the FS. Trend analysis of concentrations of COCs in groundwater was conducted within the scope of the MNA Report. Evaluation presented in the MNA Report indicates that concentrations of petroleum hydrocarbons (benzene, naphthalene, TPHd and TPHg) and chlorinated volatile organic compounds (CVOCs; cis-1,2-DCE and PCE) at the Former AST AOI and MES/Pilot Study AOIs at most locations are decreasing with time, with predicted times to reach the screening levels of less than 5 years for petroleum hydrocarbons and less than 41 years for CVOCs. Geochemical data indicate that reducing conditions which support anaerobic biodegradation of COCs are present in groundwater in the AOI. Concentrations of TPHd at monitoring well MW-3.2 are variable and have a statistically significant increasing trend while TPHg concentrations have no trend. The presence of

measureable LPH occasionally detected at this location may be affecting dissolved phase concentrations of TPHg and TPHd. Removal of the source of TPH in soil will further support natural attenuation of COCs in groundwater in the Former AST AOI and the MES/Pilot Study AOI. Ongoing evaluation of natural attenuation with monitoring as a response for TPH in groundwater in this AOI should be performed as TPH in soil and groundwater attenuate.

4.5.2.4.3 Proposed Groundwater Remedial Action at the Former AST and Former MES/Pilot Study AOIs

Source removal, treatment of backfill material with gypsum, natural attenuation, O&M including monitoring, and use restrictions through a LUC are the recommended remedial actions for groundwater containing TPH in the Former AST/Former MES/Pilot Study AOIs. As discussed previously, remediation of TPH related impacts within these AOIs is subject to remediation of residual impacts in smear-zone soil. Focused soil excavation and enhanced degradation with gypsum of petroleum hydrocarbons in the Former AST/Former MES/Pilot Study AOIs is likely to have a positive effect on attenuation rates of petroleum hydrocarbons in groundwater. A LUC will restrict the use of groundwater and a groundwater O&M Plan will describe groundwater monitoring along with criteria for curtailment of monitoring.

4.5.3 Former Dip Tank AOI (OU-C)

Remedial alternatives were evaluated in the FS Report to address PCP in soils and groundwater.

4.5.3.1 Soil

4.5.3.1.1 Summary of Alternative Evaluation

The RI Report identified a PRA (excavation area) based on the concentrations of PCP (maximum concentration of 20 mg/kg) and dioxin/furans (maximum TCDD-TEQ concentration of 404 pg/g) in soil (Figure 4-2); these concentrations are above the remedial goal for PCP (12.3 mg/kg) and the remedial goal for dioxin (DTSC, 2009a) of 50 pg/g, respectively. Remedial alternatives evaluated in the FS for soil at the Former Dip Tank AOI include:

- No Action – A baseline to which other remedial technologies are compared.

- LUCs and ICs and SMP – A LUC is a legal mechanism restricting the future use of a property from residential and other sensitive uses. ICs are non-engineered instruments, such as administrative and legal controls, that help eliminate human exposure to contamination. A SMP is an aspect of O&M and specifies soil management procedures. The potential use of covers and barriers is included in this alternative.

- Ex-Situ Soil Remediation – Bioremediation of contaminants through Land Farming.

- ISSS – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.

- Excavation and Disposal – Removal of contaminated soil and transport of soil to an offsite disposal facility.

Based on analysis presented in the FS, Excavation and Disposal ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment and state support/agency acceptance receive high rankings because affected media would be removed from the site. Short-term effectiveness received a moderate ranking because of construction activities associated with the excavation. Community acceptance was ranked moderate. The removal of affected soil from the site is offset by community concerns related to the implementation of this alternative, such as truck traffic and fugitive dust. Implementability received a moderate ranking compared to the implementability of other alternatives for this media. Full discussion of the remedial alternative selection process is provided in the FS Report. Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.3.1.2 Proposed Soil Remedial Action for the Former Dip Tank AOI

Removal and disposal of PCP and dioxin/furans in soil at the Former Dip Tank AOI can significantly reduce PCP and dioxin/furan migration to and concentrations in groundwater and the overall cost is low. Therefore, based on these factors and comparison of alternatives with evaluation criteria, excavation and disposal of approximately 170 cy of soil at the location shown on Figure 4-2 is the recommended remedial action to address PCP and dioxins/furans in soils in the Former Dip Tank AOI.

The former dip tank is listed as “abandoned in place”; therefore, if encountered during soil excavation and is at an accessible depth and configuration relative to the adjacent Dry Shed 4 foundations, the former dip tank will be removed. Confirmation sampling will be conducted following excavation. Dioxin and PCP concentrations in soil confirmation samples will be compared to the unrestricted remedial goals of 50 pg/g and 12.3 mg/kg, respectively. Based on existing data and risk assessment results, unrestricted use is expected following remedy implementation.

Contingency Remedy: If the unrestricted remedial goals are not met due to physical or engineering constraints, then a contingency remedial action would be implemented that includes a Land Use Covenant restricting sensitive uses and an Operations and Maintenance Plan that addresses soil management and operation and maintenance of a cover, if required. A cover (i.e., asphalt, concrete, or clean fill material) will be required, if contaminants in soil remain above commercial remedial goals, or if contaminant transport could result in an unacceptable risk to public health or to other environmental receptors.

4.5.3.2 Groundwater

4.5.3.2.1 Summary of Alternatives Evaluation

Concentrations of PCP and dioxin/furans in groundwater at MW-3.12 are correlated strongly with groundwater elevation, indicating that COCs in groundwater are a result of contact with COCs in soil in the seasonally saturated zone. Remedial alternatives evaluated in the FS for groundwater remediation in addition to soil remediation discussed above to address PCP and dioxin/furans in groundwater at the Former Dip Tank AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- Natural Attenuation Analysis – Demonstrated natural degradation of contaminants without long term monitoring.
- Natural Attenuation with Monitoring and Use Restrictions – Demonstrated natural degradation of contaminants with long term monitoring. O&M and restrictions on the use of groundwater are included in this alternative.
- Groundwater Extraction and Treatment – Removal of groundwater through extraction wells and treatment of groundwater to reduce contaminants.

Based on analysis presented in the FS, Natural Attenuation with Monitoring ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, state support/agency acceptance, and reduction of toxicity, mobility, or volume through treatment receive high rankings because monitoring and analysis associated with the remedy would show that natural attenuation mechanisms including active physical, biological, and geochemical reactions are successfully reducing COC concentrations and WQOs would be achieved in a reasonable time frame. Short-term effectiveness was ranked high because minimal exposure to affected media would be required. Implementability also received a high ranking. Community acceptance was ranked moderate because COCs are currently below drinking water standards, but may be present above WQOs in a potentially residential area beyond the timeframe for redevelopment. Full discussion of the remedial alternative selection process is provided in the FS Report. Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.3.2.2 Summary of MNA Report Evaluation for the Dip Tank AOI

Following the FS Report, the MNA Report was prepared to provide an assessment of the various natural attenuation processes in each AOI and support the recommendations presented in the FS. Trend analysis of concentrations of COCs in groundwater was conducted within the scope of the MNA Report. Evaluation presented in the MNA Report indicates that no trends were observed in PCP and dioxin concentrations in groundwater at MW-3.12 in the Dip Tank AOI. Residual PCP and dioxins in soil may contribute to increased concentrations in groundwater when groundwater levels rise at this location. Excavation of PCP and dioxin-affected soil will result in lower concentrations of COCs in groundwater. Geochemical parameters indicate mildly to moderately reducing conditions in groundwater, which are favorable for anaerobic biodegradation of PCP and reductive dechlorination of dioxin-like compounds. Excavation of COC-affected soil will further support natural attenuation of PCP and dioxin congeners in groundwater in the Former Dip Tank AOI. Further evaluation of natural attenuation with monitoring as a response for PCP and dioxin congeners in groundwater in this AOI should be performed following additional activities.

4.5.3.2.3 Proposed Groundwater Remedial Action and the Former Dip Tank AOI

Based on this correlation and comparison of alternatives with evaluation criteria, source removal, natural attenuation with monitoring and use restrictions are the

recommended remedial actions to address PCP and dioxins/furans in groundwater in the Former Dip Tank AOI. Findings presented in the MNA Report indicate that source removal would further support natural attenuation of COCs in groundwater. Included in the proposed remedial action is a LUC that will restrict the use of groundwater. Further, a groundwater O&M Plan will describe groundwater monitoring along with criteria for curtailment of monitoring and acceptance of unrestricted use.

4.5.4 Rail Lines East AOI (OU-C)

The RI Report identified a presumptive remedial area based on the concentration of lead (4,600 mg/kg) in sample OUC-SS-061 (Figure 4-3a). The excavation area is based on one sample that is above the remedial goal for lead (102 mg/kg).

Analysis conducted in the RI indicates B(a)P concentrations above the of 0.038 mg/kg screening level, used in the RI, and a potential risk drivers for future residential uses. Therefore, the FS evaluated alternative remedial actions for addressing B(a)P. The DTSC recognized urban background level for B(a)P is 0.40 mg/kg and this concentration is the remedial goal for B(a)P. The EPC for B(a)P at the Rail Lines East is 0.120 mg/kg in the first 6 inches of soil and 0.10 in the top 2 feet of soil. Because B(a)P concentrations in the Rail Lines East AOI are below the remedial goal of 0.40 mg/kg, a remedial action for soil containing B(a)P is not necessary and is not included in the proposed Remedial Action.

Remedial alternatives were evaluated in the FS Report to address lead in surface soils and subsurface soils.

4.5.4.1 Soils

4.5.4.1.1 Summary of Alternatives Evaluation

Lead has been detected at 4,600 mg/kg, above the remedial goal of 102 mg/kg, within the top 1.5 feet of soil at this AOI. Remedial alternatives evaluated in the FS for surface and shallow subsurface soil at the Rail Lines East AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- LUCs and ICs and SMP – A LUC/IC are a legal mechanism restricting the future use of a property from residential and other sensitive uses. ICs are non-engineered instruments, such as administrative and legal controls, that help eliminate human

exposure to contamination. A SMP is an aspect of O&M and specifies soil management procedures.

- Capping – Barriers and Covers – Physical barriers that contain and restrict the movement on contaminants.

- In-Situ Solidification/Stabilization – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.

- Excavation and Disposal – Removal of contaminated soil and transport of soil to offsite disposal facility.

Based on analysis presented in the FS, Excavation and Disposal ranked highest amongst the identified alternatives for addressing lead contaminated soil. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment and state support/agency acceptance receive high rankings because affected media would be removed from the site. Short-term effectiveness received a moderate ranking because of construction activities associated with the excavation. Community acceptance was ranked moderate. The removal of affected soil from the site is offset by community concerns related to the implementation of this alternative, such as truck traffic and fugitive dust. Implementability received a moderate ranking compared to the implementability of other alternatives for this media. Full discussion of the remedial alternative selection process is provided in the FS Report.

Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.4.1.2 Proposed Soil Remedial Action at the Rail Lines East AOI

Based on the overall estimated cost and scope and comparison of alternatives with evaluation criteria, excavation and disposal of approximately 40 cy of soil in the excavation area as shown on Figure 4-3b is recommended to address lead affected soil at the Rail Lines East AOI. Confirmation sampling will be conducted following excavation and compared with the unrestricted remedial goal for lead.

Contingency Remedy: If the unrestricted remedial goals are not met due to physical or engineering constraints, then a contingency remedial action would be implemented that includes a Land Use Covenant restricting sensitive uses and an Operations and

Maintenance Plan that addresses soil management and operation and maintenance of a cover, if required. A cover (i.e., asphalt, concrete, or clean fill material) will be required, if contaminants in soil remain above commercial remedial goals, or if contaminant transport could result in an unacceptable risk to public health or to other environmental receptors.

4.5.5 Kilns AOI (OU-C)

Remedial alternatives were evaluated in the FS Report to address TPH and B(a)P in soils.

4.5.5.1 Summary of Alternatives Evaluation

The RI Report identified a presumptive remedial area based on the concentration of TPHd (7,000 mg/kg) in one sample (OUC-SS-058). The sample was originally collected based on visual observation of staining. Because of the visual nature of the staining, it is assumed that the excavation will be limited to the stained area (Figure 4-4). Additional sampling conducted in 2012 confirms concentrations of TPHd are below screening levels outside of the stained area. Co-located with the TPHd is B(a)P at 0.89 mg/kg and above the remedial goal of 0.40 mg/kg. Remedial alternatives evaluated in the FS for soil at the Kilns AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- LUC and ICs with a SMP – A LUC is a legal mechanism restricting the future use of a property from residential and other sensitive uses. A SMP is an aspect of O&M and specifies soil management procedures.
- Capping – Barriers and Covers – Physical barriers that contain and restrict the movement on contaminants.
- Ex-Situ Soil Remediation – Bioremediation of soil through Land Farming.
- ISSS – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.
- Excavation and Disposal – Removal of contaminated soil and transport of soil to offsite disposal facility.

Based on analysis presented in the FS, Excavation and Disposal ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment and state support/agency acceptance receive high rankings because affected media would be removed from the site. Short-term effectiveness received a moderate ranking because of construction activities associated with the excavation. Community acceptance was ranked moderate. The removal of affected soil from the site is offset by community concerns related to the implementation of this alternative, such as truck traffic and fugitive dust. Implementability received a moderate ranking compared to the implementability of other alternatives for this media. Full discussion of the remedial alternative selection process is provided in the FS Report. Table 4-1 summarizes the comparison of the alternatives for each AOI to the evaluation criteria.

4.5.5.2 Proposed Soil Remedial Action for the Kilns AOI

Based on the overall estimated cost and scope and comparison of alternatives with evaluation criteria, excavation and disposal of approximately 7.5 cy of soil at the location shown on Figure 4-4 is recommended to address TPHd and B(a)P in soils at the Kilns AOI. Confirmation sampling will be conducted following excavation and analytical results will be compared with the remedial goal for B(a)P of 0.40 mg/kg and the LGW remedial goal for TPHd of 2,730 mg/kg.

Contingency Remedy: If the unrestricted remedial goals are not met due to physical or engineering constraints, then a contingency remedial action would be implemented that includes a Land Use Covenant restricting sensitive uses and an Operations and Maintenance Plan that addresses soil management and operation and maintenance of a cover, if required. A cover (i.e., asphalt, concrete, or clean fill material) will be required, if contaminants in soil remain above commercial remedial goals, or if contaminant transport could result in an unacceptable risk to public health or to other environmental receptors.

4.5.6 Former MS/IRM AOI (OU-C)

Past remedial efforts, including soil removal for TPHd, PCB, and lead as part of the Interim Remedial Measures, have removed much of the affected soil at this AOI. While TPHd and lead are still present in soil within this AOI, the concentrations of TPH and lead are below human health remedial goals. A revised risk assessment for the MS/IRM AOI determined that the risk to a future resident from soil in the top 2 feet is

$7x10^{-6}$ (7 in one-million) and from soil, to a depth of 10 feet, is $1x10^{-6}$ (one in one-million).

The RI Report reported elevated TPHd concentrations in soil just south of the 2009 excavation area at MW-3.21 (8,230 mg/kg at 3 to 4 feet bgs). Data also indicate elevated concentrations of lead at two locations (180 mg/kg and 220 mg/kg) in subsurface (2 to 4ft bgs) zone soil east of the Covered Shed and at the 2009 excavation area. Lead concentrations were below lead remedial goal of 102 mg/kg in nine other locations east of the Covered Shed. The EPC for lead at the Former MS/IRM AOI in soil between 0 and 0.5 feet is 30 mg/kg and 67 mg/kg from 0 to 10 feet. Therefore, NFA is recommended for TPHd and lead in soil at the MS/IRM area.

The RI Report also reported TPHd in groundwater at MW-3.21 below the TPHd Primary Screening Level of 1.22 mg/L and WQO of 0.47mg/L. Because TPHd in groundwater were below the Primary Screening Level and the WQO, MW-3.21 was removed from the Comprehensive Groundwater Monitoring Program.

Historically, TPH and VOCs have also been detected in groundwater above screening levels along the eastern edge of the AOI, though these COCs are attributed to an offsite source, a gas station which is being remediated under the oversight of the NCRWQCB. Three monitoring wells for the gas station investigation are located on the Georgia-Pacific property (Stantec, 2013). All TPH constituent concentrations have been non detect or below screening levels at MW-3.4 and MW-3.6 since 2005 and at MW-3.21 since sampling began in 2009. VOCs and MTBE have been non detect or below screening levels at MW-3.4 since 2007 and at MW-3.21 since sampling began in 2009. PAHs have been non detect at MW-3.21 since sampling began in 2009. Although barium concentrations at MW-3.21 have exceeded background concentrations (25.6 micrograms per liter [µg/L]), they are well below the screening level (1,000 µg/L). With the exception of arsenic, all dissolved metals concentrations have been non detect or below WQOs at MW-3.21 since sampling began in 2009. The applicable WQO for arsenic is the site background concentration of 2.5 µg/L. With the exception of one result of 2.6 µg/L in September 2010, arsenic concentrations have been below the applicable WQO since sampling began in 2009. One VOC, vinyl chloride was detected in MW-30 below the detection limit in all four quarters in 2010. Groundwater monitoring at monitoring wells in the MS/IRM AOI was discontinued in 2011 (CMP Update #5, October 2011).

Past groundwater contamination at the MS/IRM area is attributed to TPH in soil at an offsite source. The Interim Remedial Measures conducted removed TPH in soil and

groundwater monitoring wells down gradient from the removal area have not detected TPHd above screening level of 1.22 mg/L (ARCADIS, 2011a). The remediation of the offsite source, the Unocal Service Station, for groundwater contamination is managed by the NCRWQCB. Three wells, included in the Unocal investigation are located within the MS/IRM AOI. Concentrations of TPHd, TPHg, MTBE, and BTEX have been non-detect since May 2012 (Stantec, 2013). Because concentrations of COCs in wells monitored by both parties are non-detect or below WQOs, NFA is recommended for groundwater at the MS/IRM AOI.

Remedial alternatives were evaluated in the FS Report to address lead and TPHd in soils and TPHd and VOCs in groundwater. Because COCs in soil, soil vapor and groundwater are below remedial goals and the risk assessment did not show an unacceptable risk, NFA is recommended for the MS/IRM AOI.

4.5.7 Planer #2 AOI (OU-D)

Remedial alternatives were evaluated in the FS Report to address TPH and B(a)P in soils and VOCs in groundwater.

4.5.7.1 Soil

4.5.7.1.1 Summary of Alternatives Evaluation

The remedial area is based detection of TPHd in one sample (OUD-DP-090), which is above the RBSC (for direct contact and indoor air pathway) and the LGW screening level for TPHd. Further samples were collected showing concentrations above the screening levels for B(a)P (Figure 4-6); however, these locations were not added to the excavation based on the BLRA and an EPC for B(a)P at 0.053 mg/kg from 0-2 feet bgs, which is below the B(a)P remedial goal of 0.40 mg/kg. Step-out sampling defined the lateral and vertical extent of TPHd and B(a)P. Remedial alternatives evaluated in the FS for soil at the Planer #2 AOI include:

- No Action – A baseline to which other remedial technologies are compared.

- LUCs and ICs and SMP – A LUC/IC are a legal mechanism restricting the future use of a property from residential and other sensitive uses. ICs are non-engineered instruments, such as administrative and legal controls, that help eliminate human exposure to contamination. A SMP is an aspect of O&M and specifies soil management procedures.

- Capping – Barriers and Covers – Physical barriers that contain and restrict the movement on contaminants.

- ISSS – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.

- Ex-Situ Soil Remediation – Bioremediation of soil in Biopiles

- Ex-Situ Soil Remediation – Bioremediation of soil through Land Farming

- Excavation and Disposal – Removal of contaminated soil and transport of soil to offsite disposal facility.

Based on analysis presented in the FS, Excavation and Disposal ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment and state support/agency acceptance receive high rankings because affected media would be removed from the site. Short-term effectiveness received a moderate ranking because of construction activities associated with the excavation. Community acceptance was ranked moderate. The removal of affected soil from the site is offset by community concerns related to the implementation of this alternative, such as truck traffic and fugitive dust. Implementability received a moderate ranking compared to the implementability of other alternatives for this media. Full discussion of the remedial alternative selection process is provided in the FS Report.

4.5.7.1.2 Proposed Soil Remedial Action for the Planer #2 AOI

Based on the overall estimated cost and scope and comparison of alternatives with evaluation criteria, soil excavation and disposal are the proposed remedial actions for soil at the Planer #2 AOI. Excavation and disposal of approximately 140 cy of soil in the excavation area as shown in Figure 4-6 is recommended to address TPHd at 33,000 mg/kg and B(a)P in soils at one location at the Planer #2 AOI. Confirmation sampling will be conducted following excavation and the resulting EPC compared with the unrestricted remedial goal for B(a)P of 0.40 mg/kg and the leaching to groundwater remedial goal for TPHd of 2,730 mg/kg.

Contingency Remedy: If the unrestricted remedial goals are not met due to physical or engineering constraints, then a contingency remedial action would be implemented that

includes a Land Use Covenant restricting sensitive uses and an Operations and Maintenance Plan that addresses soil management and operation and maintenance of a cover, if required. A cover (i.e., asphalt, concrete, or clean fill material) will be required, if contaminants in soil remain above commercial remedial goals, or if contaminant transport could result in an unacceptable risk to public health or to other environmental receptors.

4.5.7.2 Soil Vapor

During the RI, soil vapor samples were collected directly from the subsurface to evaluate baseline risk due to soil vapor inhalation in ambient air and indoor air. As discussed in Section 2.7.5, health risks and hazards associated with soil vapor/indoor air exceeded acceptable thresholds in the BLRA. Process options detailed in the FS Report were developed to evaluate remedial alternatives for soil and soil vapor concurrently.

4.5.7.2.1 Proposed Soil Vapor Remedial Action for the Planer #2 AOI

The proposed remedial action to address soil vapor risks are soil vapor mitigation, LUC, and O&M. The existing conditions (open space) at the former Mill Site do not present an immediate need for the implementation of soil vapor mitigation; however, future construction and use in these areas may require soil vapor mitigation. The design of the soil vapor mitigation measures shall be submitted to and approved by DTSC prior to any future use of the AOIs. The O&M Plan will specify procedures that will ensure the long-term effectiveness of the covers. Soil vapor remedial goals are shown in Table 3-5.

4.5.7.3 Groundwater

4.5.7.3.1 Summary of FS Evaluation

1,1-DCA and 1,1-DCE were detected in groundwater at low concentrations close to the screening level. Arsenic is detected in one well (MW-6.3) at concentrations ranging from a high of 25 µg/L in March of 2010 to 7.1 µg/L in August of 2013. Although arsenic levels in groundwater are declining, concentrations are still above the groundwater background concentration and remedial goal of 2.5 µg/L. Naphthalene was detected in groundwater in grab samples only. In addition, as discussed in Section 2.7.5, vinyl chloride, PCE, and 1,2,4-TMB contribute to soil vapor risks in the AOI due to

volatilization from groundwater. Remedial alternatives evaluated in the FS for groundwater at the Planer #2 AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- Natural Attenuation Analysis – Demonstrated natural degradation of contaminants without long term monitoring.
- Natural Attenuation with Monitoring – Demonstrated natural degradation of contaminants with long term monitoring.
- Groundwater Extraction and Treatment – Removal of groundwater through extraction wells and treatment of groundwater to reduce contaminants.

Based on analysis presented in the FS, Natural Attenuation with Monitoring (PL2GW-3) ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, state support/agency acceptance, and reduction of toxicity, mobility, or volume through treatment receive high rankings because monitoring and analysis associated with the remedy would show that natural attenuation mechanisms including active physical, biological, and geochemical reactions are successfully reducing COC concentrations and WQOs would be achieved in a reasonable time frame. Short-term effectiveness was ranked high because minimal exposure to affected media would be required. Implementability also received a high ranking. Community acceptance was ranked moderate because COCs may be present above groundwater remedial goals beyond the timeframe for redevelopment. Full discussion of the remedial alternative selection process is provided in the FS Report.

4.5.7.3.2 Summary of MNA Report Evaluation for Planer #2 AOI

Following the FS Report, the MNA Report was prepared to provide an assessment of the various natural attenuation processes in each AOI and support the recommendations presented in the FS. Trend analysis of concentrations of COCs in groundwater was conducted within the scope of the MNA Report. Evaluation presented in the MNA Report indicates that concentrations of COCs within the Planer #2 AOI show decreasing to stable trends with the exception of MW-6.7, with many monitoring locations having current concentrations below the WQO. Geochemical data indicate that anaerobic biodegradation of COCs likely is occurring in some locations, resulting in

decreasing concentrations of 1,1-DCE and 1,1-DCA. Concentrations of COCs are likely to continue to decline with time. 1,1,1--TCA and TCE have been occasionally detected below screening levels at MW-6.7 and in MW-6.6, IW-6.2, and IW-6.3. The presence and increase in 1,1-DCE concentration is evidence of conditions favorable to the breakdown of residual parent chlorinated solvents and is likely to attenuate following exhaustion of residual parent mass. The presence of chloroethane below screening levels at MW-6.7 is further evidence of ongoing chlorinated hydrocarbon transformation in this area. The absence of vinyl chloride at MW-6.7 may be related to the utilization of aerobic degradation pathways that favor vinyl chloride at this location. Decreasing concentrations of chlorinated solvents with distance from MW-6.7 provides further evidence of attenuation. Active remediation including a pilot study for in-situ chemical oxidation in this area was considered and rejected as unlikely to be effective with concurrence from DTSC. Arsenic is present in MW-6.3 at concentrations above the remedial goal and background concentration of 2.5 µg/L and is below the MCL of 10 µg/L. Arsenic concentrations above background concentrations are a result of microbial iron reduction, which is enhance due to organic contaminants present at the Planer #2 AOI, resulting in a release of naturally occurring arsenic, and will decrease to background concentrations once native redox conditions are established. These results indicate natural attenuation with monitoring is an appropriate response for COCs in groundwater in the Planer #2 AOI.

4.5.7.3.3 Proposed Groundwater Remedial Action for the Planer #2 AOI

Based on historical groundwater monitoring data and comparison of alternatives with evaluation criteria, natural attenuation with monitoring and use restrictions is recommended to address VOCs and arsenic in groundwater in the Planer #2 AOI. A LUC will restrict the use of groundwater exceeding remedial goals. Groundwater monitoring and natural attenuation verification will be described in a groundwater O&M Plan.

4.5.8 Former Shipping Office and Truck Shop AOI (OU-D)

Remedial alternatives were evaluated in the FS Report to address TPHd in soils.

4.5.8.1 Summary of Alternative Evaluation

Maximum concentrations of TPHd in soil are concentrated in a limited area at the Former Bark Shelter and northwest of the former #8 Fiber Plant and Storage Area (Figure 4-7). The maximum TPHd concentration (9,090 mg/kg total TPHd C10 – C24)

at OU-DP-18 and 9 feet bgs is below the TPHd (aliphatic) direct contact and indoor air remedial goal of 10,772 mg/kg for total TPHd (C10 – C24). Concentrations of TPHd in other parts of this AOI, while above the screening levels, are just below the TPHd direct contact and indoor air remedial goal of 10,772 mg/kg. B(a)P has also detected at the Former Shipping Office and Truck Shop AOI; however, the EPC for B(a)P is 0.044 mg/kg and is below the B(a)P remedial goal of 0.40 mg/kg and was not considered in the FS alternative analysis. Remedial alternatives evaluated in the FS to address TPHd in soil at the Former Shipping Office and Truck Shop AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- LUCs and ICs and SMP – A LUC is a legal mechanism restricting the future use of a property from residential and other sensitive uses. ICs are non-engineered instruments, such as administrative and legal controls, that help eliminate human exposure to contamination. A SMP is an aspect of O&M and specifies soil management procedures.
- ISSS – Use of reagents to produce an inert and less permeable material to eliminate movement of contaminants.
- Ex-Situ Soil Remediation – Bioremediation of soil in Biopiles.
- Ex-Situ Soil Remediation – Bioremediation of soil through Land Farming.
- Excavation and Disposal – Removal of contaminated soil and transport of soil to offsite disposal facility.

Based on analysis presented in the FS, LUCs and ICs and a SMP ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, long-term effectiveness and permanence, short-term effectiveness, implementability, compliance with ARARs, and state support/agency acceptance receive high rankings because exposure pathways to affected media would be interrupted and uncontrolled contact with soil would not be permitted. Reduction of toxicity, mobility, or volume through treatment received a low ranking because COCs would remain in place. In soil, natural attenuation mechanisms including active physical, biological, and geochemical reactions would reduce concentrations of degradable COCs such as hydrocarbons, but would have little to no effect on compounds such as lead. Community acceptance was ranked moderate. The presence of COCs beyond the timeframe for redevelopment is offset by the absence of

community concerns related to the implementation of this alternative, such as truck traffic and fugitive dust. Implementability received a high ranking.

4.5.8.2 Proposed Soil Remedial Action for the Former Shipping Office and Truck Shop AOI

The RI identified the presence of TPHd at levels just below the TPHd remedial goal near the Former Bank Shelter and #8 Fiber Plant and Storage Area. Results of the BLRA (ARCADIS, 2011a) indicate that the risk associated with TPHd in this AOI is relatively small compared to the high cost to excavate the material. Based on the above and comparison of alternatives with evaluation criteria, LUCs/ICs and SMP is recommended to address the TPHd in soil at the Former Shipping Office and Truck Stop AOI. The LUC will restrict sensitive use such as residential, schools, hospitals, and day cares and require the use of an O&M and SMP during soil disturbing activities. The areal extent of the LUC will be proposed in the Remedial Design Document for OU-C and OU-D.

4.5.9 Sawmill and Sorter AOI (OU-D)

Remedial alternatives were evaluated in the FS Report to address arsenic in groundwater.

4.5.9.1 Summary of Alternative Evaluation

Arsenic was detected above the MCL in several groundwater samples just north and west of the Former Gang Mill Area in the Sawmill and Sorter AOI. Remedial alternatives evaluated in the FS for groundwater at the Sawmill and Sorter AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- Natural Attenuation Analysis – Demonstrated natural degradation of contaminants without long term monitoring.
- Natural Attenuation with Monitoring – Demonstrated natural degradation of contaminants with long term monitoring.
- Groundwater Extraction and Treatment – Removal of groundwater through extraction wells and treatment of groundwater to reduce contaminants.

- Repeated In-Situ Chemical Oxidation Injections – Successive additions of oxidants into groundwater until remedial goals are met.

Based on analysis presented in the FS, Natural Attenuation with Monitoring (O&M) ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, state support/agency acceptance, and reduction of toxicity, mobility, or volume through treatment receive high rankings because monitoring and analysis associated with the remedy would show that natural attenuation mechanisms including active physical, biological, and geochemical reactions are successfully reducing COC concentrations and WQOs would be achieved in a reasonable time frame. Short-term effectiveness was ranked high because minimal exposure to affected media would be required. Implementability also received a high ranking. Community acceptance was ranked moderate because COCs are currently below drinking water standards, but may be present above WQOs in a potentially residential area beyond the timeframe for redevelopment. Full discussion of the remedial alternative selection process is provided in the FS Report

4.5.9.2 Summary of MNA Report Evaluation for the Former Sawmill/Sorter AOI

Following the FS Report, the MNA Report was prepared to provide an assessment of the various natural attenuation processes in each AOI and support the recommendations presented in the FS. Trend analysis of concentrations of COCs in groundwater was conducted within the scope of the MNA Report. Evaluation presented in the MNA Report indicates that concentrations of arsenic in groundwater at the Former Sawmill/Sorter AOI monitoring wells indicate arsenic concentrations are stable to decreasing. Arsenic concentrations above background concentrations are a result of microbial iron reduction resulting in a release of naturally occurring arsenic, and will decrease to background concentrations once native redox conditions are established. Concentrations of arsenic generally decrease with distance along the flow path and natural attenuation will further reduce arsenic concentrations in groundwater in the Sawmill and Sorter AOI. These results indicate that natural attenuation with monitoring is an appropriate response for COCs in groundwater in this AOI.

4.5.9.3 Proposed Groundwater Remedial Action for the Sawmill/Sorter AOI

Based on evaluation of the nature and extent of COCs presented in the FS Report and comparison of alternatives with evaluation criteria, natural attenuation with monitoring and use restrictions is recommended to address arsenic in groundwater in the Sawmill

and Sorter AOI. A LUC will restrict the use of groundwater, exceeding remedial goals. Groundwater monitoring and natural attenuation verification will be described in a groundwater O&M Plan.

4.5.10 Greenhouse AOI (OU-D)

Remedial alternatives were evaluated in the FS Report to address atrazine in groundwater.

4.5.10.1 Summary of Alternatives Evaluation

Atrazine was detected above screening levels in four grab groundwater samples and two monitoring well samples from within the greenhouse AOI. Remedial alternatives evaluated in the FS for groundwater at the Greenhouse AOI include:

- No Action – A baseline to which other remedial technologies are compared.
- Natural Attenuation Analysis – Demonstrated natural degradation of contaminants without long term monitoring.
- Natural Attenuation with Monitoring – Demonstrated natural degradation of contaminants with long term monitoring.
- Groundwater Extraction and Treatment – Removal of groundwater through extraction wells and treatment of groundwater to reduce contaminants.

Based on analysis presented in the FS, Natural Attenuation with Monitoring ranked highest amongst the identified alternatives. Of the evaluation criteria, protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, state support/agency acceptance, and reduction of toxicity, mobility, or volume through treatment receive high rankings because monitoring and analysis associated with the remedy would show that natural attenuation mechanisms including active physical, biological, and geochemical reactions are successfully reducing COC concentrations and WQOs would be achieved in a reasonable time frame. Short-term effectiveness was ranked high because minimal exposure to affected media would be required. Implementability also received a high ranking. Community acceptance was ranked moderate because COCs are currently below drinking water standards, but may be present above WQOs in a potentially residential area beyond the timeframe for

redevelopment. Full discussion of the remedial alternative selection process is provided in the FS Report.

4.5.10.2 Summary of MNA Report Evaluation for the Greenhouse AOI

Following the FS Report, the MNA Report was prepared to provide an assessment of the various natural attenuation processes in each AOI and support the recommendations presented in the FS. Trend analysis of concentrations of COCs in groundwater was conducted within the scope of the MNA Report. Evaluation presented in the MNA Report indicates that atrazine concentrations within the Greenhouse AOI are stable to decreasing. Groundwater geochemical conditions are aerobic to mildly reducing and may support aerobic degradation of atrazine. These results indicate natural attenuation with monitoring is an appropriate response for atrazine in Greenhouse AOI groundwater.

4.5.10.3 Proposed Groundwater Remedial Action for the Greenhouse AOI

Evaluation presented in the FS Report indicates that plume migration is not likely. Therefore, based on historical groundwater monitoring data and comparison of alternatives with evaluation criteria, Natural Attenuation with Monitoring and use restrictions is recommended to address atrazine in groundwater in the Greenhouse AOI. A LUC will restrict the use of groundwater, exceeding remedial goals. Groundwater monitoring and natural attenuation verification will be described in a groundwater O&M Plan. Remedy details and a discussion of implementation are presented in Section 4.7.

4.6 Summary of Proposed Remedial Actions, including No Further Action

Eleven AOIs included in the OU-C and OU-D FS are considered in the OU-C and OU-D RAP. All or portions of following ten AOIs, excluded from the FS, are proposed for NFA based on the data in the RI Report and a re-evaluation in the OU-C and OU-D RAP as presented in Section 2.8.

1. Rail Lines West
2. Dry Sheds #4, #5
3. Former Planer #1, #50
4. Former Log Storage and Sediment Stockpile
5. Log Deck

6. Former Sheep Barn
7. Former Oil House
8. Miscellaneous
9. Transformer Pad
10. Parcel 6

A summary of proposed remedial actions for 11 AOIs evaluated in the FS, including NFA for MS/IRM AOI is provided in the table below.

Summary Table: Proposed Remedial Actions
Parcel 2 AOI – Groundwater *Proposed Alternative:* • *Natural Attenuation to address dioxins/furans and pentachlorophenol* • *LUC restricting domestic use of groundwater above Remedial Goals* • *Operations and Maintenance Plan specifying groundwater monitoring requirements*
Former AST and MES/Pilot Study AOIs – Surface Soil, Soil Vapor, and Groundwater *Soil Proposed Alternative: Former AST AOI and MES/Pilot Study AOI* • *LUC restricting residential or other sensitive land uses* • *Operations and Maintenance Plan, including soil management requirements* • *Excavation and disposal of TPHd contaminated soil* *Soil Vapor Proposed Alternative: Former AST and MES/Pilot Study AOIs* • *Source Removal: Excavation and disposal of TPHd contaminated soil* • *LUC restricting residential or other sensitive land uses* • *Soil Vapor Mitigation* • *Operations and Maintenance Plan* *Groundwater Proposed Alternative: Former AST and MES/Pilot Study AOIs* • *Source Removal: Excavation and disposal of TPHd contaminated soil* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater above Remedial Goals*

Summary Table: Proposed Remedial Actions
Former Dip Tank AOI – Soil and Groundwater *Soil and groundwater Proposed Alternative:* • *Source Removal: Excavation and Disposal of dioxin and PCP contaminated soil* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements*
Rail Lines East AOI - Surface and Shallow Subsurface Soils *Proposed Alternative:* • *Excavation and disposal of lead contaminated soil*
Kilns AOI – Soil *Proposed Alternative:* • *Excavation and Disposal of TPHd and B(a)P contaminated soil*
Former MS/IRM AOI – Soil and Groundwater • *No Further Action as TPHd, lead and B(a)P concentrations are below soil unrestricted remedial goals and TPHd and VOCs are below groundwater remedial goals*
Planer #2 AOI – Soil, Soil Vapor and Groundwater *Soil Proposed Remedial Action:* • *Excavation and disposal of TPHd and B(a)P contaminated soil* *Soil Vapor Proposed Remedial Action:* • *Soil Vapor Mitigation* • *LUC restricting residential or other sensitive land uses* • *Operations and Maintenance* *Groundwater Proposed Remedial Action:* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater*
Former Shipping Office and Truck Shop AOI – Soil *Soil Proposed Alternative:* • *LUC restricting residential or other sensitive land uses* • *Operations and Maintenance, including soil management plan*

Summary Table: Proposed Remedial Actions
Sawmill and Sorter AOI – Groundwater *Proposed Alternative:* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater*
Greenhouse AOI – Groundwater *Proposed Alternative:* • *Natural Attenuation of Groundwater* • *Operations and Maintenance Plan specifying groundwater monitoring requirements* • *LUC restricting the use of groundwater*

4.7 Remedial Action Implementation

Separate Remedial Design and Implementation Plans (RDIPs) for soil excavations, soil covers/barriers, and soil vapor mitigation shall be submitted to DTSC for review and approval prior to implementation of the remedial action. The Soil Vapor Mitigation RDIP will be submitted if and when future use will create unacceptable risk to potential receptors. A Soil Cover/Barrier RDIP shall address the location and design of covers and/or barriers that will eliminate exposure and prevent transport of contaminated soil.

The Soil Excavation and RDIP will include the excavation implementation plan, including design features, permit requirements, best management practices, mitigation measures, and sampling requirements for the AOIs recommended for soil excavation and disposal in the RAP. The Soil Excavation RDIP will include, but is not limited to the following elements:

- Description of equipment used to excavate, handle, and transport contaminated material
- A transportation plan identifying routes of travel and final destination of the RAP wastes generated and disposed
- Identification of necessary permits and agreements

- Dust Control and air monitoring
- Mitigation measures to address cultural, historical and biological resources and erosion control
- Excavation procedures and soil management

A summary of anticipated area and volume of the planned soil excavations is provided in the table below. Post-remedy confirmation samples will be compared to chemical specific remedial goals for evaluation of remedy effectiveness. The values in the table are estimates and the actual areal extent, volume and weight of excavation soil will depend on the results of confirmation sampling and achievement of remedial goals.

Summary Table: Proposed Soil Excavations: estimated area, volume and weight

AOI	Area (square feet)	Depth (feet)	Volume (cubic yards)	Weight (tons)
Former Dip Tank	2,250	2	170	221
Rail Lines East	540	2	40	52
Kilns	100	2	7.5	9.75
Planer #2	625	6	140	182
Former AST and MES/Pilot Study	1,350 - 2,700	15	750 - 1,500	975 - 1,950
Total	**4,865 - 6,215**		**1,108 - 1,858**	**1,440 - 2,415**

Notes:

[a] Volume estimates for AST and MES/Pilot Study Area include a range due to greater uncertainty.

5. Reporting, Public Participation, CEQA, and Schedule

5.1 Reporting

Following implementation of the excavations at the Former AST, MES/Pilot Study, Dip Tank, Rail Line East, Kilns, and Planer #2 AOIs, a report documenting the remedial actions will be submitted.

A groundwater O&M plan will specify monitoring, evaluation, and reporting requirements associated with the natural attenuation remedy. Routine natural attenuation reporting will include at a minimum analysis of current concentrations, trend regression assessments, and comparison with benchmarks established in the O&M Plan to evaluate the ongoing effectiveness of the remedial approach. When groundwater cleanup goals are achieved, requests for NFA at selected AOIs will be submitted.

A RDIP will be submitted for DTSC review and approval for the planned excavations. A design for a soil vapor mitigation system will be submitted to DTSC for review and approval, if and when future use will create unacceptable risk to potential receptors.

5.2 Public Participation

The public participation requirements for the RAP process include the following:

- Developing a Public Participation Plan.
- Holding a minimum 30-day public comment period.
- Publishing a public notice of the availability of the draft RAP for public review and comment in a local newspaper of general circulation.
- Posting a notice of the availability of the draft RAP for public review and comment at the Site.
- Distributing a fact sheet to parties on the site mailing list describing the proposed remedy and the availability of the draft RAP for public comment.
- Making the draft RAP and other supporting documents (i.e., CEQA document) available for public review at the DTSC office and in the local information repositories.
- Conducting a public meeting during the public comment period.

- Responding to public comments received on the draft RAP and CEQA documents.

5.3 California Environmental Quality Act

CEQA requires environmental review of project impacts prior to project approval. A CEQA review is required if a project has a potential for resulting in a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. CEQA applies to all discretionary projects proposed to be carried out or approved by California public agencies, unless an exemption applies.

In accordance with CEQA, DTSC had prepared an Initial Study and a draft Mitigated Negative Declaration for public review to ensure that CEQA requirements are satisfied. The final Initial Study and Negative Declaration are included in Appendix D. DTSC responses to public comments will be provided in the Responsiveness Summary included in Appendix E of the Final RAP.

5.4 Schedule

The total duration of removal activities at the excavations is anticipated to last approximately 6 weeks. Remedial construction activities will proceed after all require permits are acquired.

A LUC and a O&M Plan will be developed and implemented following approval of this RAP. A draft O&M Plan shall be submitted to DTSC for review and approval.

The groundwater O&M Plan will include a schedule for natural attenuation monitoring and reporting.

A Completion Report describing implemented soil excavation activities and installation of replacement groundwater monitoring wells shall be submitted to DTSC for review and approval.

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Tables

Table 2-1
Data Gaps Investigation Analytical Results

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Area of Interest	Location	Sample Type:	Depth Interval (ft bgs)	TPHg, BTEX and Oxygenates												TPHd/TPHmo		Metals
				Benzene (ug/kg or ug/L)	DIPE (ug/kg or ug/L)	Ethanol (ug/kg or ug/L)	ETBE (ug/kg or ug/L)	Ethylbenzene (ug/kg or ug/L)	Gasoline C6-C10 (ug/kg or ug/L)	MTBE (ug/kg or ug/L)	TAME (ug/kg or ug/L)	TBA (ug/kg or ug/L)	Toluene (ug/kg or ug/L)	Xylenes, Total (ug/kg or ug/L)	Diesel C10-C24 (mg/kg or ug/L)	Motor Oil C24-C36 (mg/kg or ug/L)	Lead (mg/kg)
Former AST and Former Parcel 3 MES / Pilot Study AOIs	OUC-DP-1001	SO	6-7	<5.2	<5.2	<520	<5.2	<5.2	<260	<5.2	<5.2 U*	<10	<5.2	<10	**1.1**	<50	---
		SO	10.5-11.5	<480	<480	<19,000	<480	**160 J**	**52,000**	<480	<480 U*	<970	<480	<970	**780**	**41 J**	---
		SO	16-17	<4.2	<4.2	<420	<4.2	<4.2	<210	<4.2	<4.2 U*	<8.4	<4.2	<8.4	**1.5**	<50	---
	OUC-DP-1002	SO	6-7	<5.3	<5.3	<530	<5.3	<5.3	<270	<5.3	<5.3 U*	<11	<5.3	<11	**0.57 JB**	**4.5 JB**	---
		SO	10-11	<4.8	<4.8	<480	<4.8	**170**	**140,000**	<4.8	<4.8 U*	<9.6	<4.8	<9.6	**3,300 B**	**240 J**	---
		SO	16-17	<4.7	<4.7	<470	<4.7	<4.7	<240	<4.7	<4.7 U*	<9.4	<4.7	<9.4	<1.0	<50	---
	OUC-DP-1003	SO	6-7	<5.2	<5.2	<520	<5.2	<5.2	<260	<5.2	<5.2 U*	<10	<5.2	<10	<1.0	<50	---
		SO	10.5-11.5	<4.2	<4.2	<420	<4.2	**1.1 J**	**590**	<4.2	<4.2 U*	<8.4	<4.2	<8.4	**440**	**27 J**	---
		SO	16-17	<4.4	<4.4	<440	<4.4	<4.4	<220	<4.4	<4.4 U*	<8.9	<4.4	<8.9	<0.98	<49	---
	OUC-DP-1004	WG	--	<25	<25	<13,000	<25	130	**27,000**	<25	<25	<200	<25	<50	**56,000**	**2000**	---
		WG/DUP	--	<25	<25	<13,000	<25	110	**30,000**	<25	<25	<200	<25	<50	**120,000**	**3,800 J**	---
		SO	6-7	<5.5	<5.5 U*	<550 U*	<5.5	**41**	**4,100**	<5.5	<5.5	<11	<5.5	<11	**2,700**	**350 J**	---
		SO	10-11	<420	<420	<17,000	<420	**4,400**	**470,000**	<420	<420 U*	<850	<420	<850	**9,600**	**410 J**	---
		SO	16-17	<5.0	<5.0 U*	<500 U*	<5.0	<5.0	<250	<5.0	<5.0	<10	<5.0	<10	**3.0**	<49	---
	OUC-DP-1005	SO	6-7	<5.4	<5.4	<540	<5.4	**9.1**	**6,400**	<5.4	<5.4 U*	<11	<5.4	<11	**740**	**39 J**	---
		SO	10-11	<440	<440	<18,000	<440	**650**	**220,000**	<440	<440 U*	<880	<440	<880	**2,000**	**94 J**	---
		SO	16-17	<4.4	<4.4	<440	<4.4	<4.4	<220	<4.4	<4.4 U*	<8.9	<4.4	<8.9	<0.99	<50	---
	OUC-DP-1006	SO	6-7	<5.3	<5.3	<530	<5.3	<5.3	<270	<5.3	<5.3 U*	<11	<5.3	<11	**18**	<50	---
		SO	9.5-10.5	<480	<480	<19,000	<480	**700**	**170,000**	<480	<480 U*	<960	<480	<960	**1,600**	**66 J**	---
		SO	16-17	<4.3	<4.3	<430	<4.3	<4.3	<210	<4.3	<4.3 U*	<8.5	<4.3	<8.5	<0.98	<49	---
	OUC-DP-1007	WG	--	<25	<25	<13,000	<25	52	**99,000**	<25	<25	<200	<25	<50	**360,000**	**8,300 J**	---
		SO	6-7	<5.1	<5.1 U*	<510 U*	<5.1	<5.1	<260	<5.1	<5.1	<10	<5.1	<10	**1.4**	<50	---
		SO	10-11	<410	<410	<16,000	<410	**190 J**	**150,000**	<410	<410 U*	<820	<410	<820	**3,500 B**	**110 JB**	---
		SO	16-17	<4.1	<4.1 U*	<410 U*	<4.1	<4.1	<200	<4.1	<4.1	<8.2	<4.1	<8.2	**0.65 JB**	**2.0 JB**	---
	OUC-DP-1008	SO	6-7	<5.4	<5.4	<540	<5.4	<5.4	**1,800**	<5.4	<5.4 U*	<11	<5.4	<11	**870 B**	**79 J**	---
		SO	10-11	<4.7	<4.7	<470	<4.7	**1,100**	**200,000**	<4.7	<4.7 U*	<9.3	**1.7 J**	**8.7 J**	**4,200 B**	**240 J**	---
		SO	13-14	<5.4	<5.4	<540	<5.4	<5.4	<270	<5.4	<5.4 U*	<11	<5.4	<11	**8.1**	<50	---
	OUC-DP-1009	SO	6'7	<500	<500	<20,000	<500	**52 J**	**72,000**	<500	<500 U*	<1,000	<500	**220 J**	**5,900 B**	**310 J**	---
		SO	9.5-10.5	<5.2	<5.2	<520	<5.2	**720**	**160,000**	<5.2	<5.2 U*	<10	**1.2 J**	**250**	**2,000 B**	**130 J**	---
		SO	13.5-14.5	<5.2	<5.2	<520	<5.2	<5.2	**620**	<5.2	<5.2 U*	<10	<5.2	<10	**60 B**	**24 J**	---
	OUC-DP-1010	SO	6-7	<5.2	<5.2	<520	<5.2	<5.2	<260	<5.2	<5.2 U*	<10	<5.2	<10	**0.35 J**	<50	---
		SO	11-12	<430	<430	<17,000	<430	<430	**140,000**	<430	<430 U*	<850	<430	<850	**1,700**	**46 J**	---
		SO	16-17	<5.1	<5.1	<510	<5.1	<5.1	<250	<5.1	<5.1 U*	<10	<5.1	<10	**3.1**	<50	---
	OUC-DP-1011	SO	6.5-7	<5.4	<5.4	<540	<5.4	<5.4	<270	<5.4	<5.4	<11	<5.4	<11	**0.45 J**	**1.8 JB**	---
		SO	11-12	<4.5	<4.5	<450	<4.5	**46**	**61,000**	<4.5	<4.5	<8.9	<4.5	<8.9	**810**	**32 JB**	---
		SO	16-17	<5.1	<5.1	<510	<5.1	<5.1	<260	<5.1	<5.1	<10	<5.1	<10	**6.4**	**1.8 JB**	---
	OUC-DP-1012	WG	--	<10	<10	<5,000	<10	2.3 J	**2,800**	<10	<10	<80	<10	<20	**130,000**	**5,000 J**	---
		SO	6-7	<5.4	<5.4	<540	<5.4	<5.4	<270	<5.4	<5.4	<11	<5.4	<11	**0.44 J**	**2.3 JB**	---
		SO	11.5-12.5	<4.1	<4.1	<410	<4.1	**32**	**120,000**	<4.1	<4.1	<8.3	<4.1	<8.3	**2,400**	<2,500	---
		SO	16-17	<4.8	<4.8	<480	<4.8	<4.8	<240	<4.8	<4.8	<9.5	<4.8	<9.5	**0.62 J**	<50	---
Former AST and Former Parcel 3 MES / Pilot Study AOIs	OUC-DP-1013	SO	6.5-7	<5.1	<5.1	<510	<5.1	<5.1	<260	<5.1	<5.1	<10	<5.1	<10	**0.64 J**	**2.6 JB**	---
		SO	11.5-12	<4.4	<4.4	<440	<4.4	<4.4	<220	<4.4	<4.4	<8.9	<4.4	<8.9	**690**	**20 JB**	---
		SO	16.5-17	<5.0	<5.0	<500	<5.0	<5.0	<250	<5.0	<5.0	<10	<5.0	<10	**12**	**13 JB**	---
Kilns AOI	OUC-DP-1014	SO	0-0.5	---	---	---	---	---	---	---	---	---	---	---	**28 B**	**510 B**	---
	OUC-DP-1015	SO	0-0.5	---	---	---	---	---	---	---	---	---	---	---	**160 B**	**1,200 B**	---
	OUC-DP-1016	SO	1.5-2	---	---	---	---	---	---	---	---	---	---	---	**2.9 B**	**35 JB**	---
Rail Lines EastAOI	OUC-SS-1017	SO	0-0.5	---	---	---	---	---	---	---	---	---	---	---	---	---	**42**

Notes for Table 2-1

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Bold entries indicate measured concentrations.

X/X after result	=	Data qualifiers. The first was added by the laboratory and the second by ARCADIS during data validation. If there is only a laboratory qualifier, it is shown without a slash after (e.g., J).
--	=	not available, not measured, not analyzed, not applicable, or not established
<	=	sample result is less than the indicated MRL.
AOI	=	area of interest
B	=	analyte was also detected in the associated method blank.
BTEX	=	bezene, toluene, ethylbenzene, and total xylenes
DIPE	=	di-isopropyl ether
DUP	=	duplicate sample
ETBE	=	ethyl tertiary butyl ether
ft bgs	=	feet below ground surface
J	=	Indicates that the associated numerical value is an estimated concentration.
MDL	=	method detection limit
mg/kg	=	milligrams per kilogram
MRL	=	method reporting limit
MTBE	=	methyl tertiary butyl ether
ND	=	not detected
OU	=	operable unit
PAH	=	polycyclic aromatic hydrocarbon
SO	=	soil sample
TAME	=	tertiary amyl methyl ether
TBA	=	tertiary butyl alcohol
TPHd	=	total petroleum hydrocarbons as diesel
TPHg	=	total petroleum hydrocarbons as gasoline
TPHmo	=	total petroleum hydrocarbons as motor oil
U	=	not detected
µg/L	=	microgram(s) per liter
µg/kg	=	microgram(s) per kilogram

Table 2-2
OU-C and OU-D
Area of Interest (AOI) Status and Proposed Remedial Action

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	OU	NFA in RI Report	Proposed NFA In RAP, but not included in FS	Proposed Remedial Action in RAP, with media listed
Parcel 1	C	X		
Parcel 2	C			Groundwater (GW)
Rail Lines West	C	Partial	X	
Former Dip Tank	C			GW,SOIL
Former AST	C			GW,SOIL
Former MES/Pilot Study	C			GW,SOIL
Dry Sheds #4,#5	C	Partial	X	
Former Planer #1, #50	C	Partial	X	
Truck Loading Shed	C	X		
Former Green Chain	C	X		
Construction Engineering	C	X		
Rail Lines East	C			SOIL
Kilns	C			SOIL
Former MS/IRM	C			NFA for soil and GW after further evaluation in RAP
Former Oil House	C		X	
Miscellaneous	C		X	
Transformer Pad	C		X	
West of IRM	Moved to OU E from OU C			
IRM	Moved to OU E from OU C			
Parcel 6	C		X	
Planer #2	D			GW, SOIL
Former Shipping Off. & Truck Shop	D	Partial		SOIL
Sawmill/Sorter	D	Partial		GW
Greenhouse	D			GW
Scales	D	X		
Former Log Storage and Sediment Stockpile	D	Partial	X	
Log Deck	D	Partial	X	
Riparian	Moved to OU E from OU D			
Clinker/Fill	D	X		
Former Sheep Barn	D	Partial	X	
Former Airstrip	D	X		
Cypress Gate	D	X		

Notes:
FS - Feasibility Study
NFA - No Further Action
OU - Operable Unit
RAP - Remedial Action Plan
RI - Remedial Investigation

Table 2-3
Exposure Point Concentrations for COCs
in Each AOI with Proposed Remedial Action

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Depth	Lead mg/kg	B(a)P mg/kg	Dioxin TEQ mg/kg	Pentachlorophenol mg/kg
Remedial Goal		**102**	**0.4**	**5.00E-05**	**12.3**
Parcel 2	0 - 0.5 ft. bgs	39	0.078	-	-
	0 - 2 ft. bgs	30	0.078	-	-
	0- 10 ft. bgs	22	0.078	-	2[m]
Former AST	0 - 0.5 ft. bgs	150	0.065	-	-
	0 - 2 ft. bgs	140	0.057	-	-
	0- 10 ft. bgs	220	0.018	-	-
MES/Pilot Study	0 - 0.5 ft. bgs	160	-	-	-
	0 - 2 ft. bgs	150	-	-	-
	0- 10 ft. bgs	100	-	-	-
Former Dip Tank- post excavation	0 - 0.5 ft. bgs	29[m]	-	8.90E-06	-
	0 - 2 ft. bgs	29[m]	-	1.70E-05	0.99[m]
	0- 10 ft. bgs	16	-	6.00E-06	-
Rail Lines East- post excavation	0 - 0.5 ft. bgs	73	0.12	-	-
	0 - 2 ft. bgs	71	0.1	-	-
	0- 10 ft. bgs	70	0.082	-	-
Kilns- post excavation	0 - 0.5 ft. bgs	60	-	-	-
	0 - 2 ft. bgs	60	-	-	-
	0- 10 ft. bgs	60	-	-	-
Former MS/IRM	0 - 0.5 ft. bgs	30	0.0066	-	-
	0 - 2 ft. bgs	-	0.0052	-	-
	0- 10 ft. bgs	67	0.037	-	-
Planer #2- post excavation	0 - 0.5 ft. bgs	15	0.086	-	-
	0 - 2 ft. bgs	13	0.053	-	-
	0- 10 ft. bgs	10	0.046	-	-
Former Shipping Office	0 - 0.5 ft. bgs	-	0.055	-	-
	0 - 2 ft. bgs	13	0.044	-	-
	0- 10 ft. bgs	9.9	0.023	-	-
Sawmill Sorter	0 - 0.5 ft. bgs	41	.011[m]	-	-
	0 - 2 ft. bgs	32	0.0062	-	-
	0- 10 ft. bgs	38	0.0045	-	-
Greenhouse	0 - 0.5 ft. bgs	28[m]	-	-	-
	0 - 2 ft. bgs	28[m]	-	-	-
	0- 10 ft. bgs	28[m]	-	-	-

Notes:

EPC are calculated for expected post excavation concentrations for the Former Dip Tank, Rail Lines East, Kilns, and Planer #2 AOIs.

[m] = maximum concentration used for EPC

Table 2-4
Summary of Risk Drivers for Soil and Soil Vapor Excluding Arsenic in OU-C and OU-D

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California.

OU	EU	Scenario	Unacceptable Risk				Pathway	Pathway % Contribution	COC	COC % Contribution
			Receptor	*Depth*	*ELCR/HI*	*Risk*				
OU-C	Former AST	RME	Resident	0-0.5 or 0-2 ft bgs	ELCR	5E-02	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	900	Soil Vapor	>98%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
				0-10 ft bgs	ELCR	5E-02	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	900	Soil Vapor	>98%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
			Commercial/industrial Worker	0-0.5 or 0-2 ft bgs	ELCR	4E-03	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	80	Soil Vapor	>99%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
				0-10 ft bgs	ELCR	4E-03	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	80	Soil Vapor	>99%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
		Lead Evaluation	Child Resident	0-0.5 or 0-2 ft bgs	--	--	Soil Exposure	100%	0-0.5 ft bgs: 153 / 105 mg/kg * 0-2 ft bgs: 141 / 105 mg/kg *	
				0-10 ft bgs	--	--	Soil Exposure	100%	220 / 105 mg/kg *	
			Construction Worker	0-10 ft bgs	--	--	Soil Exposure	100%	220 / 185 mg/kg *	
			Utility/Trench Worker	0-10 ft bgs	--	--	Soil Exposure	100%	220 / 185 mg/kg *	
	Former Parcel 3 MES/Pilot Study	RME	Resident	0-0.5 or 0-2 ft bgs	ELCR	5E-02	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	900	Soil Vapor	>99%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
				0-10 ft bgs	ELCR	5E-02	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	900	Soil Vapor	>99%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
			Commercial/industrial Worker	0-0.5 or 0-2 ft bgs	ELCR	4E-03	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	80	Soil Vapor	>98%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%
				0-10 ft bgs	ELCR	4E-03	Soil Vapor	>99%	Benzene	75%
									Ethylbenzene	14%
					HI	80	Soil Vapor	>99%	1,2,4-TMB	69%
									Naphthalene	12%
									Benzene	12%

Table 2-4
Summary of Risk Drivers for Soil and Soil Vapor Excluding Arsenic in OU-C and OU-D

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California.

OU	EU	Scenario	Unacceptable Risk				Pathway	Pathway % Contribution	COC	COC % Contribution
			Receptor	*Depth*	*ELCR/HI*	*Risk*				
OU-C	Former Parcel 3 Machine Shop/IRM	RME	Resident	0-0.5 or 0-2 ft bgs	ELCR	3E-04	Soil Vapor	>99%	Vinyl Chloride	52%
									Benzene	31%
					HI	2	Soil Vapor	>95%	1,2,4-TMB	44%
									Bromomethane	19%
									Benzene	14%
				0-10 ft bgs	ELCR	3E-04	Soil Vapor	>98%	Vinyl Chloride	52%
									Benzene	31%
					HI	2	Soil Vapor	>82%	1,2,4-TMB	38%
									Bromomethane	16%
									Benzene	12%
			Commercial/industrial Worker	0-0.5 or 0-2 ft bgs	ELCR	3E-05	Soil Vapor	>99%	Vinyl Chloride	52%
									Benzene	31%
				0-10 ft bgs	ELCR	3E-05	Soil Vapor	>99%	Vinyl Chloride	52%
									Benzene	30%
	Rail Lines East	RME	Resident	0-0.5 or 0-2 ft bgs	ELCR	2E-06	Soil	100%	B(a)P-TEQ	76%
OU-D	Planer#2	RME	Resident	0-0.5 or 0-2 ft bgs	ELCR	2E-03	Soil Vapor	>99%	Vinyl Chloride	37%
									PCE	31%
					HI	30	Soil Vapor	>98%	1,2,4-TMB	42%
									PCE	24%
									1,1-DCE	11%
				0-10 ft bgs	ELCR	2E-03	Soil Vapor	>99%	Vinyl Chloride	37%
									PCE	31%
					HI	30	Soil Vapor	>98%	1,2,4-TMB	42%
									PCE	24%
									1,1-DCE	11%
			Commercial/industrial Worker	0-0.5 or 0-2 ft bgs	ELCR	2E-04	Soil Vapor	>92%	Vinyl Chloride	37%
									PCE	31%
					HI	3	Soil Vapor	>97%	1,2,4-TMB	42%
									PCE	24%
									1,1-DCE	11%
				0-10 ft bgs	ELCR	2E-04	Soil Vapor	>99%	Vinyl Chloride	37%
									PCE	31%
					HI	3	Soil Vapor	>98%	1,2,4-TMB	42%
									PCE	24%
									1,1-DCE	11%

Notes:
Table presents ELCR and HI risk summaries for AOIs with an ELCR greater than 1E-06 and/or an HI greater than 1.
* = For the lead hazard evaluation: Lead EPC / Receptor Specific Screening Level
-- = Not applicable
> = greater than

1,1-DCE = 1,1-Dichloroethane
1,2,4-TMB = 1,2,4-trimethylbenzene
AOI = area of interest
AST = aboveground storage tank
bgs = below ground surface
COC = chemical of concern
EPC = exposure point concentration
ELCR = excess lifetime cancer risk
EU = exposure unit
ft = feet
HI = hazard index
IRM = interim remedial measure
MES = mobile equipment shop
mg/kg = milligrams per kilogram
OU = operable unit
B(a)P TEQ = Benzo(a)pyrene toxicity equivalents (carcinogenic PAHs)
PCE = tetrachloroethene
RME = reasonable maximum exposure

Table 3-1
Applicable or Relevant and Appropriate Requirements (ARARs) and "To be Considered" (TBC) Factors

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Standard, Requirement, Criteria, Limitation	Citation	Description	Type of ARARs
Federal			
Resource Conservation and Recovery Act	40 CFR Part 261	Establishes criteria to determine whether solid waste exhibits characteristics that makes it a regulated hazardous waste	Chemical/ Action
	40 CFR 263	Standards applicable to transporters of hazardous waste	Chemical/ Action
Toxic Substances Control Act	40 CFR 761.60 , 761.61, 761.75	Regulations that determine the appropriate characterization, cleanup, and disposal requirements for PCBs.	Chemical/ Action
Clean Water Act	33 USCA 1251-1376 40 CFR 100-149	Regulations requiring development and implementation of a storm water pollution prevention plan	Action
Clean Air Act	42 USC 7401-7642	Emission Standards from stationary and mobile sources	Chemical
Occupational Health and Safety	29 CFR 1910.120	Establishes requirements for health and safety training	Action
National Archaeological and Historical Preservation Action	16 USC § 469 36 CFR Part 65	Provides requirements if significant scientific/cultural/historical artiacts are found	TBC
Risk Assessment Guidance for Superfund; Ecological Risk Assessment Guidance for Superfund; Ecological Screening Levels	USEPA, 1989, 1997, 2005	Guidance and framework to assess human and ecological risks	TBC
Preliminary Remediation Goals	USEPA Region 9, 2004	Risk-based concentrations that are intended to assist risk assessors and others in initial screening-level evaluations of environmental measurements.	TBC
State and Local			
Title 22, California Hazardous Waste Control Act of 1972	22 CCR 66260.1 et seq.	Establishes criteria for determining waste classification for the purposes of transportation and disposal of wastes	Chemical/ Action
	22 CCR 66262.1 et seq.	Establishes standards applicable to generators of hazardous waste	Action
	22 CCR Chapter 18	Identifies hazardous waste restricted from land disposal unless specific treatment standards are met	Chemical/ Action

Table 3-1
Applicable or Relevant and Appropriate Requirements (ARARs) and "To be Considered" (TBC) Factors

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Standard, Requirement, Criteria, Limitation	Citation	Description	Type of ARARs
Title 27, Division 2 of the Califomia Code of Regulations	27 CCR 20005 et seq.	Regulation of solid waste	Chemical/ Action
Water Quality Control Plan for the North Coast Region	NCRWQCB, May 2011	Beneficial uses, water quality objectives, and implementation plans	Chemical/ Action
SWRCB Resolution No. 68-16	SWRCB, October 1968	Establishes policy for the regulation of discharges to waters of the state.	TBC
SWRCB Resolution No. 92-49	SWRCB October 1996 Water Code Section 13304	Establishes policies and proceedures for investigation and cleanup and abatement of discharges.	TBC
SWRCB Resolution No. 2012-0016	SWRCB, 2012	Provides a framework and environmental standards for evaluating the need for active remediation and monitoring to protect human health and the environment from petroleum hydrocarbon constituents in soil, soil vapor, and groundwater	TBC
Ambient Air Quality Standards	H&S Sec. 39000-44071 and Mendocino County Air Quality Management District Regulations	Establishes standards for emissions of chemical vapors and dust	Chemical
California Coastal Act	Public Resources Code Division 20	Establishes permitting requirements and conditions for any "development" which remedial activities qualify as.	Location/ Action
Manifest System, Record-Keeping, Reporting and Transportation of Hazardous Waste	22 CCR Chapter 13	Governs transportation of hazardous materials	Action
State PCB Requirements	22 CCR 66261.113	Establishes standards to disposal of PCBs	Chemical/ Action
California Hazardous Waste Control	Health and Safety Code, Chapter 6.5, Sec. 25100-25250.26	Establishes hazardous waste control measures	Action
California Hazardous Substances Account Act	Health and Safety Code, Chapter 6.8, Sec 25300-25395.15	Establishes site mitigation and cost recovery programs	Action
Site Investigation and Remediation Order	Docket No. HSA-RAO 06-07-150	Establishes requirements for investigation and site remediation	Action
California Environmental Quality Act	Public Resources Code Section 21000-21177	Mandates environmental impact review of projects approved by governmental agencies	Action

Table 3-1
Applicable or Relevant and Appropriate Requirements (ARARs) and "To be Considered" (TBC) Factors

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Standard, Requirement, Criteria, Limitation	Citation	Description	Type of ARARs
Discharges of Hazardous Waste to Land	Title 23, California Code of Regulations, Division 3, Ch. 15	Applies to discharge of waste	Action
Emission Standard	MCAQMD Regulation 1 Chapters 1, 2 and 4.	Establishes emission standards and permitting requirements for equipment and dust.	Action
City of Fort Bragg Grading Permit Requirements and Procedures	Title 18, Chapter 18.60	Establishes requirements for excavation and grading.	Location/ Action
Stockpiling Requirements of Contaminated Soil	H&S Sec. 25123.3(a)(20)	Establishes standards for stockpiling of non-RCRA contaminated soil	Location/ Action
Requirements for Substances Deleterious to Fish and Wildlife	California Fish and Game Code Section 5650	Makes it unlawful to deposit into, permit to pass into, or place where it can pass into the waters of the state certain specified pollutants.	Chemical/ Action
Relevant Policies for the Protection and Conservation of Fish and Wildlife	California Fish and Game Code Section 2014	Requires conservation of natural resources and prevention of the willful or negligent destruction of birds, mammals, fish, reptiles, or amphibia.	Location/ Action
	California Fish and Game Code Section 1600	Establishes protection and conservation of the fish and wildlife resources.	Location/ Action
Occupational Health and Safety	8 CCR GISO 5192	Establishes worker health and safety requirements	Action
Remedial Action Plan Policy	EO-95-007-PP	Guidance and framework to develop a remedial action plan	TBC
Porter-Cologne Water Quality Control Act	California Water Code Section 13000 SWRCB, 2011	Establishes policy for preservation and enhancement of the beneficial uses of the waters of the state	SWRCB
Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities; Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities	CalEPA, 1992 CalEPA, 1996	Guidance and framework to assess human and ecological risks	TBC
California Human Health Screening Levels	CalEPA, 2006	Risk-based concentrations for human receptors that are intended to assist risk assessors and others in initial screening-level evaluations of environmental measurements.	TBC

Table 3-1
Applicable or Relevant and Appropriate Requirements (ARARs) and "To be Considered" (TBC) Factors

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Standard, Requirement, Criteria, Limitation	Citation	Description	Type of ARARs

Notes:

CalEPA - California Environmental Protection Agency
CCR – California Code of Regulation
CFR – Code of Federal Regulation
GISO - General Industry Safety Order
HSC - Health and Safety Code
MCAQMD – Mendocino County Air Quality Management District
RCRA - Resource Conservation and Recovery Act
RWQCB - Regional Water Quality Control Board
SWRCB – State Water Resources Control Board
TBC - to be considered
USC – United States Code
USCA – United States Code Annotated
USEPA - United States Environmental Protection Agency

References:

CalEPA. 1992. Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. California Environmental Protection Agency, Office of Scientific Affairs. July.

CalEPA. 2006. Public Health Goals for Drinking Water. Available at: http://www.oehha.ca.gov/water/phg/index.html. California Environmental Protection Agency. Accessed on December 22, 2006.

Table 3-2
Chemical Specific Remedial Action Goals for Groundwater

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Constituent/Analytical Group	Chemical Specific Remedial Goals - Groundwater				
	Chemical Specific Remedial Goal (µg/L)	Remedial Goal Below Detection Limit?[1]	Source	Drinking Water MCL (for comparison) (µg/L)	Vapor Intrusion[2] (for comparison) (µg/L)
Metals					
Arsenic	2.5	No	Background	10	NA
Volatile Organic Compounds (VOCs)					
Benzene	0.15	Yes	OEHHA PHG	1	27
1,2,4-Trimethylbenzene	15	No	CVWQCB T&O	NA	NA
Tetrachloroethene	0.06	Yes	OEHHA PHG	5	63
Trichloroethene	1.7	No	OEHHA PHG	5	130
cis-1,2-Dichloroethene	6	No	CA Primary MCL	6	3,100
1,1-Dichloroethane	3	No	OEHHA PHG	5	NA
1,1-Dichloroethene	6	No	CA Primary MCL	6	16,000
1,2-Dichloroethane	0.4	Yes	OEHHA PHG	0.5	100
Vinyl Chloride	0.05	Yes	OEHHA PHG	0.5	1.8
Semivolatile Organic Compounds (SVOCs)					
Pentachlorophenol	0.3	No	OEHHA PHG	1	NA
Pesticides					
Atrazine	0.15	Yes	OEHHA PHG	3	NA
Dioxins and Furans					
2,3,7,8 TCDD TEQ[3]	5E-08	Some Congeners	OEHHA PHG	3E-05	NA
Total Petroleum Hydrocarbons					
Total Gasoline (C6-C10)	50	No	T&O Threshold	NA	NA
Total Diesel (C10-C24)	100	No	T&O Threshold	NA	NA

[1] Where indicated, Remedial Goal is below detection limits typically achieved by analytical laboratories.
Compliance with remedial goals will be achieved if these constituents are not detected above the following typical detection limits (µg/L):
- Benzene - 0.5
- Tetrachloroethene - 0.5
- 1,2-Dichloroethane - 0.5
- Vinyl Chloride - 0.5
- Atrazine - 0.5

A range of detection limits is possible for individual Dioxin and Furan congeners. Compliance with remedial goals will be achieved based on comparison of TEQ values calculated using only detected congeners.

[2] Environmental Screening Level for Evaluation of Potential Vapor Intrusion for Residential Land Use; Prepared by San Francisco Regional Water Quality Control Board (Table E-1; December 2013)

[3] Note 5E-08 µg/L and 3E-5 µg/L are equal to 0.05 pg/L and 30 pg/L respectively
1 µg/L = 1,000 ng/L = 1,000,000 pg/L

Acronyms and Abbreviations:

CA Primary MCL	California Department of Public Health Primary MCL
Cal/EPA	California Environmental Protection Agency
Cal/EPA CPF	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water, Cal/EPA Cancer Potency Factor
CVWQCB T&O	CVRWQCB (2004) TPH water quality objectives for taste and odor
MCL	Maximum Contaminant Level
OEHHA PHG	Office of Environmental Health and Safety Public Health Goal
PHG	public health goal
SVOC	semi volatile organic compound
TCDD	tetrachlorodibenzo-p-dioxin
TEQ	toxic equivalent
T&O	taste and odor
VOC	volitile organic compound
µg/L	micrograms per liter (1E-6 grams per liter = parts per billion)
ng/L	nanograms per liter (1E-9 grams per liter = parts per trillion)

Table 3-3
Chemical Specific Remedial Action Goals for Soil

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

COC	Units	Soil Remedial Goal [1]					
		Unrestricted (Resident Adult/Child)	Commercial Worker[2]	Construction Worker[2]	Utility Worker[2]	Passive Recreator[2]	Occassional Recreator[2]
Lead	mg/kg	**1.02E+02**	3.95E+02	1.85E+02	1.85E+02	NA	NA
Dioxin TEQ (mammals)	mg/kg	**5.00E-05**	2.00E-04	1.41E-03	2.52E-03	NA	NA
Pentachlorophenol	mg/kg	**1.23E+01**	1.33E+01	9.54E+01	7.79E+01	NA	NA
Benzo(a)pyrene	mg/kg	**4.00E-01**	4.00E-01	1.66E+00	2.97E+00	1.53E+00	4.00E-01

Notes:

mg/kg = milligrams per kilogram

NA = not applicable

[1] See Appendix B for development of remedial goals

[2] Alternative goals are provided for use with restricted land use scenarios.

Table 3-4
TPH Remedial Action Goals for Soil

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Compound	Soil		
	Direct Contact RBSC[a] (design and construction of buildings are subject to LUC; unrestricted soil contact)	Direct Contact and Indoor Air RBSC[a] (unrestricted use)	Leaching to Groundwater Criteria[c]
Units	mg/kg	mg/kg	mg/kg
Aliphatics [c]			
TPH as Gasoline (C6-C8)	5,627	2.6	--
TPH as Gasoline (C8-C10)	14,066	9.8	--
Total Gasoline (C6-C10)	14,066	9.8	--
TPH as Gasoline (C7-C12)	14,066	9.8	--
TPH as Diesel (C10-C12)	14,066	51	--
TPH as Diesel (C12-C16)	14,066	648	--
TPH as Diesel (C16-C24)	14,066	10,772	--
Total Diesel (C10-C24)	14,066	10,772	2,730
TPH as Diesel (C10-C24)	14,066	10,772	2,730
TPH as Motor Oil (C24-36)	281,346	281,346	--
Aromatics [c]			
TPH as Gasoline (C6-C8)	NA	NA	--
TPH as Gasoline (C8-C10)	4,220	1.6	--
Total Gasoline (C6-C10)[1]	4,220	1.6	--
TPH as Gasoline (C7-C12)	4,220	1.6	--
TPH as Diesel (C10-C12)	4,220	8.5	--
TPH as Diesel (C12-C16)	4,220	110	--
TPH as Diesel (C16-C24)	4,220	4,220	--
Total Diesel (C10-C24)[2]	4,220	4,220	2,730
TPH as Diesel (C10-C24)	4,220	4,220	2,730
TPH as Motor Oil (C24-36)	4,220	4,220	--

Notes:

[a] Site-specific risk-based screening concentrations (RBSCs, [ARCADIS BBL, 2008]). Total Gasoline, the sum of TPH as gasoline (TPHg) ranges C6-C8 and C8-C10, and TPHg reported as the C7-C12 range are compared to the RBSCs for the C8-C10 range. Total Diesel, the sum of TPH as Diesel (TPHd) ranges C10-C12, C12-C16 and C16-C24, and TPHd reported as the C10-C24 range are compared to the RBSCs for the
[b] From Appendix G, Upper bound concentration that would result in leachate concentrations less than the RWQCB TPH Limit of 0.1 mg/L. Soil remedial goal is combined with DI-WET leachate results compared with
[c] Aliphatic remedial goals apply unless BTEX and PAH data are not available, Aromatic remedial goals may be used if BTEX and PAH data are unavailble.

Table 3-5
Soil Vapor Remedial Goals for Residential and Commerical Receptors

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Chemical	Health Effect[a]	Residential		Commercial	
		Target Indoor Air[b] µg/m^3	Remedial Goal Soil Vapor[c] µg/m^3	Target Indoor Air[b] µg/m^3	Remedial Goal Soil Vapor[d] µg/m^3
Benzene	C	0.084	56	0.42	700
Ethyl Benzene	C	1.1	733	4.9	8,166
Bromomethane	NC	5.2	3,466	22	36,666
1,1 Dichloroethylene	NC	73	48,666	310	516,666
Napthalene	C	0.083	55	0.36	600
Tetrachloroethylene	C	0.41	273	2.08	3,466
1,2,4 Trimethylbenzene	NC	7.3	4,866	31	51,666
Vinyl Chloride	C	0.031	20	0.16	266

Notes:

[a] C - carcinogenic chemical; NC – non-carcinogenic chemical

[b] From US EPA RSLs (May 2014), except benzene, 1,1 dichloroethylene, tetrachloroethylene, and vinyl chloride target air concentrations are from HERO HHRA Note 3 (May 2013, rev July 2014)

[c] Target air concentration divided by 0.0015

[d] Target air concentration divided by 0.0006

Table 4-1
Summary of Proposed Alternative Comparisons to Nine Evaluation Criteria

Remedial Action Plan - Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Parcel 2 AOI	Groundwater	No Action	P2GW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Moderate	Moderate	Moderate	Low	High	High	$0	Low	Moderate
		Natural Attenuation Analysis	P2GW-2	Demonstrate a stable and decreasing exposure trend using historical monitoring data	High	High	High	High	High	High	$50,000	Low	Moderate
		Monitored Natural Attenuation	P2GW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$111,700	High	Moderate
		Groundwater Extraction and Treatment	P2GW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	High	High	High	High	Moderate	Moderate	$2,328,600	High	Moderate
Former AST AOI and MES/Pilot Study AOI	Surface Soil	No Action	ASTSS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	ASTSS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$50,000	High	Moderate
		Capping - Barriers and Covers	ASTSS-3	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	Moderate	Moderate	Moderate	Low	$150,000	High	Low
		In-Situ Solidification / Stabilization	ASTSS-4	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$330,000	High	Moderate
		Excavation and Disposal	ASTSS-5	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$170,000	High	Moderate
	Smear Zone Soil	No Action	ASTSZS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Ex-Situ Soil Remediation	ASTSZS-2	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	High	High	High	High	Moderate	Moderate	$1,000,000	High	Moderate
			ASTSZS-3	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	$1,500,000	Moderate	Moderate
		In-Situ Solidification / Stabilization	ASTSZS-4	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$2,225,000	High	Moderate
		Excavation and Disposal	ASTSZS-5	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill. Further Data collection may be required to define the affected area.	High	High	High	High	Moderate	Moderate	$1,200,000	High	Moderate

Table 4-1
Summary of Proposed Alternative Comparisons to Nine Evaluation Criteria

Remedial Action Plan - Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Former AST AOI and MES/Pilot Study AOI	Groundwater	No Action	ASTGW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Low	Low	Low	Low	High	High	$0	Low	Low
		Natural Attenuation Analysis	ASTGW-2	Demonstrate a stable and decreasing exposure trend using historical monitoring data	High	High	High	High	High	Low	$100,000	Low	Moderate
		Monitored Natural Attenuation	ASTGW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$372,300	High	Moderate
		Groundwater Extraction and Treatment	ASTGW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	Moderate	High	Moderate	Moderate	Moderate	Moderate	$3,447,000	High	Moderate
		In-Situ Anaerobic Bio Oxidation	ASTGW-5	Anaerobic bio-oxidation of COIs followed by treatment through natural attenuation mechanisms.	High	High	High	High	Moderate	High	$683,300	High	Moderate
		In-Situ Chemical Oxidation	ASTGW-6	One-time injection of highly reactive oxidation solution for treatment of contaminants followed by periodic groundwater sampling to confirm that WQOs will be reached within a reasonable timeframe.	High	High	High	High	Moderate	Moderate	$615,000	High	Moderate
			ASTGW-7	Periodic injection of highly reactive oxidation solution for treatment of contaminants	High	High	High	High	Moderate	Moderate	$985,000	High	Moderate
Former Dip Tank AOI	Soil	No Action	FDTS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	FDTS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$75,000	High	Moderate
		Ex-Situ Soil Remediation	FDTS-3	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	$975,000	Moderate	Moderate
		In-Situ Solidification / Stabilization	FDTS-4	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$275,000	High	Moderate
		Excavation and Disposal	FDTS-5	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$32,000	High	Moderate

Table 4-1
Summary of Proposed Alternative Comparisons to Nine Evaluation Criteria

Remedial Action Plan - Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Former Dip Tank AOI	Groundwater	No Action	FDTGW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Low	Low	Low	Low	High	High	$0	Low	Low
		Natural Attenuation Analysis	FDTGW-2	Demonstrate a stable and decreasing exposure trend using historical monitoring data	High	High	High	High	High	Moderate	$50,000	Low	Moderate
		Monitored Natural Attenuation	FDTGW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$372,300	High	Moderate
		Groundwater Extraction and Treatment	FDTGW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	High	High	High	High	Moderate	Moderate	$2,266,600	High	Moderate
Rail Lines East AOI	Rail line Surface Soils	No Action	RLESS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	RLESS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$100,000	High	Moderate
		Capping - Barriers and Covers	RLESS-3	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	Moderate	Moderate	Moderate	Low	$245,000	High	Low
		In-Situ Solidification / Stabilization	RLESS-4	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$525,000	High	Moderate
		Excavation and Disposal	RLESS-5	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$50,000 - $385,000	High	Moderate
	Surface and Shallow Subsurface Soils	No Action	RLESSS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	RLESSS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$75,000	High	Moderate
		Capping - Barriers and Covers	RLESSS-3	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	Moderate	Moderate	Moderate	Low	$195,000	High	Low
		Ex-Situ Soil Remediation	RLESSS-4	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	$990,000	Moderate	Moderate
		In-Situ Solidification / Stabilization	RLESSS-5	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$875,000	High	Moderate
		Excavation and Disposal	RLESSS-6	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$1,150,000	High	Moderate

Table 4-1
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Remedial Action Plan - Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Kilns AOI	Soil	No Action	KSS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	KSS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$50,000	High	Moderate
		Capping - Barriers and Covers	KSS-3	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	Moderate	Moderate	Moderate	Low	$165,000	High	Low
		Ex-Situ Soil Remediation	KSS-4	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	$300,000	Moderate	Moderate
		In-Situ Solidification / Stabilization	KSS-5	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$400,000	High	Moderate
		Excavation and Disposal	KSS-6	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$175,000	High	Moderate
Former MS/IRM AOI	Soil	No Action	FMSS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	FMSS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$25,000	High	Moderate
		Capping - Barriers and Covers	FMSS-3	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	Moderate	Moderate	Moderate	Low	$95,000	High	Low
		In-Situ Solidification / Stabilization	FMSS-4	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$280,000	High	Moderate
		Excavation and Disposal	FMSS-5	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$25,000	High	Moderate

Table 4-1
Summary of Proposed Alternative Comparisons to Nine Evaluation Criteria

Remedial Action Plan - Operable Units C and D
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Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Former MS/IRM AOI	Groundwater	No Action	FMSGW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Low	Low	Low	Low	High	High	$0	Low	Low
		Natural Attenuation Analysis	FMSGW-2	Demonstrate a stable and decreasing exposure trend using historical monitoring data	High	High	High	High	High	High	$50,000	Low	Moderate
		Monitored Natural Attenuation	FMSGW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$372,300	High	Moderate
		Groundwater Extraction and Treatment	FMSGW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	High	High	Moderate	Moderate	Moderate	Moderate	$2,887,800	High	Moderate
		Enhanced Aerobic Bioremediation	FMSGW-5	One-time injection of calcium peroxide solution for treatment of contaminants followed by periodic groundwater sampling to confirm that WQOs will be reached within a reasonable timeframe.	High	High	High	High	Moderate	Moderate	$889,800	High	Moderate
			FMSGW-6	Periodic injection of calcium peroxide solution for treatment of contaminants	High	High	High	High	Moderate	Moderate	$600,000	High	Moderate
		Enhanced Anaerobic Bioremediation	FMSGW-7	Anaerobic bio-oxidation of COIs followed by treatment through natural attenuation mechanisms.	High	High	High	High	Moderate	Moderate	$416,400	High	Moderate
			FMSGW-8	Periodic injections to enhance anaerobic bio-oxidation of COIs	High	High	High	High	Moderate	Moderate	$480,000	High	Moderate
		In-Situ Chemical Oxidation	FMSGW-9	One-time injection of highly reactive oxidation solution for treatment of contaminants followed by periodic groundwater sampling to confirm that WQOs will be reached within a reasonable timeframe.	High	High	High	High	Moderate	Moderate	$590,100	High	Moderate
			FMSGW-10	Periodic injection of highly reactive oxidation solution for treatment of contaminants	High	High	High	High	Moderate	Moderate	$400,000	High	Moderate

Table 4-1
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Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Planer #2 AOI	Soil	No Action	PL2S-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	PL2S-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	Low	High	High	$25,000	High	Moderate
		Capping - Barriers and Covers	PL2S-3	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	Moderate	Moderate	Moderate	Low	$130,000	High	Low
		In-Situ Solidification / Stabilization	PL2S-4	Eliminate exposure pathways through containment and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$465,000	High	Moderate
		Ex-Situ Soil Remediation	PL2S-5	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	High	High	High	High	Moderate	Moderate	$300,000	High	Moderate
			PL2S-6	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	$250,000	Moderate	Moderate
		Excavation and Disposal	PL2S-7	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$85,000 - $590,000	High	Moderate
	Groundwater	No Action	PL2GW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Low	Low	Low	Low	High	High	$0	Low	Low
		Natural Attenuation Analysis	PL2GW-2	Demonstrate a stable and decreasing exposure trend using historical monitoring data	High	High	High	High	High	High	$50,000	Low	Moderate
		Monitored Natural Attenuation	PL2GW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$186,100	High	Moderate
		Groundwater Extraction and Treatment	PL2GW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	High	High	High	High	Moderate	Moderate	$2,347,000	High	Moderate

Table 4-1
Summary of Proposed Alternative Comparisons to Nine Evaluation Criteria

Remedial Action Plan - Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Media	Process Option (Retained)	Remedial Alternative	Objective	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short Term Effectiveness	Implementability	Cost	State Support / Agency Acceptance	Community Acceptance
Former Shipping Office & Truck Shop AOI	Soil	No Action	FSOS-1	Provides no additional control or action to protect human health or the environment from affected soil	Low	Low	Low	Low	High	High	$0	Low	Low
		Deed Restriction / Notification	FSOS-2	Restrict future land uses and implement soil management plan based on COIs and associated risks.	High	High	High	High	High	High	$100,000	High	Moderate
		In-Situ Solidification / Stabilization	FSOS-3	Immobilization of COIs and elimination of future exposure pathways through deed restrictions and implementation of a risk management plan.	High	High	High	High	Moderate	Moderate	$570,000	High	Moderate
		Ex-Situ Soil Remediation	FSOS-4	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	High	High	High	High	Moderate	Moderate	$400,000	High	Moderate
			FSOS-5	Eliminate soil and groundwater exposure pathways by removing COI-affected soils, treating them at the site, and backfilling the exavation with treated soil.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	$260,000	Moderate	Moderate
		Excavation and Disposal	FSOS-6	Remove affected soil and dispose offsite at a permitted disposal facility. Stockpile clean material and reuse for backfill	High	High	High	High	Moderate	Moderate	$670,000	High	Moderate
Sawmill and Sorter AOI	Groundwater	No Action	SSGW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Low	Low	Low	Low	High	High	$0	Low	Low
		Natural Attenuation Analysis	SSGW-2	Demonstrate a stable and decreasing exposure trend using historical monitoring data	High	High	High	High	High	High	$50,000	Low	Moderate
		Monitored Natural Attenuation	SSGW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$111,700	High	Moderate
		Groundwater Extraction and Treatment	SSGW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	High	High	High	High	Moderate	Moderate	$5,680,739	High	Moderate
		In-Situ Chemical Oxidation	SSGW-5	Periodic injection of highly reactive oxidation solution for treatment of contaminants	High	High	High	High	Moderate	Moderate	$500,000	High	Moderate
Greenhouse AOI	Groundwater	No Action	GHGW-1	Provides no additional control or action to protect human health or the environment from affected groundwater	Low	Low	Low	Low	High	High	$0	Low	Low
		Natural Attenuation Analysis	GHGW-2	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$50,000	Low	Moderate
		Monitored Natural Attenuation	GHGW-3	Periodic sampling of groundwater to evaluate natural biological and chemical remediation of COIs with contingency for potential future remedial actions.	High	High	High	High	High	High	$111,700	High	Moderate
		Groundwater Extraction and Treatment	GHGW-4	Containment and Extraction of affected groundwater; discharge of treated groundwater	High	High	High	High	Moderate	Moderate	$2,347,000	High	Moderate

Recommended alternatives are outlined with bold lines.

Table 4-2
Excavation Earthwork Quantities

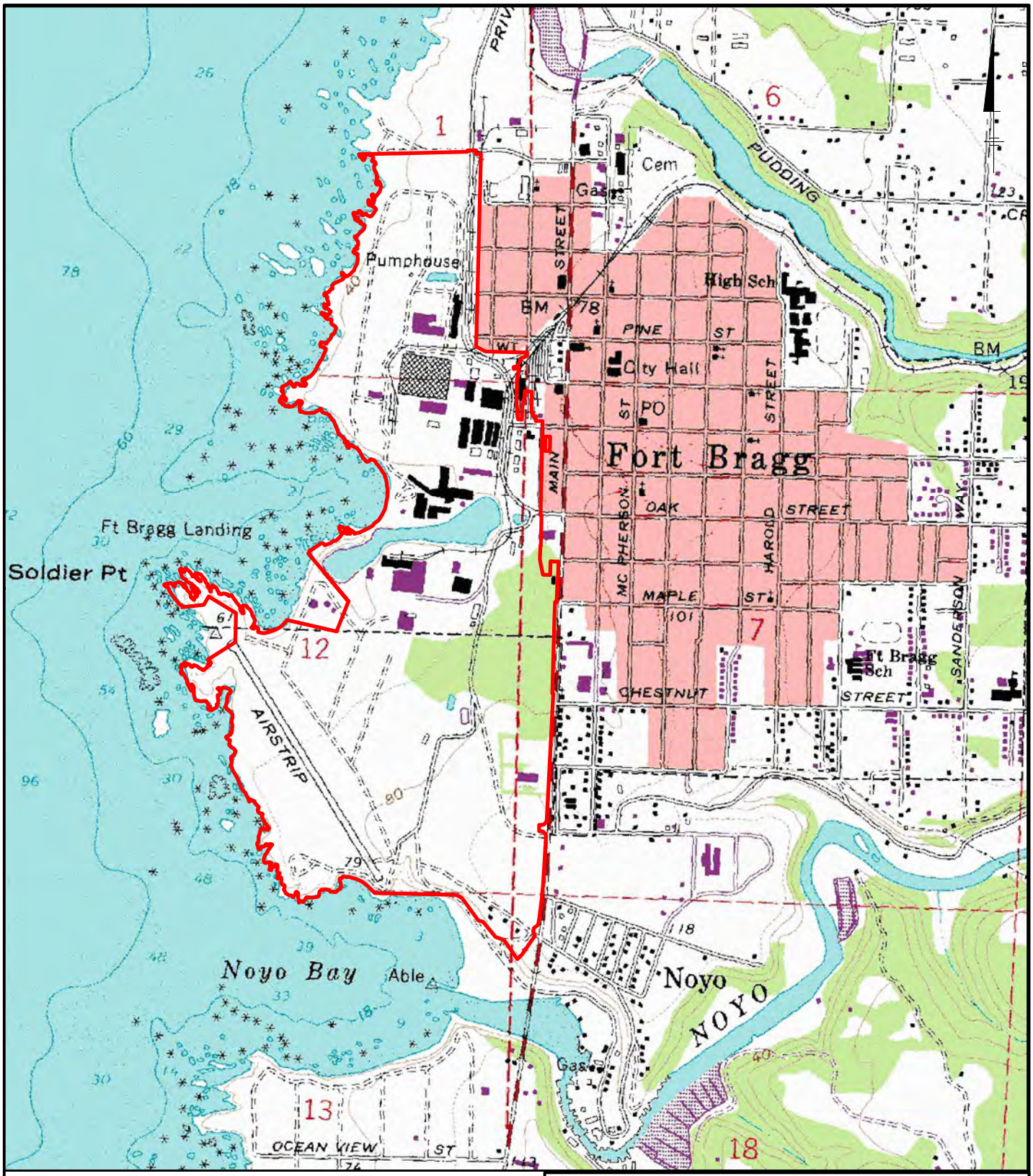
Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

AOI	Area (square feet)	Depth (feet)	Volume (cubic yards)	Weight (tons)
Former Dip Tank	2,250	2	170	221
Rail Lines East	540	2	40	52
Kilns	100	2	7.5	10
Planer #2	625	6	140	182
Former AST and MES/Pilot Study[a]	1,350 - 2,700	15	750 - 1,500	975 - 1950
Total	**4,865 - 6,215**		**1,108 - 1,858**	**1,440 - 2,415**

Notes:
a. Volume estimates for AST and MES/Pilot Study Area include a range due to greater uncertainty.
AOI - Area of Interest

ARCADIS

Figures



LEGEND:

SITE BOUNDARY

0 1,400 2,800 Feet

GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

SITE LOCATION MAP

ARCADIS

FIGURE
1-1

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:Brianna Griffith
Project # B006142.0003.00002
Path: I:\FortBragg\MXD\GWMR\3QTR12\Fig 1-1 SiteLocation.mxd Date: 11/20/2012 Time: 8:47:18 AM

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Project # B0066142.0003.00002
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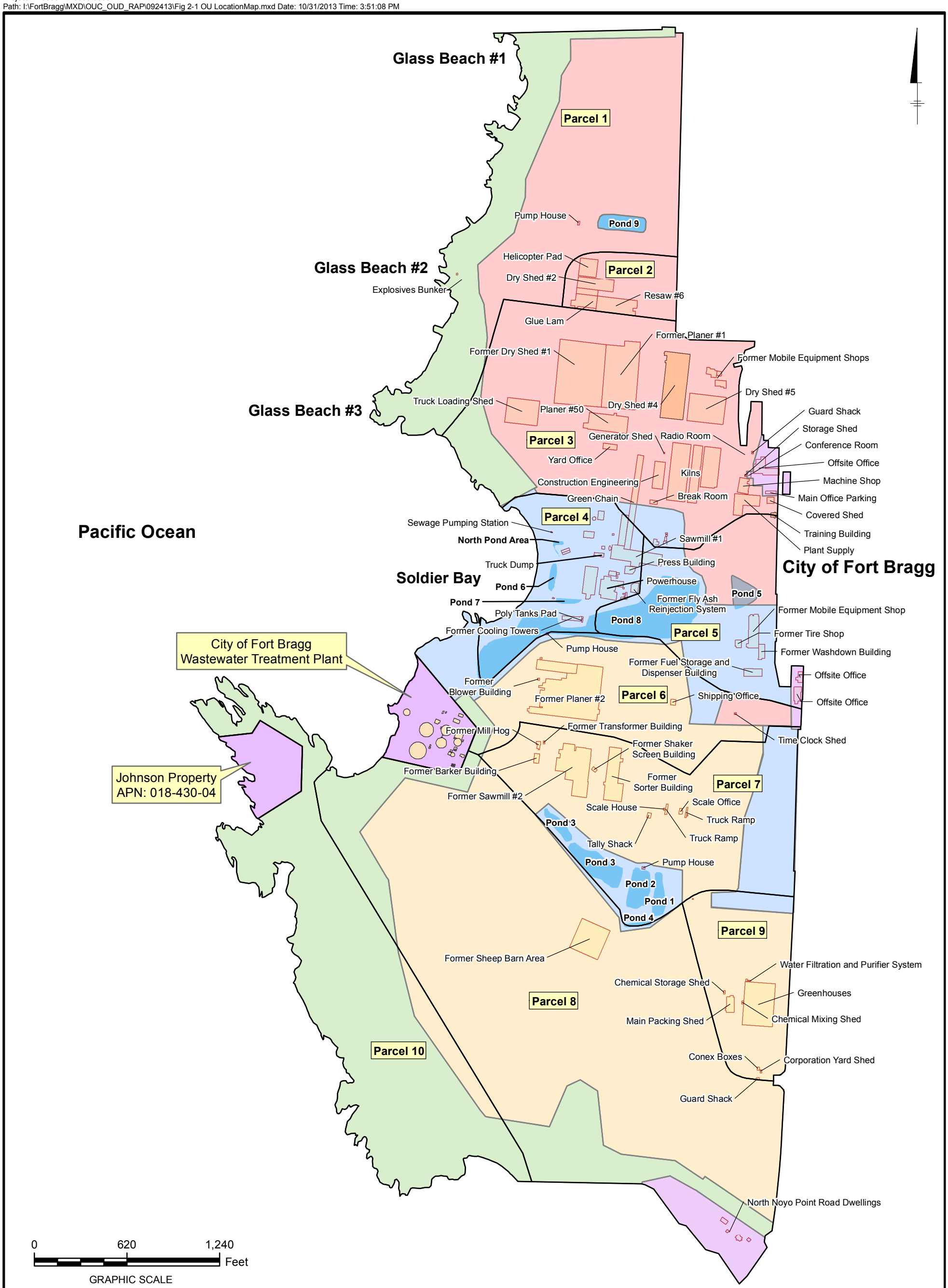


LEGEND:

- POND
- STRUCTURE
- FORMER STRUCTURE
- FACILITY PARCEL

OPERABLE UNITS

- COASTAL TRAIL/PARK ACQUISITION (OU-A)
- "OFFSITE" NON-INDUSTRIAL (OU-B)
- NORTHERN (OU-C)
- SOUTHERN (OU-D)
- PONDS/PARK (OU-E)

- PROPERTY OWNED BY OTHERS

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

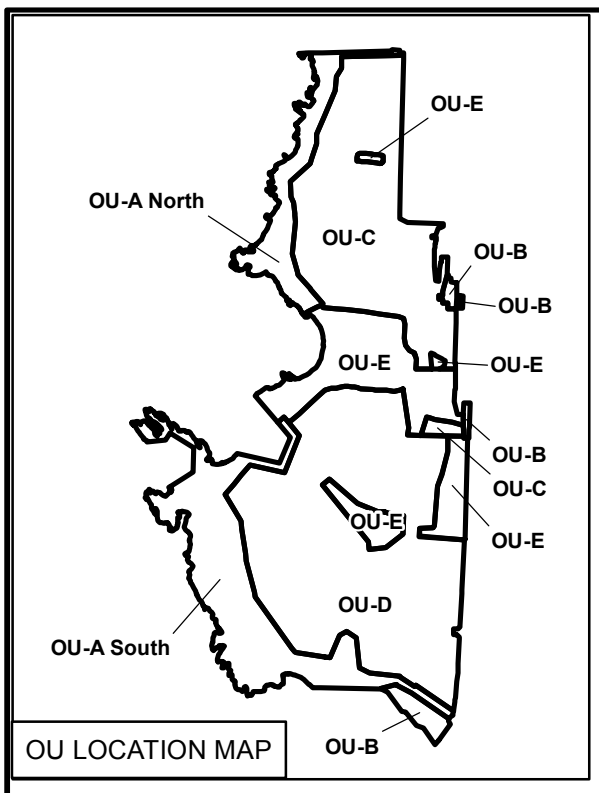
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

OPERABLE UNITS AND MAJOR FEATURES

ARCADIS

FIGURE
2-1

CITY: HR DIV/GROUP: GIS IM DB:BCG
Project #66128.0001 Task 10
Document Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2015\Fig 2-2 AOIStatus.mxd



LEGEND:

- AOI BOUNDARY
- CONSIDERED FOR REMEDIAL ACTION IN RAP
- DETERMINED NO FURTHER ACTION IN RI REPORT
- AOIS NOT INCLUDED IN FEASIBILITY STUDY, RECOMMENDED FOR NFA IN RAP
- AOIS MOVED TO OUE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
REMEDIAL INVESTIGATION OPERABLE UNITS C AND D

OU-C AND OU-D AREAS OF INTEREST STATUS

ARCADIS

FIGURE
2-2

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066138.0005.00002
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-3 SampleLocsFeaturesParcel1_2.mxd Date: 10/30/2013 Time: 8:04:15 AM

PACIFIC OCEAN

TP-4
TP-3
TP-2
TP-1
OUC-HA-28A
OUC-HA-28B
OUC-HA-29A
OUC-HA-29B
OUC-HA-28C
OUC-HA-28D
OUC-HA-29C
OUC-HA-29D
STP-18
STP-15
STP-19
STP-17
STP-16
OUC-HA-26A
OUC-HA-26B
OUC-HA-27A
OUC-HA-27B
DP-ROAD-1.3
DP-ROAD-1.2
DP-ROAD-1.1
OUC-HA-26C
OUC-HA-26D
OUC-HA-27C
OUC-HA-27D
PARCEL 1 AOI
STP-25
STP-42
OUC-HA-24A
OUC-HA-24D
STP-41
OUC-HA-24B
OUC-HA-24C
OUC-SS-001
PUMP HOUSE
LOCATION OF DIESEL AST AND CONTAMINANT BERM
OUC-HA-23D
DP-1.1
OUC-HA-25D
OUC-DP-001
P1-16
STP-39
Pond 9
DP-1.2
OUC-SS-002
OUC-SS-003
OUC-HA-22B
OUC-HA-23C
OUC-HA-25C
OUC-HA-25B
OUC-HA-25A
MW-2.4
MW-1.1
DP-ROAD-2.3
OUC-SS-007
MW-2.5
OUC-HA-046
P2-11
OUC-SS-008
OUC-HA-22C
OUC-HA-044
OUC-HA-23B
DP-ROAD-2.2
HELICOPTER PAD
OUC-HA-22A
OUC-HA-045
DP-ROAD-2.1
MW-2.1
OUC-SS-006
OUC-SS-009
OUC-SS-005
P2-10
PARCEL 2 AOI
DRY SHED #2
OUC-SS-004
P2-9
P2-8
MW-2.6
OUC-HA-22D
P2-7
OUC-DP-002
RESAW #6
BREEZEWAY
OUC-HA-23A
P2-5
MW-2.3
P2-1
GT-1
GLUE LAM
OUC-DP-054
OUC-HA-048
OUC-SS-010
OUC-DP-055
OUC-HA-047
P2-6
P2-3
STP-54
STP-56
OUC-SS-012
OUC-SS-011
P2-4
P2-2
OUC-DP-003
P2-4A
OUC-DP-004
STP-62

LEGEND:
2008/2009 SAMPLE LOCATIONS
- SURFACE/SUBSURFACE SOIL
- SURFACE SOIL (LEAD ONLY)
- SURFACE SOIL
- SURFACE/SUBSURFACE SOIL & GRAB GROUNDWATER
- DISCRETE SOIL SAMPLE FOR COMPOSITE

HISTORICAL SAMPLE LOCATIONS
- SOIL/SEDIMENT
- SURFACE WATER/GROUNDWATER
- SOIL/SEDIMENT & SURFACE WATER/GROUNDWATER
- OTHER
- ARCHAEOLOGICAL TEST PIT (OU-C)

NOTES:

1. LOCATIONS OF UNDERGROUND UTILITIES (DRAIN SYSTEM AND SANITARY SEWER LINES) ARE APPROXIMATE

ACRONYMS:

AOI AREA OF INTEREST

LEGEND:
- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- POND
- STRUCTURE
- FORMER STRUCTURE
- UNPAVED ROADWAY
- PAVED ROADWAY
- RAIL LINE
- FORMER RAIL LINE
- COMBINATION STORMWATER/ PROCESS WATER DITCH
- STORMWATER CONVEYANCE DITCH
- TRANSFORMER

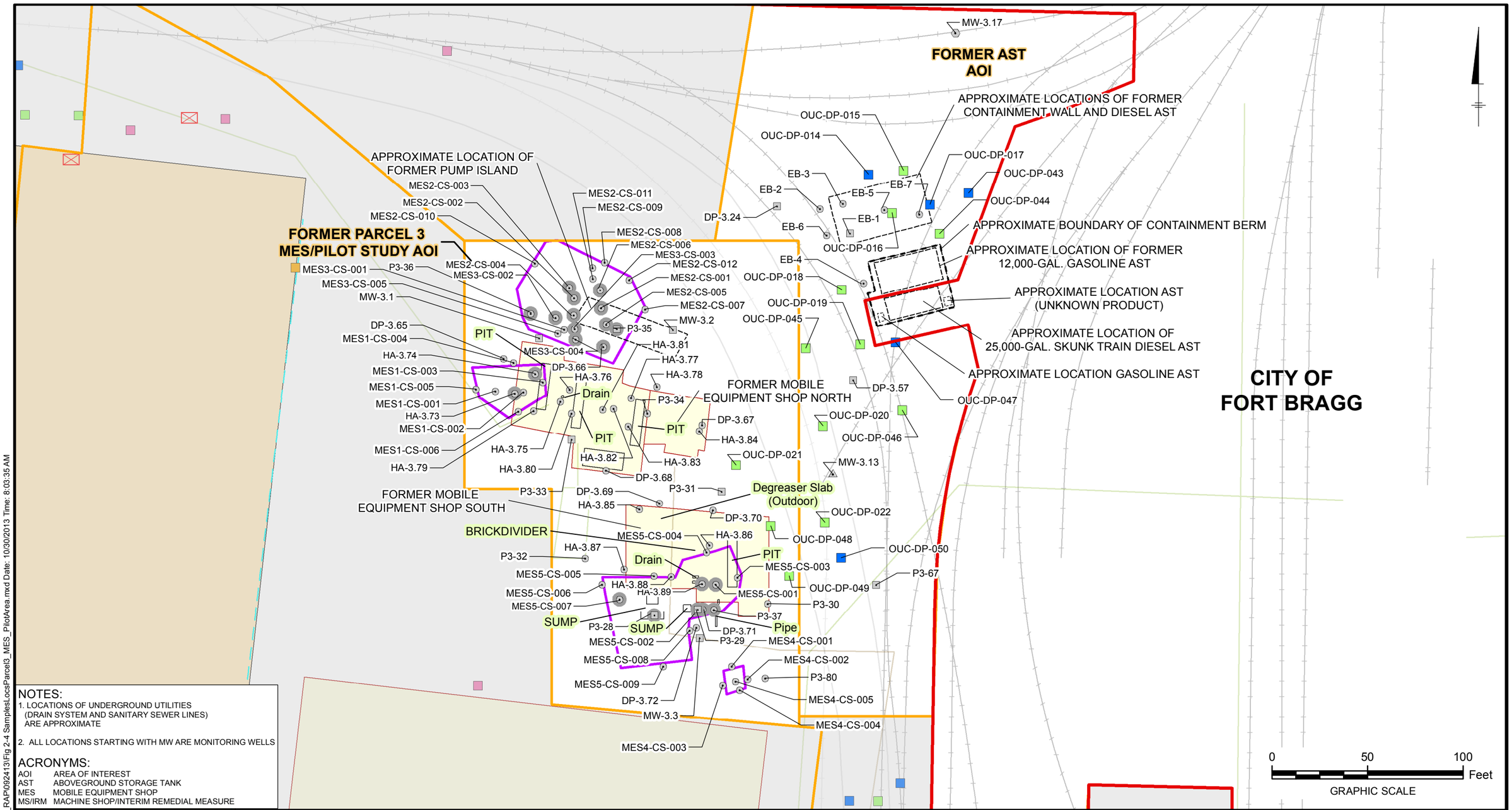
0 200 400 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: PARCEL 1 AND PARCEL 2 AOIs

ARCADIS

FIGURE
2-3



NOTES:
1. LOCATIONS OF UNDERGROUND UTILITIES (DRAIN SYSTEM AND SANITARY SEWER LINES) ARE APPROXIMATE
2. ALL LOCATIONS STARTING WITH MW ARE MONITORING WELLS

ACRONYMS:

AOI	AREA OF INTEREST
AST	ABOVEGROUND STORAGE TANK
MES	MOBILE EQUIPMENT SHOP
MS/IRM	MACHINE SHOP/INTERIM REMEDIAL MEASURE

LEGEND:

HISTORICAL SAMPLE LOCATIONS
- SOIL/SEDIMENT
- SURFACE WATER/GROUNDWATER
- SOIL/SEDIMENT & SURFACE WATER/GROUNDWATER
- OTHER
- EXCAVATED OR PARTIALLY-EXCAVATED SAMPLE LOCATION

2008/2009 SAMPLE LOCATIONS
- SURFACE/SUBSURFACE SOIL
- SURFACE SOIL (LEAD ONLY)
- SURFACE SOIL
- SURFACE/SUBSURFACE SOIL & GRAB GROUNDWATER
- DISCRETE SOIL SAMPLE FOR COMPOSITE

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- HISTORICAL GEOPHYSICAL SURVEY AREA
- EXCAVATION BOUNDARY
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE
- UNPAVED ROADWAY
- PAVED ROADWAY
- RAIL LINES
- FORMER RAIL LINES
- COMBINATION STORMWATER/ PROCESS WATER DITCH
- TRANSFORMER

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: FORMER PARCEL 3 MES/PILOT STUDY AND FORMER ABOVE GROUND STORAGE TANK AOIs

ARCADIS

FIGURE 2-4

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066128.0001.00010
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-4 SamplesLocsParcel3_MES_PilotArea.mxd Date: 10/30/2013 Time: 8:03:35 AM

P3-57
P3-56
DP-3.59
OUC-DP-011
MW-3.12
DP-3.60
OUC-DP-012
DP-3.58
OUC-DP-041
P3-26
OUC-DP-042
OUC-SS-032
OUC-SS-033
OUC-DP-013
P3-58
DP-3.61
DP-3.52
FORMER DIP TANK
P3-27
OUC-SS-034
P3-65
OUC-SS-035
FORMER DIP TANK AOI
MW-3.16
DP-3.25
DP-3.51
MW-3.16R
P3-59
DRY SHED #4
DP-3.26
DP-3.53
DRY SHEDS #4/#5 AOI
DP-3.54
DRY SHED #5
DP-3.50
OUC-SS-037
DP-3.56
OUC-SS-041
DP-3.55
OUC-SS-036
OUC-SS-040
OUC-SS-038
CURRENT FUNGICIDE DIP TANK
OUC-SS-042

CITY OF FORT BRAGG

0 100 200 Feet
GRAPHIC SCALE

NOTES:
1. LOCATIONS OF UNDERGROUND UTILITIES (DRAIN SYSTEM AND SANITARY SEWER LINES) ARE APPROXIMATE
2. ALL LOCATIONS STARTING WITH MW ARE MONITORING WELLS

ACRONYMS:
AOI AREA OF INTEREST

LEGEND:

HISTORICAL SAMPLE LOCATIONS
- SOIL/SEDIMENT
- SURFACE WATER/GROUNDWATER
- SOIL/SEDIMENT & SURFACE WATER/GROUNDWATER
- OTHER

2008/2009 SAMPLE LOCATIONS
- SURFACE/SUBSURFACE SOIL
- SURFACE SOIL (LEAD ONLY)
- SURFACE SOIL
- SURFACE/SUBSURFACE SOIL & GRAB GROUNDWATER
- DISCRETE SOIL SAMPLE FOR COMPOSITE

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- HISTORICAL GEOPHYSICAL SURVEY AREA
- EXCAVATION BOUNDARY
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE
- UNPAVED ROADWAY
- PAVED ROADWAY
- RAIL LINES
- FORMER RAIL LINES
- COMBINATION STORMWATER/ PROCESS WATER DITCH
- DIP TANK
- TRANSFORMER

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: DRY SHEDS #4/#5 AND FORMER DIP TANK AOIs

ARCADIS

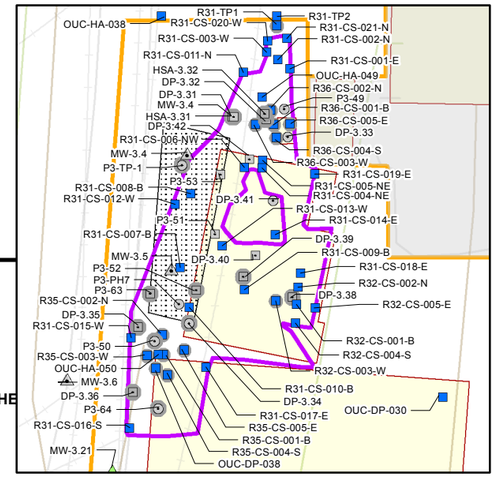
FIGURE 2-5

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066128.0001.00010
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-5 SamplesLocsFeaturesParcel3_DryShedDipTank.mxd Date: 10/30/2013 Time: 8:04:22 AM

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B006138.0005.00002
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-6 SamplesLocsFeaturesParcel3_RLEastKilnsConsEngMSIRM_Areas.mxd Date: 10/30/2013 Time: 8:04:52 AM

CITY OF FORT BRAGG

OUC-HA-033
OUC-DP-023
OUC-HA-034
OUC-HA-035
OUC-DP-024
P3-66
RADIO ROOM
GUARD SHACK
RAIL LINES EAST AOI
P3-61
OUC-SS-050
OUC-SS-051
OUC-HA-036
OUC-HA-042/OUC-SS-061
OUC-SS-052
OUC-HA-037
OUC-HA-038
OUC-SS-047
P3-39
DP-3.29
P3-40
DP-3.30
OUC-SS-053
P3-43
OUC-SS-048
KILN
KILN
KILN
KILNS AOI
OUC-SS-055
OUC-SS-054
P3-60
P3-38
CONSTRUCTION ENGINEERING
P3-41
P3-42
OUC-SS-056
P3-45
P3-44
OUC-SS-049
CONSTRUCTION ENGINEERING AOI
OUC-SS-057
OUC-SS-060
OUC-SS-062
OUC-SS-058
OUC-SS-059
BREAK ROOM
KILN
FORMER SHEET METAL/ PLUMBING/PLANT SUPPLY BUILDING
OUC-SS-063
FORMER STORAGE SHED
FORMER MACHINE SHOP
FORMER PARCEL 3 MS/IRM AOI
OUC-DP-029
P3-54
R34-CS-001-B
R34-CS-002-N
R34-CS-005-E
R34-CS-003-W
R34-CS-006-E
SP-3.1
OUC-DP-060
DP-3.44
DP-3.43
CS-CS-004-N
OUC-DP-031
R34-CS-004-S
FORMER COVERED SHE
DP-3.45
OUC-DP-061
P3-PH8
CS-CS-003-W
CS-CS-002-E
OUC-HA-039
P3-55
OUC-HA-040
MW-3.20
OUC-HA-043
CS-CS-001-S
OUC-SS-066
OUC-DP-062
OUC-HA-041
TRAINING BUILDING



NOTES:
1. LOCATIONS OF UNDERGROUND UTILITIES (DRAIN SYSTEM AND SANITARY SEWER LINES) ARE APPROXIMATE
2. ALL LOCATIONS STARTING WITH MW ARE MONITORING WELLS

ACRONYMS:
AOI AREA OF INTEREST
AST ABOVEGROUND STORAGE TANK
MS/IRM MACHINE SHOP/INTERIM REMEDIAL MEASURE

0 150 300 Feet
GRAPHIC SCALE

LEGEND:

HISTORICAL SAMPLE LOCATIONS
- SOIL/SEDIMENT
- SURFACE WATER/GROUNDWATER
- SOIL/SEDIMENT & SURFACE WATER/GROUNDWATER
- EXCAVATED OR PARTIALLY-EXCAVATED SAMPLE LOCATION

2008/2009 SAMPLE LOCATIONS
- SURFACE/SUBSURFACE SOIL
- SURFACE SOIL (LEAD ONLY)
- SURFACE SOIL
- SURFACE/SUBSURFACE SOIL & GRAB GROUNDWATER
- DISCRETE SOIL SAMPLE FOR COMPOSITE

2009 MONITORING WELL LOCATIONS
- GROUNDWATER DATA ONLY
- SOIL AND GROUNDWATER DATA

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- HISTORICAL GEOPHYSICAL SURVEY AREA
- EXCAVATION BOUNDARY
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE
- UNPAVED ROADWAY
- PAVED ROADWAY
- RAIL LINES
- FORMER RAIL LINES
- COMBINATION STORMWATER/ PROCESS WATER DITCH
- TRANSFORMER

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: RAIL LINES EAST, KILNS, FORMER PARCEL 3 MACHINE SHOP/IRM AND CONSTRUCTION ENGINEERING AOIs

ARCADIS

FIGURE 2-6

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066125.0005
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-7a TPH_MachineShop.mxd Date: 9/24/2013 Time: 5:02:18 PM

Guard Shack

Radio Room

R31-TP2
Depth TPHd
(2.5-3) 11

R31-CS-021-N
Depth TPHd
(3-3.5) 180

R31-CS-002-N
Depth TPHd
(4.5-5) 0.59

R31-CS-020-W
Depth TPHd
(3-3.5) 0.26

MACHINE SHOP AREA

R31-CS-003-W
Depth TPHd
(3.5-4) ND

R31-CS-001-NE
Depth TPHd
(4.5-5) 21

Offsite Office

R31-CS-011-N
Depth TPHd
(5-5.5) ND

Conference Room

R31-CS-005-NE
Depth TPHd
(5-5.5) 0.42

R31-CS-006-NW
Depth TPHd
(3-3.5) 1.0

Former Storage Shed

R31-CS-004-NE
Depth TPHd
(4-4.5) 39

R31-CS-008-B
Depth TPHd
(4.5-5) ND

R31-CS-019-E
Depth TPHd
(2.5-3) 160

R31-CS-012-W
Depth TPHd
(4.5-5) ND

Island was left in place, not excavated

R31-CS-014-E
Depth TPHd
(3.5-4) ND

R31-CS-013-W
Depth TPHd
(4.5-5) ND

R31-CS-018-E
Depth TPHd
(2-2.5) 33

R31-CS-007-B
Depth TPHd
(5-5.5) 1.6

R31-CS-009-B
Depth TPHd
(5.5-6) 0.52

R32-CS-002-N
Depth TPHd
(1.5-2) ND

R31-CS-010-B
Depth TPHd
(10-10.5) ND

R32-CS-005-E
Depth TPHd
(1.5-2) ND

Former Machine Shop

R32-CS-001-B
Depth TPHd
(1.5-2) 47

Main Office Parking

R31-CS-015-W
Depth TPHd
(2.5-3) ND

R32-CS-004-S
Depth TPHd
(1.5-2) 0.61

R34-CS-006-E
Depth TPHd
(1-1.5) 4.8

R31-CS-017-E
Depth TPHd
(3-3.5) 4.0

COVERED SHED AREA

Former Covered Shed

R34-TP01
Depth TPHd
(5-5.5) 330

Former Sheet Metal/Plumbing/Plant Supply Building

R31-CS-016-S
Depth TPHd
(5-5.5) 47

CS-CS-003-W
Depth TPHd
(5-5) 70

CS-CS-004-N
Depth TPHd
(5-5) 260

R34-TP02
Depth TPHd
(6.5-7) 170

CS-CS-001-S
Depth TPHd
(5-5) 80

CS-CS-002-E
Depth TPHd
(5-5) 140

Training Building

NOTES:

1. TPHd = PETROLEUM HYDROCARBONS AS DIESEL. CONCENTRATIONS ARE IN mg/kg (MILLIGRAMS PER KILOGRAM).

2. TPHd CONCENTRATIONS SCREENED AGAINST HIGHEST EXCEEDANCE OF RBSCs FOR THEIR RESPECTIVE FRACTIONS: C10-C12: 30 mg/kg; C12-C16: 90mg/kg; C16-C24: 191 mg/kg.

3. TEXT BOXES PRESENT C16-C24 SAMPLE CONCENTRATIONS (in mg/kg) THE C16-C24 DATA IS PRESENTED BECAUSE THIS FRACTION IS GENERALLY DRIVING SCREENING LEVEL EXCEEDANCES.

4. DEPTHS ARE IN FEET BELOW GROUND SURFACE.

Sample ID
CS-CS-004-N
Depth TPHd
(5-5) 260
Depth in ft bgs
TPHd Concentration in (mg/kg)

0 35 70 Feet
GRAPHIC SCALE

LEGEND:

- NOT DETECTED
- DETECTED BELOW SCREENING LEVEL
- DETECTED ABOVE SCREENING LEVEL
- DETECTED ABOVE 10X SCREENING LEVEL
- FORMER RAIL LINE
- UNPAVED ROADWAY
- PAVED ROADWAY
- PLANNED EXCAVATION AREA
- SURVEYED 2009 EXCAVATION AREA
- POND
- NON-EXCAVATED
- OU BOUNDARY
- STRUCTURE
- FORMER STRUCTURE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

FORMER MACHINE SHOP AND COVERED SHED AREAS CONFIRMATION SAMPLES - TOTAL PETROLEUM HYDROCARBONS

ARCADIS

FIGURE 2-7a

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066125.0005
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-7b MetalsPCBs_MachineShop.mxd Date: 9/24/2013 Time: 5:03:35 PM

Guard Shack

Radio Room

MACHINE SHOP AREA

Offsite Office

Former Storage Shed

Conference Room

R36-CS-002-N
R36-CS-003-W
R36-CS-001-B
R36-CS-005-E
R36-CS-004-S

Former Machine Shop

R32-CS-002-N
R32-CS-001-B
R32-CS-003-W
R32-CS-005-E
R32-CS-004-S

R35-CS-002-N
R35-CS-003-W
R35-CS-005-E
R35-CS-001-B
R35-CS-004-S

COVERED SHED AREA

Former Sheet Metal/Plumbing/Plant Supply Building

R34-CS-002-N

Main Office Parking

R34-CS-001-B
Depth Lead
(2-2.5) 180

R34-CS-003-W

Former Covered Shed

R34-CS-004-S

R34-CS-006-E
Depth Arsenic
(1-1.5) 13

R34-TP2

Training Building

NOTES:

1. SKITTLES FOR METALS EXCAVATIONS ARE BASED ON THE HIGHEST EXCEEDANCE OF CAM-17 METALS CONCENTRATIONS SCREENED AGAINST THE RESPECTIVE CHHSLr VALUES.
2. SKITTLES FOR PCB EXCAVATIONS ARE BASED ON THE TOTAL PCB CONCENTRATIONS SCREENED AGAINST THE CHHSLr: 0.089 mg/kg.
3. ARSENIC DATA WERE SCREENED AGAINST THE SITE BACKGROUND CONCENTRATION OF 10 MG/KG.
4. LEAD DATA WERE SCREENED AGAINST THE SITE BACKGROUND CONCENTRATION OF 22 MG/KG.
5. CHHSLr = CALIFORNIA HUMAN HEALTH SCREENING LEVEL RESIDENTIAL
6. mg/kg = MILLIGRAMS PER KILOGRAM
7. DEPTHS ARE IN FEET BELOW GROUND SURFACE.

Sample ID
R34-CS-006-E
Depth Arsenic
(1-1.5) 13
Depth in ft bgs
Metal Concentration in (mg/kg)

0 35 70 Feet
GRAPHIC SCALE

LEGEND:

- NOT DETECTED
- DETECTED BELOW SCREENING LEVEL
- DETECTED ABOVE SCREENING LEVEL
- DETECTED ABOVE 10X SCREENING LEVEL
- FORMER RAIL LINE
- UNPAVED ROADWAY
- PAVED ROADWAY
- PLANNED EXCAVATION AREA
- 2009 TPH EXCAVATION AREA
- 2009 METALS EXCAVATION AREA
- 2009 PCB EXCAVATION AREA
- NON-EXCAVATED
- OU BOUNDARY
- STRUCTURE
- FORMER STRUCTURE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

FORMER MACHINE SHOP AND COVERED SHED AREAS CONFIRMATION SAMPLES - METALS AND PCBs

ARCADIS

FIGURE 2-7b

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066138.0005.00002
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-8 SampleLocs_Planer#2SawMillSorter.mxd Date: 10/30/2013 Time: 8:10:55 AM

PUMP HOUSE
OUD-DP-007
OUD-HA-005
MW-6.3
OUD-HA-062
OUD-DP-062
OUD-DP-064
OUD-HA-001
OUD-DP-068
OUD-DP-067
OUD-HA-006
OUD-HA-063
MW-6.1
OUD-HA-077
OUD-DP-004
MW-6.4
OUD-HA-078
OUD-HA-004
OUD-HA-002
OUD-DP-061R
OUD-HA-079
OUD-HA-080
OUD-DP-057
P6-PH3
P6-17
OUD-DP-061
OUD-DP-003
OUD-DP-058
SUMP
OUD-DP-069
DP-6.1
MW-6.6
DP-6.2
P6-2
OUD-HA-093
OUD-DP-006
DP-6.3
DP-6.9
OUD-DP-059
OUD-DP-056
DP-6.5
OUD-DP-005
DP-6.10
FORMER HAZARDOUS WASTE STORAGE AREA
P6-1
DP-6.8
OUD-PLANER2-TANK-B
OUD-HA-003
DP-6.4
OUD-SS-004
OUD-DP-081
OUD-SS-005
DP-6.11
PLANER #2/VENEER PLANT
OUD-DP-071
OUD-DP-065
OUD-DP-012
MW-6.5
OUD-PLANER2-TANK-W
OUD-DP-063
OUD-PLANER2-TANK-E
P6-PH1
DP-6.7
OUD-DP-054
DP-6.6
P6-8
OUD-DP-055
FORMER BLOWER BUILDING
FORMER COMPRESSOR HOUSE AREA
FORMER UST
P6-10
OUD-DP-082
OUD-PLANER2-TANK-S
P6-9
P6-3
FORMER EMPTY OIL DRUM STORAGE AREA
P6-7
P6-6
OUD-DP-066
FORMER CONCRETE SLAB
PLANER #2 AOI
FORMER HYDRAULIC OIL AND PARTS STORAGE AREA
P6-5
OUD-HA-008
OUD-HA-007
FORMER SPRAY BOOTH AREA
FORMER HYDRAULIC OIL STORAGE AREA
P6-4
OUD-DP-049
OUD-HA-074
OUD-DP-089
FORMER PLANER #2
OUD-DP-009
OUD-SS-001
OUD-DP-092
PLANER PIPE DEPRESSION AREA
OUD-DP-090
OUD-HA-075
OUD-DP-094
FORMER PAINT STORAGE AREA
OUD-DP-010
OUD-SS-002
OUD-HA-073
OUD-DP-002
Pit-SB-1
OUD-DP-093
OUD-SS-003
OUD-DP-008
Planer Pipe Soil #3
OUD-HA-076
OUD-DP-001
OUD-DP-091
Planer Pipe Soil #2
Planer Pipe Soil #1
OUD-DP-011
MW-7.3
OUD-HA-025
P7-16
OUD-HA-024
OUD-DP-084
P7-13
P7-17
FORMER DIESEL AST AREA
TRANSFORMER BUILDING
OUD-DP-086
P7-14
P7-18
P7-15
P7-19
OUD-DP-077
OUD-HA-019
OUD-HA-020
OUD-HA-087
OUD-HA-026
OUD-DP-076
OUD-HA-018
DP-7.5
MW-7.2
FORMER SOIL STOCKPILE
MILL HOG
OUD-HA-030
DP-7.4
OUD-HA-021
OUD-SP-001A
OUD-DP-047
P7-4
P7-11
OUD-SP-001
OUD-DP-034
OUD-HA-029
OUD-HA-084
P7-7
OUD-SP-001C
MW-7.1
P7-5
P7-33
P7-10
OUD-HA-088
OUD-DP-085
SS-7.1
P7-6
P7-9
OUD-HA-085
OUD-HA-089
SS-7.2
OUD-DP-038
OUD-DP-046
P7-12
FORMER TP BURNER
Catch Basin
P7-3
FORMER GANG MILL AREA
P7-32
BARKER BUILDING
OUD-HA-081
OUD-DP-036
P7-34
OUD-DP-035
P7-2
OUD-DP-050
OUD-SP-001B
OUD-HA-031
OUD-HA-086
P7-1
FORMER HAZARDOUS MATERIAL AND HYDRAULIC OIL STORAGE AREA
OUD-DP-048
OUD-HA-083
CHIPPER/SHAKER BUILDING
OUD-HA-023
OUD-HA-022
FORMER EMPTY OIL DRUM STORAGE AREA
OUD-HA-082
FORMER OIL HOUSE AREA
OUD-HA-028
OUD-DP-037
OUD-HA-027
P7-8
MILL RAMP
FORMER SAWMILL #2
FORMER SORTER BUILDING
FORMER HAZARDOUS MATERIAL AND HYDRAULIC OIL STORAGE AREA
SAWMILL/SORTER AOI

LEGEND:
HISTORICAL SAMPLE LOCATIONS
- SOIL/SEDIMENT
- SOIL/SEDIMENT & SURFACE WATER/GROUNDWATER
- SURFACE WATER/GROUNDWATER

2008/2009 SAMPLE LOCATIONS
- SURFACE/SUBSURFACE SOIL
- SURFACE SOIL (LEAD ONLY)
- SURFACE SOIL
- SURFACE/SUBSURFACE SOIL & GRAB GROUNDWATER
- DISCRETE SOIL SAMPLE FOR COMPOSITE
- GRAB GROUNDWATER

2009 GROUNDWATER LOCATIONS
- GROUNDWATER DATA ONLY

NOTES:
1. LOCATIONS OF UNDERGROUND UTILITIES (DRAIN SYSTEM AND SANITARY SEWER LINES) ARE APPROXIMATE
2. ALL LOCATIONS STARTING WITH MW ARE MONITORING WELLS

ACRONYMS:
AOI AREA OF INTEREST
AST ABOVE GROUND STORAGE TANK
UST UNDERGROUND STORAGE TANK

LEGEND:
- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- POND
- STRUCTURE
- FORMER STRUCTURE
- (FORMER) INDUSTRIAL USE
- PREVIOUS GEOPHYSICAL INVESTIGATION
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE
- UNPAVED ROADWAY
- PAVED ROADWAY
- RAIL LINE
- FORMER RAIL LINE
- FORMER TRANSFORMER LOCATION (APPROXIMATE)

0 100 200 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

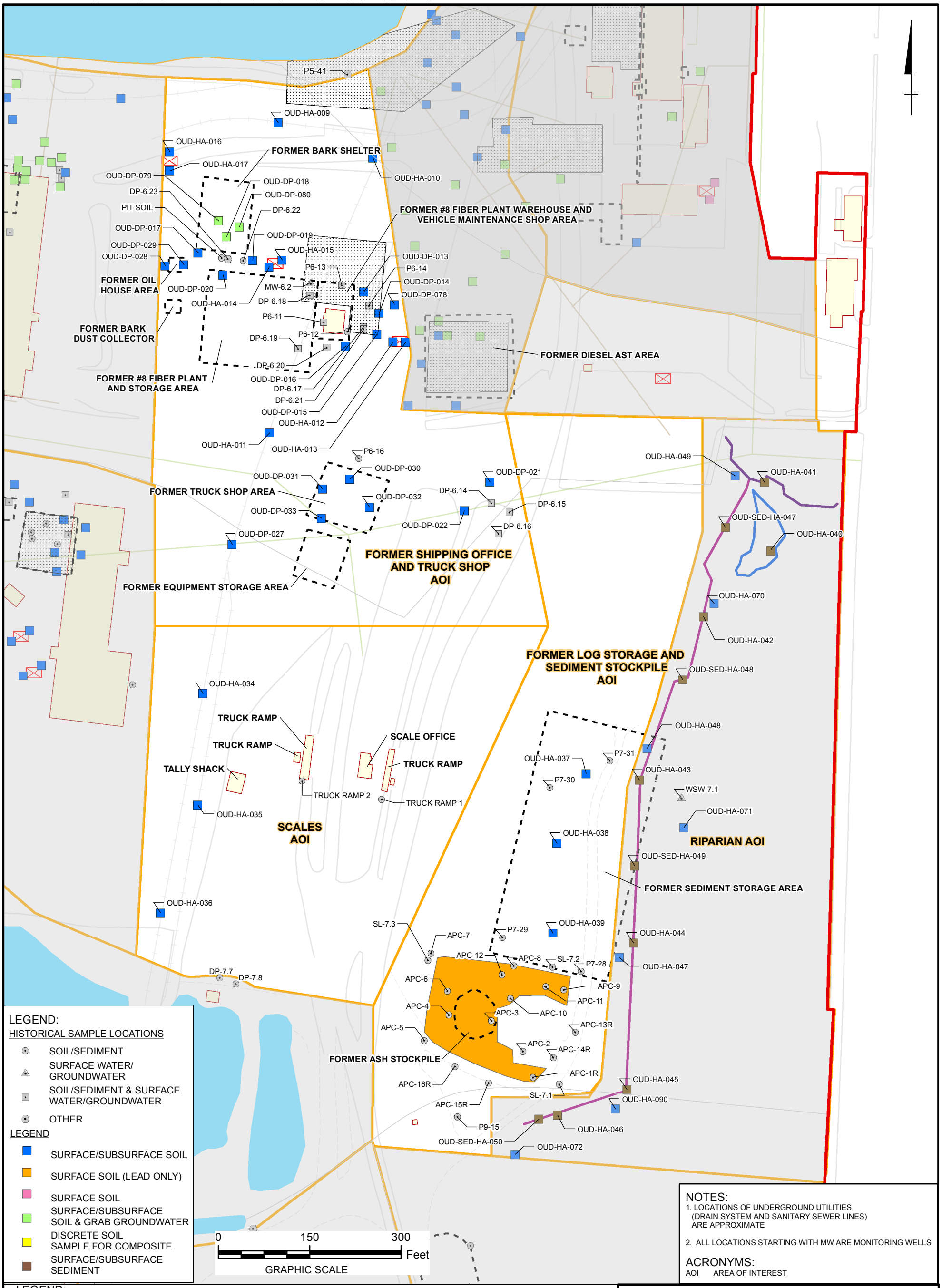
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: PLANER #2 AND SAWMILL/SORTER AOIs

ARCADIS

FIGURE
2-8

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066138.0005.00002
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-9 SampleLocs_TruckShop_Scales_LogStorage_Raparian_Areas.mxd Date: 10/30/2013 Time: 8:11:18 AM



FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

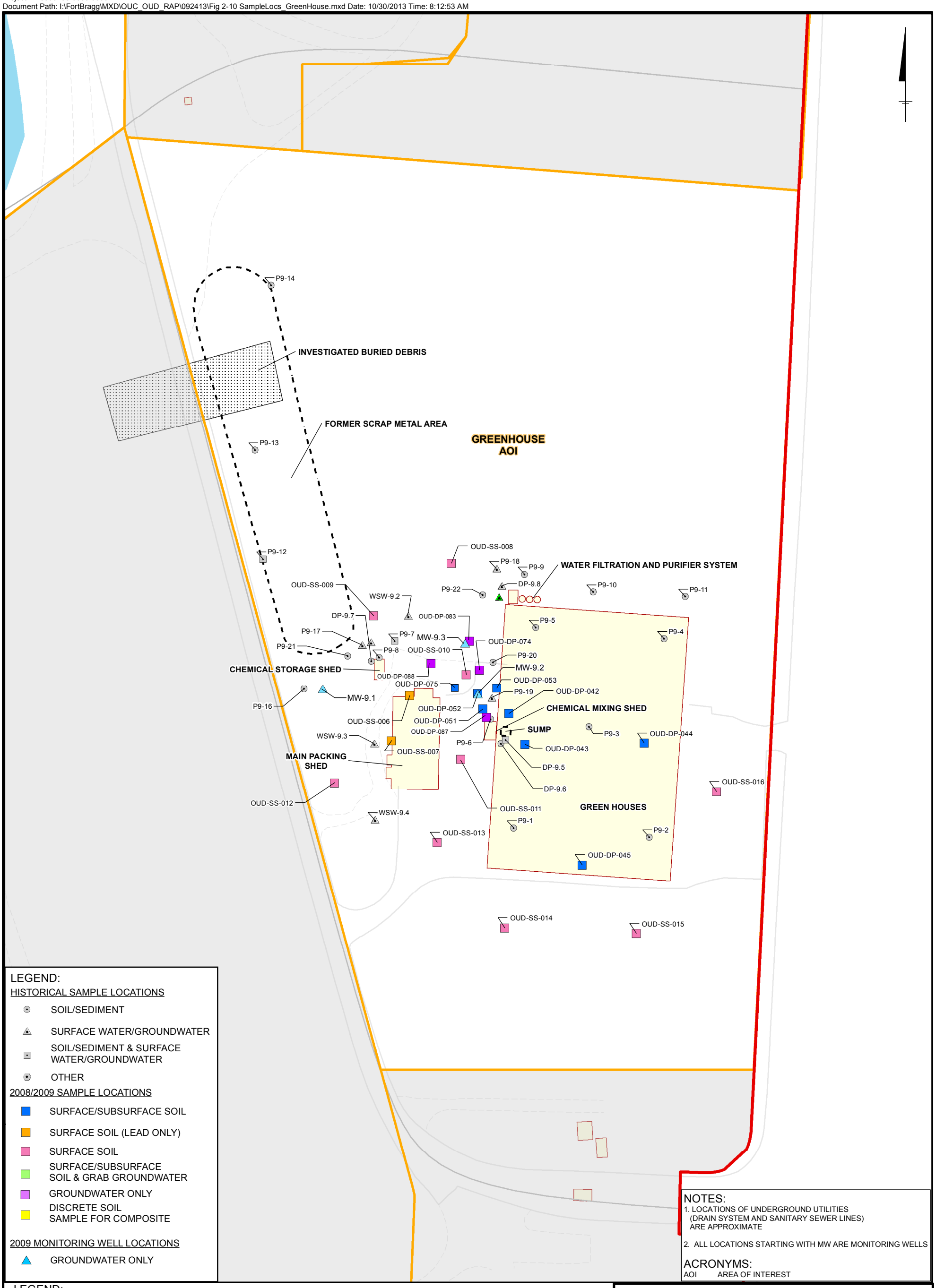
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: FORMER SHIPPING OFFICE & TRUCK SHOP, SCALES, FORMER LOG STORAGE & SEDIMENT STOCKPILE, AND RIPARIAN AOIs

ARCADIS

FIGURE
2-9

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066138.0005.00002
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-10 SampleLocs_GreenHouse.mxd Date: 10/30/2013 Time: 8:12:53 AM



LEGEND:

HISTORICAL SAMPLE LOCATIONS
- SOIL/SEDIMENT
- SURFACE WATER/GROUNDWATER
- SOIL/SEDIMENT & SURFACE WATER/GROUNDWATER
- OTHER

2008/2009 SAMPLE LOCATIONS
- SURFACE/SUBSURFACE SOIL
- SURFACE SOIL (LEAD ONLY)
- SURFACE SOIL
- SURFACE/SUBSURFACE SOIL & GRAB GROUNDWATER
- GROUNDWATER ONLY
- DISCRETE SOIL SAMPLE FOR COMPOSITE

2009 MONITORING WELL LOCATIONS
- GROUNDWATER ONLY

NOTES:
1. LOCATIONS OF UNDERGROUND UTILITIES (DRAIN SYSTEM AND SANITARY SEWER LINES) ARE APPROXIMATE
2. ALL LOCATIONS STARTING WITH MW ARE MONITORING WELLS

ACRONYMS:
AOI AREA OF INTEREST

LEGEND:
- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- POND
- STRUCTURE
- FORMER STRUCTURE
- FACILITY PARCEL
- PREVIOUS GEOPHYSICAL INVESTIGATION
- (FORMER) INDUSTRIAL USE
- PAVED ROADWAY
- UNPAVED ROADWAY
- RAIL LINE
- FORMER RAIL LINE
- SUMP LOCATION

0 100 200 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

SAMPLE LOCATIONS AND FEATURES: GREENHOUSE AOI

ARCADIS

FIGURE
2-10

CITY: Highlands Ranch DIV/GROUP: GIS DB:BCG
Project # B0066138.0005.00002
Document Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2015\Fig 2-11 EU_AOI_Landuse.mxd Date: 2/24/2015 Time: 11:34:23 AM

GLASS BEACH 1
BETWEEN GLASS BEACH 1 & 2
GLASS BEACH 2
BETWEEN GLASS BEACH 2 & 3
GLASS BEACH 3
EAST OF GLASS BEACH 3
PARCEL 3 SCRAP YARD/GEOPHYSICAL ANOMALY AREA
PARCEL 6 AND 8 COASTLINE
NORTH OF PARCEL 8 CLINKER AREA
PARCEL 10 GEOPHYSICAL ANOMALY/CLINKER AREA
PARCEL 8 CLINKER/FILL AREA
Clinker/Fill AOI
PARCEL 10 FILL AREA
FORMER RAILROAD TRACKS
PARCEL 8 FILL AREA
BLOWHOLE
NORTH OF NORTH NOYO POINT ROAD DWELLINGS

Pacific Ocean
Soldier Bay

Parcel 1 AOI
Northern District
NP
Existing Alley
Parcel 2 AOI
Former Dip Tank AOI
Rail Lines West AOI
Former Planer #1/ Planer #50 AOI
Truck Loading Shed AOI
Central District
Former Green Chain AOI
Kilns AOI
Water Treatment and Truck Dump AOI
Mill Pond and Open Space District
Powerhouse and Fuel Barn AOI
Pond 8 Fill Area AOI
Planer #2 AOI
Former Shipping Office and Truck Shop AOI
Sawmill/Sorter AOI
Southern District
Scales AOI
Research & Education Center
Former Sheep Barn AOI
Log Deck AOI
Former Airstrip AOI
Hotel / Resort

Former AST AOI
Former MES/Pilot Study AOI
Construction Engineering AOI
Rail Lines East AOI
Central Business District
Compressor House and Lath Building AOI
Former MS/IRM AOI
Former Oil House AOI
Miscellaneous AOI
Transformer Pad AOI
Pond 5 AOI
IRM AOI
West of IRM AOI
Parcel 6 AOI
Potential Future Connection
Former Log Storage and Sediment Stockpile AOI
Riparian AOI
Greenhouse AOI
Potential Future Connection
Cypress Gate AOI
Potential Future Connection

ELM STREET
SPRUCE STREET
WEST STREET
STEWART STREET
MAIN STREET (HWY 1)
SOUTH STREET
FRANKLIN STREET
MCPHERSON STREET
HARRISON STREET
City of Fort Bragg

Land Use Plan

- Specific Plan Area Boundary
- Specific Plan Study Area Boundary
- District Boundary
- Conceptual Neighborhood Park Location
- Alternative Neighborhood Park Location
- Mill Site Residential (MSR)
- Mill Site Commercial Mixed-Use (MSCMU)
- Mill Site Visitor Serving (MSVS)
- Mill Site Mixed-Use Residential (MSMU-R)
- Mill Site Light Industrial Flex (MSLIF)
- Future Coastal Trail and Parkland Area
- Open Space
- Mill Site Highway Commercial (MSHC)
- Mill Site Industrial (MSI)
- Mill Site Mixed-Use Employment Zone (MUEZ)
- Mill Site Urban Reserve (MSUR)
- Restricted Land Use Area
- Public Facilities
- Timber Resources Industrial
- Opportunity / Use Priority Sites

Printed: December 28, 2010

AOI BOUNDARY

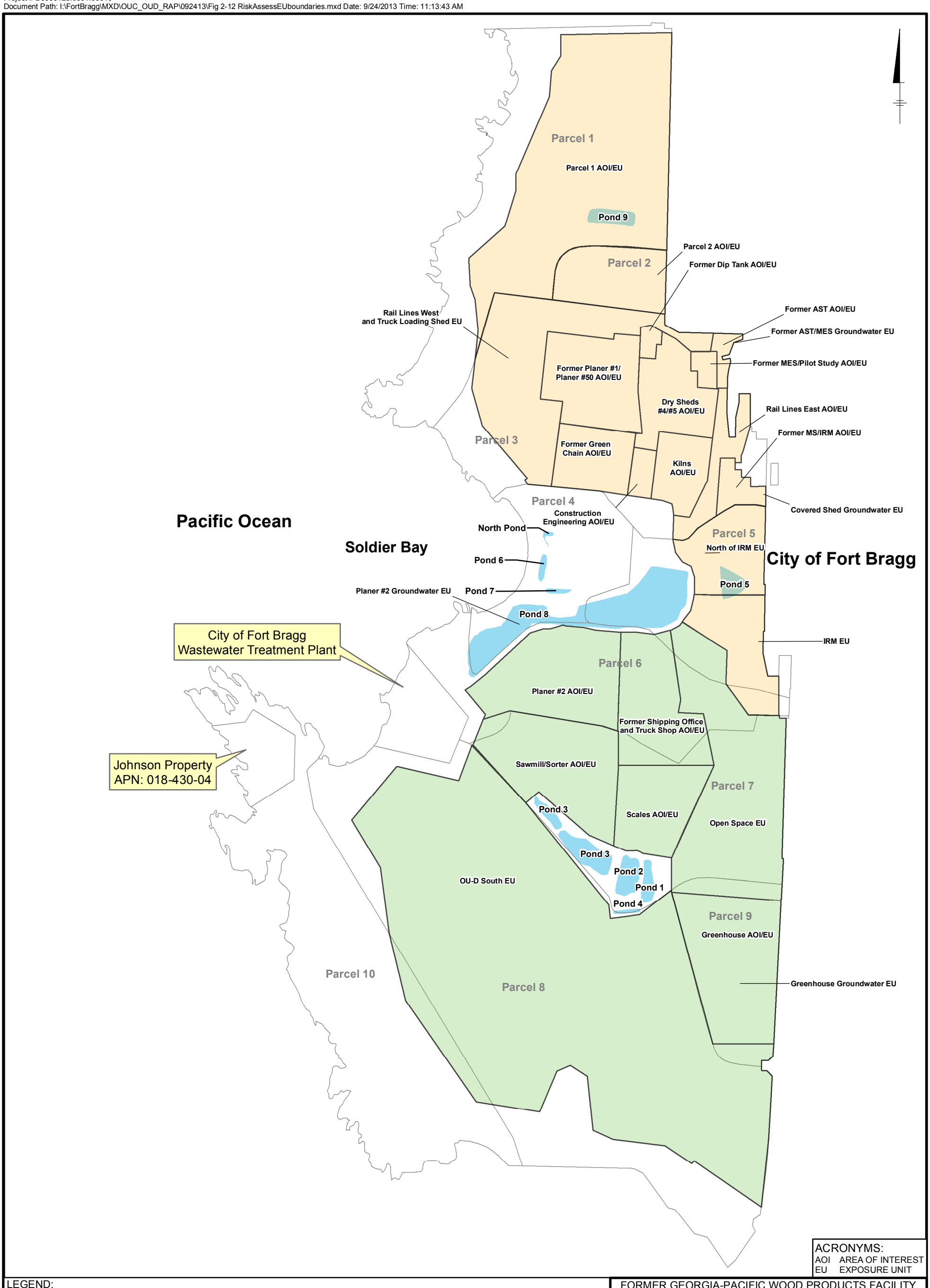
FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

LAND USE PLAN

ARCADIS

FIGURE
2-11

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066128.0001.00010
Document Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 2-12 RiskAssessEUboundaries.mxd Date: 9/24/2013 Time: 11:13:43 AM



ACRONYMS:
AOI AREA OF INTEREST
EU EXPOSURE UNIT

LEGEND:
- POND
- FACILITY PARCEL
- OU-C WIDE GROUNDWATER EXPOSURE UNIT
- OU-D WIDE GROUNDWATER EXPOSURE UNIT

0 620 1,240 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

EXPOSURE UNITS FOR THE BHHRA

ARCADIS

FIGURE
2-12

CITY: HR DIV/GROUP: GIS IM DB:BCG
Project #66128.0001 Task 10

Parcel 1 AOI
Parcel 2 AOI
Rail Lines West AOI
GLASS BEACH 2
Pacific Ocean
City of Fort Bragg
Former Dip Tank AOI
Former AST AOI
BETWEEN GLASS BEACH 2 & 3
Former MES/Pilot Study AOI
Truck Loading Shed AOI
Dry Sheds #4/#5 AOI
Kilns AOI
GLASS BEACH 3
Former Planer #1/Planer #50 AOI
Rail Lines East AOI
Former MS/IRM AOI
EAST OF GLASS BEACH 3
PARCEL 3 SCRAP YARD/GEOPHYSICAL ANOMALY AREA
Former Green Chain AOI
Construction Engineering AOI
Compressor House and Lath Building AOI
Former Oil House AOI
Water Treatment and Truck Dump AOI
Miscellaneous AOI
Transformer Pad AOI
Soldier Bay
Pond 5 AOI
Sawmill #1 AOI
Powerhouse and Fuel Barn AOI
IRM AOI
Pond 8 Fill Area AOI
West of IRM AOI
Planer #2 AOI
Former Shipping Office and Truck Shop AOI
Parcel 6 AOI
PARCEL 6 AND 8 COASTLINE
Former Log Storage and Sediment Stockpile AOI
Sawmill/Sorter AOI
Riparian AOI
Scales AOI
Former Sheep Barn AOI

LEGEND:

AOI BOUNDARY

PRESUMPTIVE REMEDY AREAS

0 620 1,240 Feet

GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
REMEDIAL INVESTIGATION OPERABLE UNITS C AND D

PRESUMPTIVE REMEDY AREAS

ARCADIS

FIGURE 2-13

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066128.0000.00004
Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2015\Fig 2-14 TPHgDataGapsInvestigationResults_Soil.mxd Date: 2/5/2015 Time: 12:14:16 PM

OUC-DP-1002
Depth	C6-C10
(6-7)	<0.27
(10-11)	140
(16-17)	<0.24

OUC-DP-018
Depth	C6-C8	C8-C10
(0-2)	0.013	0.035
(6-8)	0.028	0.028
(10-12)	44	330

DP-3.24
Depth	C6-C8	C8-C10
(0.75-1.25)	<0.24	<0.24
(4.75-5.25)	<0.22	<0.22
(9.7-10.2)	<0.23	<0.23

OUC-DP-014
Depth	C6-C8	C8-C10
(0-2)	<0.28	0.017
(5-7)	0.0087	0.014
(10-12)	0.03	0.064

OUC-DP-015
Depth	C6-C8	C8-C10
(0-2)	<0.27	0.013
(5-7)	<0.27	0.0096
(10-11.7)	<0.22	0.011

OUC-DP-1003
Depth	C6-C10
(6-7)	<0.26
(10.5-11.5)	0.59
(16-17)	<0.22

OUC-DP-1001
Depth	C6-C10
(6-7)	<0.26
(10.5-11.5)	52
(16-17)	<0.21

MW-3.17
Depth	C6-C8	C8-C10
(12.5-14)	41	220

OUC-DP-017
Depth	C6-C8	C8-C10
(0-2)	<0.25	0.095
(5-7)	<0.25	0.01
(11-13)	8.7	360

MES2-CS-008
Depth	C6-C8	C8-C10
(5.5-6)	<0.23	<0.23

OUC-DP-019
Depth	C6-C8	C8-C10
(0-2)	0.021	0.19
(6-8)	0.15	2.9
(10-12)	48	330

FORMER AST AOI

OUC-DP-043
Depth	C6-C8	C8-C10
(0-2)	<0.24	<0.24
(5-7)	<0.24	<0.24
(12-13)	3.1	130

MES2-CS-012
Depth	C6-C8	C8-C10
(6.5-7)	<0.21	<0.21

OUC-DP-1004
Depth	C6-C10
(6-7)	4.1
(10-11)	470
(16-17)	<0.25

OUC-DP-044
Depth	C6-C8	C8-C10
(0-2)	<0.21	0.0098
(6.2-7.2)	0.01	0.055
(12.5-13.5)	27	210

MES2-CS-007
Depth	C6-C8	C8-C10
(6-6.5)	<0.23	<0.23

MW-3.2
Depth	C7-C12
(5-5.5)	<1.1
(10-10.5)	340

OUC-DP-016
Depth	C6-C8	C8-C10
(0-2)	0.022	0.032
(5-7)	<0.33	0.019
(10-12)	0.0084	0.013

STF-DP-018
Depth	C6-C10
(0-0.5)	<0.25
(2.5-3)	<0.24
(6-7)	<0.28
(13-14)	0.44

MW-3.1
Depth	C7-C12
(5-5.5)	<0.99
(10-10.5)	<0.99

STF-DP-1019
Depth	C6-C10
(0-0.5)	<0.25
(2.5-3)	<0.24
(6-7)	<0.25
(11-12)	<0.23

OUC-DP-045
Depth	C6-C8	C8-C10
(0-2)	0.019	0.084
(7-8)	0.086	4.3
(10-11.5)	43	270

FORMER PARCEL 3
MES/PILOT STUDY
AOI

OUC-DP-1013
Depth	C6-C10
(6.5-7)	<0.26
(11.5-12)	<0.22
(16.5-17)	<0.25

P3-34
Depth	C7-C12
(2-2.5)	<0.96
(5-5.5)	<1.0

OUC-DP-1005
Depth	C6-C10
(6-7)	6.4
(10-11)	220
(16-17)	<0.22

OUC-DP-047
Depth	C6-C8	C8-C10
(0-2)	0.023	0.11
(5-6.5)	0.012	0.51
(7-8.5)	2	160

OUC-DP-020
Depth	C6-C8	C8-C10
(0-2)	<0.24	0.027
(5-7)	0.032	2.5
(8-11)	31	290

P3-32
Depth	C7-C12
(2-2.5)	<1.0
(5-5.5)	<1.1

STF-DP-1020
Depth	C6-C10
(0-0.5)	<0.25
(2.5-3)	<0.25
(7-8)	3.1
(9-10)	88
(12-13)	1600

OUC-DP-021
Depth	C6-C8	C8-C10
(0-2)	<0.23	0.092
(5-7)	<0.24	0.024
(10-12)	<0.20	<0.20

OUC-DP-1012
Depth	C6-C10
(6-7)	<0.27
(11.5-12.5)	120
(16-17)	<0.24

STF-DP-1021
Depth	C6-C10
(0-0.5)	<0.24
(2.5-3)	<0.24
(6-7)	<0.25
(10.25-11.25)	47

OUC-DP-1006
Depth	C6-C10
(6-7)	<0.27
(9.5-10.5)	170
(16-17)	<0.21

MW-3.13
Depth	C6-C8	C8-C10
(0-0.5)	0.017	0.051
(8.5-9)	17	260

OUC-DP-1011
Depth	C6-C10
(6-7)	<0.27
(11-12)	61
(16-17)	<0.26

MW-3.3
Depth	C7-C12
(5-5.5)	<1

OUC-DP-046
Depth	C6-C8	C8-C10
(0-2)	<0.23	<0.23
(7-8)	<0.23	0.22
(10-11.2)	40	330

OUC-DP-048
Depth	C6-C8	C8-C10
(5-6.5)	<0.24	0.015
(8.2-9.8)	0.015	0.02

OUC-DP-1010
Depth	C6-C10
(6-7)	<0.26
(11-12)	140
(16-17)	<0.25

OUC-DP-1009
Depth	C6-C10
(6-7)	72
(9.5-10.5)	160
(13.5-14.5)	0.62

OUC-DP-1007
Depth	C6-C10
(6-7)	<0.26
(10-11)	150
(16-17)	<0.20

STF-DP-1022
Depth	C6-C10
(0-0.5)	<0.23
(2.5-3)	<0.24
(7.5-8)	43
(8.5-9.5)	220

OUC-DP-049
Depth	C6-C8	C8-C10
(0-2)	<0.2	<0.2
(5-6.5)	<0.23	<0.23
(7.5-9)	<0.22	<0.22

OUC-DP-022
Depth	C6-C8	C8-C10
(0-2)	<0.21	0.03
(5-7)	<0.23	0.012
(8-11)	9.9	190

STF-DP-1023
Depth	C6-C10
(0-0.5)	0.26
(2.5-3)	<0.25
(6.5-7)	<0.25
(11.5-12)	79

OUC-DP-050
Depth	C6-C8	C8-C10
(5-6.5)	<0.22	<0.22
(8-9.5)	0.016	0.016

STF-DP-1024
Depth	C6-C10
(0-0.5)	<0.24
(2.5-3)	<0.24
(6.5-7)	<0.23
(9.5-10)	<0.22

OUC-DP-1008
Depth	C6-C10
(6-7)	1.8
(10-11)	200
(13-14)	<0.27

NOTES:
1. SCREENING RESULTS ARE BASED ON A COMPARISON OF THE TPHg CONCENTRATIONS TO THE COMBINED DIRECT CONTACT, INDOOR AIR, AND LEACHING TO GROUNDWATER RBSCs FOR THEIR RESPECTIVE FRACTIONS (FRACTIONS: C6-C8: 0.88 mg/kg; C7-C12: 6.7 mg/kg; C8-C10: 6.7 mg/kg). C7-C12 IS PRESENTED FOR HISTORICAL SAMPLES WHERE FRACTION DATA WAS NOT AVAILABLE. FOR EACH COMPARISON, THE HIGHEST EXCEEDANCE OF ALL SAMPLES PER DEPTH INTERVAL IS PRESENTED AS THE SCREENING RESULT.
2. DEPTH INTERVALS ARE 0-2 FT BGS, >2-10 FT BGS, AND >10 FT BGS. THE SCREENING PER DEPTH INTERVAL INCLUDES THE RESULTS FOR ANY SAMPLES WITHIN OR SPANNING THE DEPTH INTERVAL.
3. SAMPLES FROM AREAS THAT WERE LATER EXCAVATED WERE NOT INCLUDED IN THE SCREENING; RESULTS FOR LOCATIONS WITHIN EXCAVATION BOUNDARIES ARE BASED ON SAMPLES COLLECTED BELOW THE EXCAVATED DEPTHS OR ON SAMPLES COLLECTED FROM BACKFILL.
4. HISTORICAL DATASET INCLUDES ALL SOIL SAMPLES COLLECTED THROUGH MAY 2012.

ACRONYMS:
AOI AREA OF INTEREST
AST ABOVEGROUND STORAGE TANK
mg/kg MILLIGRAMS PER KILOGRAM.
RBSC SITE-SPECIFIC RISK-BASED SCREENING CRITERIA FOR ALIPHATICS (ARCADIS BBL, 2007c)
TPHg TOTAL PETROLEUM HYDROCARBONS AS GASOLINE

LOCATION TYPE
HISTORICAL SOIL SAMPLE LOCATION
2012 DATA GAPS INVESTIGATION SAMPLE LOCATION

SCREENING RESULT
NOT DETECTED
DETECTED ≤ BELOW SCREENING LEVEL
DETECTED > SCREENING LEVEL
DETECTED > 10 X SCREENING LEVEL

SCREENING RESULT DEPTH INTERVAL (SEE NOTES 1 & 3)
0-2 ft bgs
>2-10 ft bgs
>10 ft bgs

LEGEND:
SITE BOUNDARY
AOI BOUNDARY
STRUCTURE
FORMER STRUCTURE
(FORMER) INDUSTRIAL USE
PAVED ROADWAY
UNPAVED ROADWAY
FORMER RAIL LINE
RAIL LINE
PLANT DRAIN SYSTEM LINE
SANITARY SEWER LINE

SAMPLE ID
MW-3.13
Depth	C6-C8	C8-C10
(0-0.5)	0.017	0.051
(8.5-9)	17	260

Depth in ft bgs
TPHg CONCENTRATION IN mg/Kg

0 60 120 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

DATA GAPS INVESTIGATION RESULTS - TPHg IN SOIL

ARCADIS

FIGURE
2-14

CITY: HR DIV/GROUP: AIT GIS DB:BCG
Project # B0066128.0000.00004
Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2015\Fig 2-15 TPHdDataGapsInvestigationResults_Soil_rev1.mxd Date: 2/5/2015 Time: 11:58:52 AM

OUC-DP-018

Depth	C10-C12	C12-C16	C16-C24
(0-2)	0.57	11	90
(6-8)	2.7	14	23
(10-12)	2,200	4,600	3,100

DP-3.24

Depth	C10-C12	C12-C16	C16-C24
(0.75-1.25)	<1	<1	1.1
(4.75-5.25)	<1	<1	<1
(9.45-9.95)	<1	<1	<1

OUC-DP-014

Depth	C10-C12	C12-C16	C16-C24
(0-2)	2.5	12	240
(5-7)	<1.1	<1.1	0.14
(10-12)	0.17	<1.2	0.37

OUC-DP-015

Depth	C10-C12	C12-C16	C16-C24
(0-2)	0.74	2.4	31
(5-7)	<1.1	<1.1	0.14
(10-11.7)	0.2	<1.2	<1.2

OUC-DP-1002

Depth	C10-24
(6-7)	0.57 JB
(10-11)	3,300 B
(16-17)	<1.0

OUC-DP-1003

Depth	C10-24
(6-7)	<1.0
(10.5-11.5)	440
(16-17)	<0.98

OUC-DP-1001

Depth	C10-24
(6-7)	1.1
(10.5-11.5)	780
(16-17)	1.5

MW-3.17

Depth	C10-C12	C12-C16	C16-C24
(12.5-14)	89	230	200

OUC-DP-017

Depth	C10-C12	C12-C16	C16-C24
(0-2)	0.99	3.7	79
(5-7)	0.15	<1.1	0.14
(11-13)	300	300	23

MES2-CS-008

Depth	C10-C12	C12-C16	C16-C24
(5.5-6)	<1.1	<1.1	0.19

OUC-DP-045

Depth	C10-C12	C12-C16	C16-C24
(0-2)	0.60	<1.1	7.5
(7-8)	370	920	710
(10-11.5)	1,200	3,100	2,200

FORMER AST AOI

OUC-DP-043

Depth	C10-C12	C12-C16	C16-C24
(0-2)	<5.3	8.9	96
(5-7)	<1.1	<1.1	0.23
(12-13)	180	460	33

MES2-CS-012

Depth	C10-C12	C12-C16	C16-C24
(6.5-7)	<1.1	<1.1	1.8

OUC-DP-1004

Depth	C10-24
(6-7)	2,700
(10-11)	9,600
(16-17)	3.0

OUC-DP-044

Depth	C10-C12	C12-C16	C16-C24
(0-2)	0.38	1.9	22
(6.2-7.2)	<1.1	<1.1	1.1
(12.5-13.5)	5.4	2.3	0.36

MES2-CS-007

Depth	C10-C12	C12-C16	C16-C24
(6.5-7)	<1.1	<1.1	<1.1

MW-3.2

Depth	C10-24
(5-5.5)	4.8
(10-10.5)	780

MW-3.1

Depth	C10-24
(5-5.5)	<1
(10-10.5)	<1

STF-DP-1018

Depth	C10-24
(0-0.5)	50
(2.5-3)	0.79 J
(6-7)	0.45 J
(13-14)	470

OUC-DP-016

Depth	C10-C12	C12-C16	C16-C24
(0-2)	1.0	3.5	24
(5-7)	0.2	<1.1	0.19
(10-12)	0.83	20	46

MES1-CS-004

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	<1.1	<1.1	<1.1

MES1-CS-003

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	0.22	<1.1	<1.1

STF-DP-1019

Depth	C10-24
(0-0.5)	94
(2.5-3)	0.64 J
(6-7)	<0.99
(11-12)	1.7 B

MES1-CS-002

Depth	C10-C12	C12-C16	C16-C24
(6-6.5)	<1.1	<1.1	<1.1

FORMER PARCEL 3
MES/PILOT STUDY
AOI

P3-34

Depth	C10-24
(2-2.5)	5
(5-5.5)	2

OUC-DP-1005

Depth	C10-24
(6-7)	740
(10-11)	2,000
(16-17)	<0.99

MES1-CS-005

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	<1.1	<1.1	<1.1

OUC-DP-1013

Depth	C10-24
(6.5-7)	0.64 J
(11.5-12)	690
(16.5-17)	12

MES1-CS-001

Depth	C10-C12	C12-C16	C16-C24
(6-6.5)	<1.1	<1.1	<1.1

MES1-CS-006

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	<1.1	<1.1	<1.1

OUC-DP-047

Depth	C10-C12	C12-C16	C16-C24
(0-2)	4.2	110	690
(5-6.5)	58	340	600
(7-8.5)	500	1,500	1,300

OUC-DP-020

Depth	C10-C12	C12-C16	C16-C24
(0-2)	2.3	1.0	13
(5-7)	73	310	280
(8-11)	1,000	2,700	2,000

OUC-DP-021

Depth	C10-C12	C12-C16	C16-C24
(0-2)	4.3	30	140
(5-7)	<1.1	<1.1	0.27
(10-12)	<1.2	<1.2	0.47

OUC-DP-019

Depth	C10-C12	C12-C16	C16-C24
(0-2)	1.9	8.9	94
(6-8)	56	180	140
(10-12)	1,200	3,000	2,200

MES5-CS-006

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	<1.1	<1.1	1.0

STF-DP-1020

Depth	C10-24
(0-0.5)	66
(2.5-3)	6.1
(7-8)	390
(9-10)	2,700
(12-13)	140

MES5-CS-005

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	<1.1	<1.1	0.68

OUC-DP-1006

Depth	C10-24
(6-7)	18
(9.5-10.5)	1,600
(16-17)	<0.98

MW-3.13

Depth	C10-C12	C12-C16	C16-C24
(0-0.5)	3.7	27	92
(8.5-9)	1,400	2,000	1,300

STF-DP-1021

Depth	C10-24
(0-0.5)	33
(2.5-3)	0.79 J
(6-7)	0.92 J
(10.25-11.25)	2,200

MW-3.3

Depth	C10-24
(5-5.5)	<1

OUC-DP-048

Depth	C10-C12	C12-C16	C16-C24
(5-6.5)	<1.1	<1.1	0.14
(8.2-9.8)	<1.2	<1.2	<1.2

OUC-DP-1011

Depth	C10-24
(6-7)	0.45 J
(11-12)	810
(16-17)	6.4

OUC-DP-1012

Depth	C10-24
(6-7)	0.44 J
(11.5-12.5)	2,400
(16-17)	0.62 J

OUC-DP-1007

Depth	C10-24
(6-7)	1.4
(10-11)	3,500 B
(16-17)	0.65 JB

OUC-DP-1010

Depth	C10-24
(6-7)	0.35 J
(11-12)	1,700
(16-17)	3.1

MES4-CS-005

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	0.24	<1.2	2.1

OUC-CP-049

Depth	C10-C12	C12-C16	C16-C24
(0-2)	11	87	310
(5-6.5)	<1.1	0.12	1.0
(7.5-9)	<1.1	<1.1	<1.1

OUC-DP-046

Depth	C10-C12	C12-C16	C16-C24
(0-2)	<1.1	2.2	65
(7-8)	75	290	260
(11-12)	2100	4,300	2,600

OUC-DP-022

Depth	C10-C12	C12-C16	C16-C24
(0-2)	43	270	400
(5-7)	<1.1	<1.1	0.20
(8-11)	310	980	810

OUC-DP-1009

Depth	C10-24
(6-7)	5,900 B
(9.5-10.5)	2,000 B
(13.5-14.5)	60 B

STF-DP-1022

Depth	C10-24
(0-0.5)	37
(2.5-3)	0.66 J
(7.5-8)	7,500
(8.5-9.5)	4,200

OUC-CP-050

Depth	C10-C12	C12-C16	C16-C24
(5-6.5)	<1.1	<1.1	<1.1
(8-9.5)	<1.1	<1.1	0.23

STF-DP-1023

Depth	C10-24
(0-0.5)	3,400
(2.5-3)	220
(6.5-7)	200
(11.5-12)	9,400

OUC-DP-024

Depth	C10-12	C12-16	C16-24
(0-2)	0.70	1.2	45
(2-4)	<1.1	<1.1	0.17
(5-7)	<1.2	<1.2	<1.2

STF-DP-1024

Depth	C10-24
(0-0.5)	32
(2.5-3)	140
(6.5-7)	0.34 J
(9.5-10)	<0.99

OUC-DP-1008

Depth	C10-24
(6-7)	870 B
(10-11)	4,200 B
(13-14)	8.1

NOTES:

1. SCREENING RESULTS ARE BASED ON A COMPARISON OF TPHd CONCENTRATIONS TO THE DIRECT CONTACT AND INDOOR AIR RBSCs FOR FRACTIONS C10-C12 (51 mg/kg) AND C12-C16 (648 mg/kg). C16-C24 AND TOTAL TPHd (C10-C24) SCREENING RESULTS ARE BASED ON A COMPARISON OF TPHd CONCENTRATIONS TO THE LEACHING TO GROUNDWATER CRITERIA OF 1,045 mg/kg. THE HIGHEST FRACTION EXCEEDANCE OF ALL SAMPLES PER LOCATION IS PRESENTED AS THE SCREENING RESULT.
2. TEXT BOXES PRESENT C10-C12, C12-C16 AND C16-C24 SAMPLE CONCENTRATIONS (in mg/kg) BECAUSE VARIOUS FRACTIONS ARE DRIVING SCREENING LEVEL EXCEEDANCES.
3. SAMPLES FROM AREAS THAT WERE LATER EXCAVATED WERE NOT INCLUDED IN THE SCREENING; RESULTS FOR LOCATIONS WITHIN EXCAVATION BOUNDARIES ARE BASED ON SAMPLES COLLECTED BELOW THE EXCAVATED DEPTHS OR ON SAMPLES COLLECTED FROM BACKFILL.
4. DEPTH INTERVALS ARE 0-2 FT BGS, >2-10 FT BGS, AND >10 FT BGS. THE SCREENING PER DEPTH INTERVAL INCLUDES THE RESULTS FOR ANY SAMPLES WITHIN OR SPANNING THE DEPTH INTERVAL.
5. HISTORICAL DATASET INCLUDES ALL SOIL SAMPLES COLLECTED THROUGH MAY 2012.

ACRONYMS:

AOI	AREA OF INTEREST
AST	ABOVEGROUND STORAGE TANK
GW	GRAB GROUNDWATER SAMPLE
ft bgs	FEET BELOW GROUND SURFACE
LGW	LEACHING TO GROUNDWATER
MES	MOBILE EQUIPMENT SHOP
mg/kg	MILLIGRAMS PER KILOGRAM
MS/IRM	MACHINE SHOP/INTERIM REMEDIAL MEASURE
RBSC	SITE-SPECIFIC RISK-BASED SCREENING CONCENTRATION FOR ALIPHATICS
TPHd	TOTAL PETROLEUM HYDROCARBONS AS DIESEL
UST	UNDERGOUND STORAGE TANK

LOCATION TYPE

- HISTORICAL SOIL SAMPLE LOCATION
- 2012 DATA GAPS INVESTIGATION SAMPLE LOCATION

SCREENING RESULT

- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

SCREENING RESULT DEPTH INTERVAL (SEE NOTES 1 & 3)

- 0-2 ft bgs
- >2-10 ft bgs
- >10 ft bgs

LEGEND:

- SITE BOUNDARY
- AOI BOUNDARY
- STRUCTURE
- FORMER STRUCTURE
- (FORMER) INDUSTRIAL USE
- PROPOSED SOIL EXCAVATION AREA
- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- RAIL LINE
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE

SAMPLE ID

OUC-DP-017

Depth	C10-C12	C12-C16	C16-C24
(5-7)	0.15	<1	0.14

Depth in ft bgs

TPHd Concentration in (mg/kg)

0 60 120 Feet

GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

DATA GAPS INVESTIGATION RESULTS - TPHd IN SOIL

ARCADIS

FIGURE
2-15

CITY: Highlands Ranch DIV/GROUP: GIS DB:BCG
Project # B0066103.0000.00016
Document Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2015\Fig 2-16 TPHgDataGapsInvestigationResults_GW.mxd Date: 2/5/2015 Time: 12:01:24 PM

OUC-DP-015
C6-C8 C8-C10 C6-C10
0.10 0.57 0.67 2008

OUC-DP-016
C6-C8 C8-C10 C6-C10
<0.05 0.01 0.01 2008

MW-3.17
C6-C8 C8-C10 C6-C10
0.10 0.21 0.31 2010
0.36 0.90 1.26 2008

FORMER AST AOI

OUC-DP-018
C6-C8 C8-C10 C6-C10
0.37 4.4 4.77 2008

OUC-DP-045
C6-C8 C8-C10 C6-C10
0.2 0.94 1.14 2008

OUC-DP-044
C6-C8 C8-C10 C6-C10
0.32 0.71 1.0 2009

MW-3.2
C6-C8 C8-C10 C6-C10
0.04 0.27 0.13 2012
- - 0.26 2011

OUC-DP-1004
C6-C10
27 2012

DP-3.24
C6-C10
ND 2005

STF-DP-1018
C6-C10
2.2 2012

P3-35
C6-C10
1.4 2003

STF-DP-1019
C6-C10
<0.05 2012

MW-3.1
C6-C8 C8-C10 C6-C10
0.01 0.02 0.03 2008
0.02 0.03 0.05 2008

STF-DP-1020
C6-C10
1.6 2012

FORMER MES/PILOT STUDY AOI

DP-3.25
C6-C10
ND 2005

P3-33
C7-C12
<0.05 2003

OUC-DP-019
C6-C8 C8-C10 C6-C10
0.07 0.74 0.81 2008

MW-3.16R
C6-C8 C8-C10 C6-C10
<0.05 <0.05 - 2012

OUC-DP-021
C6-C8 C8-C10 C6-C10
0.01 0.01 0.02 2008

STF-DP-1021
C6-C10
19 2012

DP-3.26
C6-C10
ND 2005

P3-31
C6-C10
<0.05 2003

OUC-DP-1012
C6-C10
2.8 2012

P3-28
C6-C10
2.5 2003

OUC-DP-046
C6-C8 C8-C10 C6-C10
<0.5 0.20 0.20 2008

P3-29
C6-C10
<0.05 2003

STF-DP-1022
C6-C10
22 2012

MW-3.3
C6-C8 C8-C10 C6-C10
ND ND ND 2007
<0.01 0.01 0.01 2006

STF-DP-1023
C6-C10
1.1 2012

MW-3.13
C6-C8 C8-C10 C6-C10
<0.05 0.06 - 2012
0.06 0.54 0.60 2007

OUC-DP-048
C6-C8 C8-C10 C6-C10
0.01 <0.05 0.01 2008

OUC-DP-020
C6-C8 C8-C10 C6-C10
0.22 1.8 2.02 2008

MW-3.18
C6-C8 C8-C10 C6-C10
<0.05 <0.05 ND 2010
<0.01 <0.05 0.01 2008

OUC-DP-049
C6-C8 C8-C10 C6-C10
0.02 0.01 0.03 2008

OUC-DP-1007
C6-C10
99 2012

OUC-DP-022
C6-C8 C8-C10 C6-C10
0.03 0.09 0.12 2008

STF-DP-1024
C6-C10
<0.05 2012

NOTES:
1. TPHg CONCENTRATIONS ARE SCREENED AGAINST THE FRACTION-SPECIFIC RBSCs OF 0.597 mg/L (C6-C8) AND 1.22 mg/L (C8-C10). TOTAL TPHg (C6-C10 AND C7-C12) CONCENTRATIONS ARE SCREENED AGAINST THE RWQCB TASTE AND ODOR VALUE OF 0.05 mg/L.
2. THE DEPICTED RESULTS ARE THE MOST RECENT DETECTIONS AND THE MAXIMUM OF THE HISTORICAL DATA (DATA THROUGH MAY 2012) (BOTTOM) OR THE MAXIMUM OF 2008-2009 DATA (TOP).
3. CONCENTRATIONS FOR BOTH TPHg FRACTIONS ARE PRESENTED IN TEXT BOXES BECAUSE BOTH ARE DRIVING EXCEEDANCES OF THE RBSC. THE TOTAL TPHg (C6-C10 AND C7-C12) CONCENTRATION IS ALSO PRESENTED. C7-C12 IS PRESENTED FOR HISTORICAL SAMPLES WHERE FRACTION DATA WAS NOT AVAILABLE.
4. ONLY MONITORING WELLS CURRENTLY PRESENT AT THE SITE ARE SHOWN ON THIS FIGURE.
5. GROUNDWATER GRAB DATA FOR SAMPLES COLLECTED WITHIN AREAS THAT WERE LATER EXCAVATED ARE NOT PRESENTED.

ACRONYMS:
AOI AREA OF INTEREST
GW GROUNDWATER
MW MONITORING WELL
mg/L MILLIGRAMS PER LITER
RBSC SITE-SPECIFIC RISK-BASED SCREENING CONCENTRATION FOR ALIPHATICS
RWQCB NORTH COAST REGIONAL WATER QUALITY BOARD TASTE AND ODOR THRESHOLD
SL SCREENING LEVEL
TPHg TOTAL PETROLEUM HYDROCARBONS AS GASOLINE

MONITORING WELL SAMPLE LOCATION
2012 DATA GAPS INVESTIGATION GRAB GROUNDWATER
HISTORICAL GROUNDWATER GRAB SAMPLE LOCATION
GREATEST EXCEEDANCE HISTORICAL GW GRAB (RBSC SL)
GREATEST EXCEEDANCE HISTORICAL GW GRAB (RWQCB SL)
GREATEST EXCEEDANCE 2012 GW GRAB (RBSC SL)
GREATEST EXCEEDANCE 2012 GW GRAB (RWQCB SL)

Sample ID
MW-3.17
C6-C8 C8-C10 C6-C10
0.10 0.21 0.31 2010
0.36 0.90 1.26 2008
Fraction
Most recent sample concentrations
Historical maximum sample concentrations
TPHg in mg/L

LEGEND:
NO DATA AVAILABLE
NOT DETECTED
DETECTED BELOW SCREENING LEVEL
DETECTED ABOVE SCREENING LEVEL
DETECTED ABOVE 10X SCREENING LEVEL
SITE BOUNDARY
AOI BOUNDARY
POND
STRUCTURE
FORMER STRUCTURE
FORMER STRUCTURE-FOUNDATION INTACT
EXCAVATION BOUNDARY
PAVED ROADWAY
UNPAVED ROADWAY
FORMER RAIL LINES
RAIL LINE
PLANT DRAIN SYSTEM LINE
SANITARY SEWER LINE
0 60 120 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

DATA GAPS INVESTIGATION RESULTS - TPHg IN GROUNDWATER

ARCADIS

FIGURE
2-16

CITY: Highlands Ranch DIV/GROUP: GIS DB:BCG
Project # B0066103.0000.00016
Document Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2015\Fig 2-17 TPHdDataGapsInvestigationResults_GW.mxd Date: 2/5/2015 Time: 12:01:03 PM

OUC-DP-018
11.4 2008

OUC-DP-015
0.35 2008

MW-3.17
0.26 2009
0.06 2010

STF-DP-1020
5.5 2012

DP-3.24
0.33 2005

OUC-DP-016
ND 2008

OUC-DP-044
0.05 2008

OUC-DP-019
47.2 2008

OUC-DP-045
580 2008

FORMER AST AOI

OUC-DP-1004
56 2012

DP-3.57
1010 2005

P3-35
35 2003

MW-3.2
0.17 2012
4.51 2009

STF-DP-1018
18 2012

MW-3.1
ND 2008
<0.11 2006

STF-DP-1019
<0.05 2012

STF-DP-1021
170 2012

FORMER MES/PILOT STUDY AOI

DP-3.25
ND 2005

OUC-DP-1012
130 2012

MW-3.16R
0.01 2009
<0.05 2012

P3-33
0.07 2003

P3-31
0.52 2003

OUC-DP-046
29 2008

DP-3.26
ND 2005

MW-3.13
<0.05 2012
2.63 2007

P3-28
17 2003

STF-DP-1022
99 2012

P3-29
1.6 2003

STF-DP-1023
52 2012

MW-3.3
ND 2007
0.28 2006

P3-67
0.36 2003

OUC-DP-048
0.02 2008

OUC-DP-1007
360 2012

OUC-DP-049
0.01 2008

MW-3.18
ND 2010
0.02 2010

P3-66
0.49 2003

STF-DP-1024
0.04 2012

NOTES:
1. THE DEPICTED RESULTS MOST RECENT AND THE DETECTIONS ARE THE MAXIMUM HISTORICAL AND MAY 2012 DETECTIONS.
2. HISTORICAL DATASET INCLUDES GROUNDWATER SAMPLES COLLECTED THROUGH MAY 2012.
3. TEXT BOXES PRESENT TOTAL TPHd CONCENTRATIONS (mg/L) BECAUSE TOTAL CONCENTRATIONS ARE DRIVING THE RWQCB SCREENING LEVEL EXCEEDANCE.
4. TOTAL TPHd ARE SCREENED AGAINST THE RBSC (DIRECT CONTACT AND INDOOR AIR PATHWAY) VALUE OF 1.22 mg/L, AND THE RWQCB TASTE AND ODOR VALUE OF 0.1 mg/L.
5. ONLY MONITORING WELLS CURRENTLY PRESENT AT THE SITE ARE SHOWN ON THIS FIGURE.
6. GROUNDWATER GRAB DATA FOR SAMPLES COLLECTED WITHIN AREAS THAT WERE LATER EXCAVATED ARE NOT PRESENTED.

ACRONYMS:
AOI AREA OF INTEREST
AST ABOVEGROUND STORAGE TANK
GW GROUNDWATER
MW MONITORING WELL
mg/L MILLIGRAMS PER LITER
MES MOBILE EQUIPMENT SHOP
MS/IRM MACHINE SHOP/INTERIM REMEDIAL MEASURE
RBSC SITE-SPECIFIC RISK-BASED SCREENING CONCENTRATION FOR ALIPHATICS
RWQCB NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD TASTE AND ODOR THRESHOLD
SL SCREENING LEVEL
TPHd TOTAL PETROLEUM HYDROCARBONS AS DIESEL

MONITORING WELL SAMPLE LOCATION
2012 DATA GAPS INVESTIGATION GRAB GROUNDWATER LOCATION
HISTORICAL GROUNDWATER GRAB SAMPLE LOCATION

GREATEST EXCEEDANCE HISTORICAL GW GRAB (RBSC SL)
GREATEST EXCEEDANCE HISTORICAL GW GRAB (RWQCB SL)
GREATEST EXCEEDANCE 2012 GW GRAB (RBSC SL)
GREATEST EXCEEDANCE 2012 GW GRAB (RWQCB SL)

Sample ID
MW-3.2
0.17 2012
4.51 2009
Most recent sample concentration
Historical maximum sample concentration
Total TPHd in mg/L

LEGEND:
NO DATA AVAILABLE
NOT DETECTED
DETECTED BELOW SCREENING LEVEL
DETECTED ABOVE SCREENING LEVEL
DETECTED ABOVE 10X SCREENING LEVEL

SITE BOUNDARY
AOI BOUNDARY
OTHER OPERABLE UNITS/AOIs
POND
STRUCTURE
FORMER STRUCTURE
FORMER STRUCTURE-FOUNDATION INTACT
EXCAVATION BOUNDARY

PAVED ROADWAY
UNPAVED ROADWAY
FORMER RAIL LINES
RAIL LINE
PLANT DRAIN SYSTEM LINE
SANITARY SEWER LINE

0 60 120 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

DATA GAPS INVESTIGATION RESULTS - TPHd IN GROUNDWATER

ARCADIS

FIGURE
2-17

Potential Exposure Media	Exposure Media	EXPOSURE PATHWAY(S)	OU-C Potential Human Receptors: Child/Adult Resident	OU-C: Commercial/Industrial Worker	OU-C: Construction Worker	OU-C: Utility/Trench Worker	OU-D Potential Human Receptors: Child/Adult Resident	OU-D: Commercial/Industrial Worker	OU-D: Construction Worker	OU-D: Utility/Trench Worker	OU-D: Recreational Visitor
Surface and Subsurface Soil	Surface Soil (0-0.5 or 0-2 ft bgs)	Ingestion	●	●	●	●	●	●	●	●	●
		Dermal Contact	●	●	●	●	●	●	●	●	●
Groundwater	Airborne Soil Particulates	Inhalation	●	●	●	●	●	●	●	●	●
Ditch/Drainage Surface Water and Sediment[a]	Subsurface Soil (0-10 ft bgs)	Ingestion	●	●	●	●	●	●	●	●	●
		Dermal Contact	●	●	●	●	●	●	●	●	●
	Airborne Vapors	Inhalation - Indoor Air[b]	●	●	—	—	●	●	—	—	—
		Inhalation - Ambient Air[b]	●	●	●	●	●	●	●	●	●
	Groundwater	Ingestion	●	●	—	—	●	●	—	—	—
		Dermal Contact	●	—	—	●	●	—	—	●	—
	Airborne Vapors	Inhalation Related to Domestic Use	●	○	—	—	●	○	—	—	—
		Inhalation - Indoor Air[b]	●	●	—	—	●	●	—	—	—
		Inhalation - Ambient Air	○	○	○	○	○	○	○	○	○
		Inhalation - Exposed Groundwater During Construction	—	—	—	●	—	—	—	●	—

Notes:

----------● Incomplete or insignificant exposure route

— · — · ► Potentially complete pathway if VOCs are identified as COPCs at the exposure unit.

► or ● Potentially complete exposure pathway

— Incomplete pathway

○ Potentially complete but insignificant exposure pathway

COPCs = chemicals of potential concern

ft bgs = feet below ground surface

OU = operable unit

OU-C = Northern

OU-D = Southern

VOCs = volatile organic compounds

[a] Exposure media present in OU-D only.

[b] Inhalation of vapors in indoor air and in ambient air will be evaluated using (in order of preference) soil vapor and groundwater data.

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

HUMAN HEALTH CONCEPTUAL SITE MODEL FOR OPERABLE UNITS C AND D

ARCADIS

FIGURE
2-18

Exposure Media	Exposure Route	Potential Ecological Receptors			
		Plants	Invertebrates	Birds	Mammals
Surface Soil	Direct Contact	•	•	o	o
	Incidental Ingestion	NA	NA	•	•
	Contaminated Biota	NA	NA	•	•
Subsurface Soil	Direct Contact	•[1]	NA	NA	o
	Incidental Ingestion	NA	NA	NA	•
	Inhalation	NA	NA	NA	•
	Contaminated Biota	NA	NA	NA	NA
Groundwater Seeps/Springs	Direct Contact	—	—	o	o
Stream Sediment	Direct Contact	•	•	o	o
	Incidental Ingestion	NA	NA	•	•
	Contaminated Biota	NA	NA	•	•
Stream Surface Water	Direct Contact	o	o	o	o
	Incidental Ingestion	NA	o	o	o
	Contaminated Biota	NA	NA	o	o

Notes:

o Pathway potentially complete, but considered insignificant; associated sources will be evaluated separately

• Potentially complete and significant exposure pathway

— Incomplete pathway

NA = Not applicable

OU = Operable Unit

[1] = Only areas with sufficient tree vegetation

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

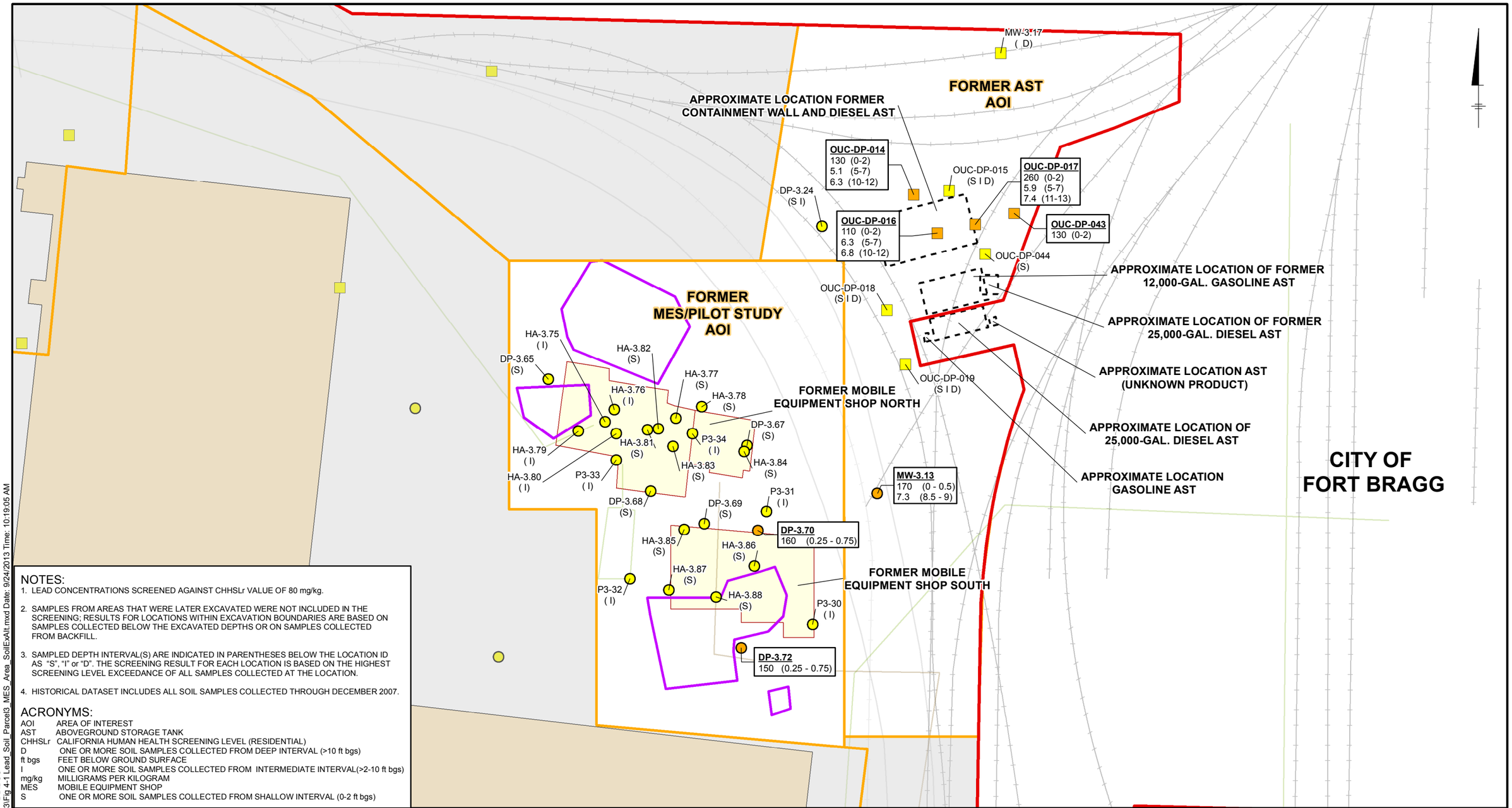
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

ECOLOGICAL CONCEPTUAL SITE MODEL FOR OPERATING UNIT D

ARCADIS

FIGURE

2-19



NOTES:

1. LEAD CONCENTRATIONS SCREENED AGAINST CHHSLr VALUE OF 80 mg/kg.
2. SAMPLES FROM AREAS THAT WERE LATER EXCAVATED WERE NOT INCLUDED IN THE SCREENING; RESULTS FOR LOCATIONS WITHIN EXCAVATION BOUNDARIES ARE BASED ON SAMPLES COLLECTED BELOW THE EXCAVATED DEPTHS OR ON SAMPLES COLLECTED FROM BACKFILL.
3. SAMPLED DEPTH INTERVAL(S) ARE INDICATED IN PARENTHESES BELOW THE LOCATION ID AS "S", "I" or "D". THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION.
4. HISTORICAL DATASET INCLUDES ALL SOIL SAMPLES COLLECTED THROUGH DECEMBER 2007.

ACRONYMS:

AOI	AREA OF INTEREST
AST	ABOVEGROUND STORAGE TANK
CHHSLr	CALIFORNIA HUMAN HEALTH SCREENING LEVEL (RESIDENTIAL)
D	ONE OR MORE SOIL SAMPLES COLLECTED FROM DEEP INTERVAL (>10 ft bgs)
ft bgs	FEET BELOW GROUND SURFACE
I	ONE OR MORE SOIL SAMPLES COLLECTED FROM INTERMEDIATE INTERVAL(>2-10 ft bgs)
mg/kg	MILLIGRAMS PER KILOGRAM
MES	MOBILE EQUIPMENT SHOP
S	ONE OR MORE SOIL SAMPLES COLLECTED FROM SHALLOW INTERVAL (0-2 ft bgs)

LEGEND:

LOCATION TYPE

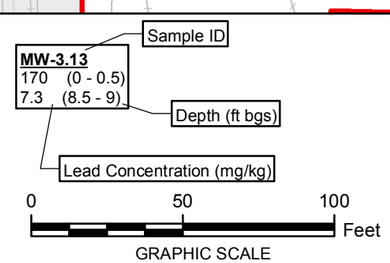
- HISTORICAL SOIL SAMPLE LOCATION
- 2008/2009 SOIL SAMPLE LOCATION

SCREENING RESULT

- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- FORMER STRUCTURE
- EXCAVATION BOUNDARY
- (FORMER) INDUSTRIAL USE

- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- RAIL LINE
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE



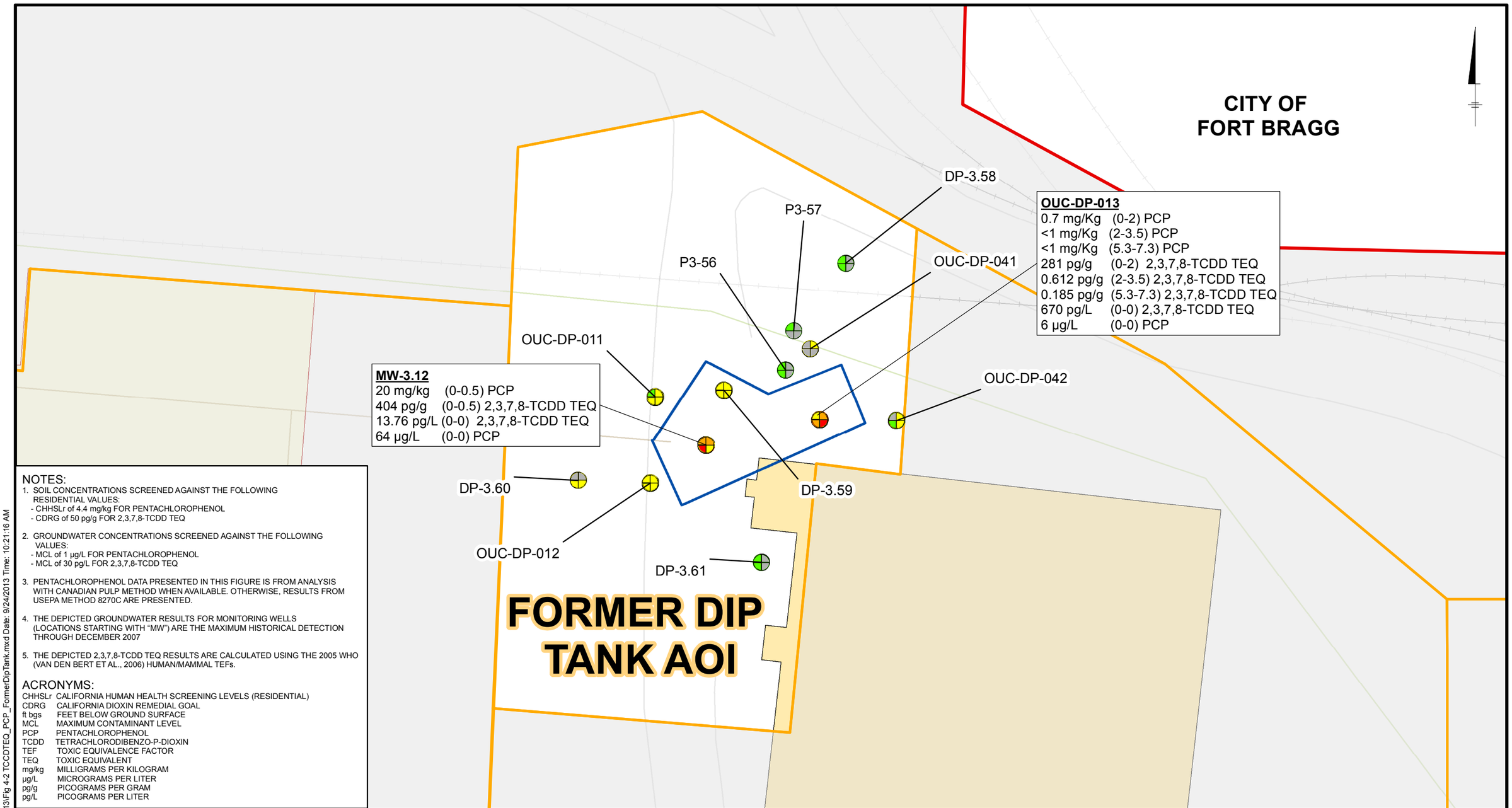
FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

LEAD CONCENTRATIONS IN SOIL AT FORMER AST AND FORMER MES/PILOT STUDY AOIs

ARCADIS

FIGURE 4-1

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 4-1 Lead_Soil_Parcel3_MES_Area_SoilExAlt.mxd Date: 9/24/2013 Time: 10:19:05 AM



NOTES:

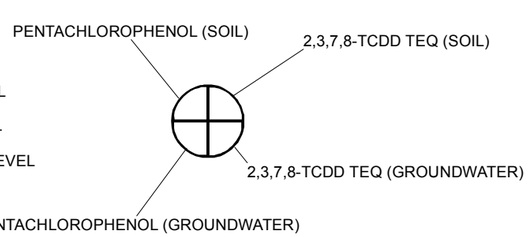
1. SOIL CONCENTRATIONS SCREENED AGAINST THE FOLLOWING RESIDENTIAL VALUES:
   - CHHSLr of 4.4 mg/kg FOR PENTACHLOROPHENOL
   - CDRG of 50 pg/g FOR 2,3,7,8-TCDD TEQ
2. GROUNDWATER CONCENTRATIONS SCREENED AGAINST THE FOLLOWING VALUES:
   - MCL of 1 µg/L FOR PENTACHLOROPHENOL
   - MCL of 30 pg/L FOR 2,3,7,8-TCDD TEQ
3. PENTACHLOROPHENOL DATA PRESENTED IN THIS FIGURE IS FROM ANALYSIS WITH CANADIAN PULP METHOD WHEN AVAILABLE. OTHERWISE, RESULTS FROM USEPA METHOD 8270C ARE PRESENTED.
4. THE DEPICTED GROUNDWATER RESULTS FOR MONITORING WELLS (LOCATIONS STARTING WITH "MW") ARE THE MAXIMUM HISTORICAL DETECTION THROUGH DECEMBER 2007
5. THE DEPICTED 2,3,7,8-TCDD TEQ RESULTS ARE CALCULATED USING THE 2005 WHO (VAN DEN BERT ET AL., 2006) HUMAN/MAMMAL TEFs.

ACRONYMS:

CHHSLr	CALIFORNIA HUMAN HEALTH SCREENING LEVELS (RESIDENTIAL)
CDRG	CALIFORNIA DIOXIN REMEDIAL GOAL
ft bgs	FEET BELOW GROUND SURFACE
MCL	MAXIMUM CONTAMINANT LEVEL
PCP	PENTACHLOROPHENOL
TCDD	TETRACHLORODIBENZO-P-DIOXIN
TEF	TOXIC EQUIVALENCE FACTOR
TEQ	TOXIC EQUIVALENT
mg/kg	MILLIGRAMS PER KILOGRAM
µg/L	MICROGRAMS PER LITER
pg/g	PICOGRAMS PER GRAM
pg/L	PICOGRAMS PER LITER

LEGEND:

- NOT DETECTED
- DETECTED BELOW SCREENING LEVEL
- DETECTED ABOVE SCREENING LEVEL
- DETECTED ABOVE 10X SCREENING LEVEL
- NO DATA AVAILABLE



- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- PENTACHLOROPHENOL PRESUMPTIVE REMEDY AREA
- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINES
- RAIL LINES
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE

Sample ID — Depth in ft bgs (0-0 indicates groundwater)

MW-3.9
0.031 pg/L (0-0) 2,3,7,8-TCDD TEQ
2.9 J µg/L (0-0) PCP

concentration

0 35 70 Feet

GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

PENTACHLOROPHENOL AND 2,3,7,8-TCDD TEQ CONCENTRATIONS IN SOIL AND GROUNDWATER AT THE FORMER DIP TANK AOI

ARCADIS

FIGURE 4-2

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
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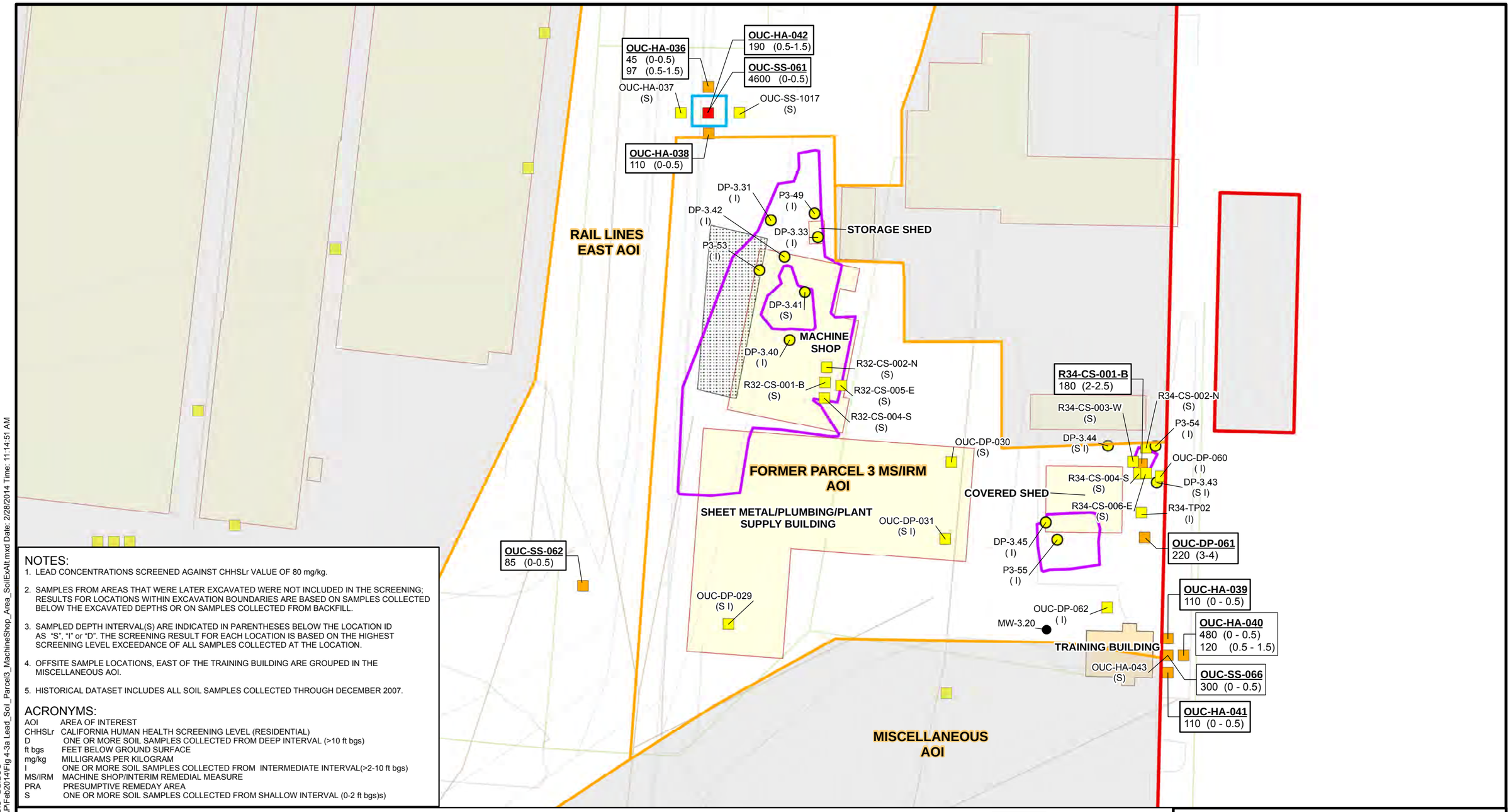


NOTES:

1. LEAD CONCENTRATIONS SCREENED AGAINST CHHSLr VALUE OF 80 mg/kg.
2. SAMPLES FROM AREAS THAT WERE LATER EXCAVATED WERE NOT INCLUDED IN THE SCREENING; RESULTS FOR LOCATIONS WITHIN EXCAVATION BOUNDARIES ARE BASED ON SAMPLES COLLECTED BELOW THE EXCAVATED DEPTHS OR ON SAMPLES COLLECTED FROM BACKFILL.
3. SAMPLED DEPTH INTERVAL(S) ARE INDICATED IN PARENTHESES BELOW THE LOCATION ID AS "S", "I" or "D". THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION.
4. OFFSITE SAMPLE LOCATIONS, EAST OF THE TRAINING BUILDING ARE GROUPED IN THE MISCELLANEOUS AOI.
5. HISTORICAL DATASET INCLUDES ALL SOIL SAMPLES COLLECTED THROUGH DECEMBER 2007.

ACRONYMS:

AOI	AREA OF INTEREST
CHHSLr	CALIFORNIA HUMAN HEALTH SCREENING LEVEL (RESIDENTIAL)
D	ONE OR MORE SOIL SAMPLES COLLECTED FROM DEEP INTERVAL (>10 ft bgs)
ft bgs	FEET BELOW GROUND SURFACE
mg/kg	MILLIGRAMS PER KILOGRAM
I	ONE OR MORE SOIL SAMPLES COLLECTED FROM INTERMEDIATE INTERVAL(>2-10 ft bgs)
MS/IRM	MACHINE SHOP/INTERIM REMEDIAL MEASURE
PRA	PRESUMPTIVE REMEDAY AREA
S	ONE OR MORE SOIL SAMPLES COLLECTED FROM SHALLOW INTERVAL (0-2 ft bgs)s)

LEGEND:

LOCATION TYPE

- HISTORICAL SOIL SAMPLE LOCATION
- 2008/2009 SOIL SAMPLE LOCATION
- MONITORING WELL

SCREENING RESULT

- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- EXCAVATION BOUNDARY
- LEAD PRESUMPTIVE REMEDY AREA
- PREVIOUS GEOPHYSICAL INVESTIGATION
- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- RAIL LINE
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE

Sample ID
OUC-HA-043
300 (0 - 0.5)
17 (0.5 - 1.5)
Depth (ft bgs)
Lead Concentration (mg/kg)

0 60 120 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

LEAD CONCENTRATIONS IN SOIL AT FORMER PARCEL 3 MACHINE SHOP/IRM AOI AND RAIL LINES EAST PRA

ARCADIS

FIGURE 4-3a

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2014\Fig 4-3a Lead_Soil_Parcel3_MachineShop_Area_SoilExAlt.mxd Date: 2/28/2014 Time: 11:14:51 AM

CITY: (DENTECH) DIV/GROUP:(ENV) DB:BGRIFFITH LD: PIC: PM: TM: DATE: 2/28/2014
PROJECT: PATH: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2014\Fig 4-3b BaPTEQSoil_RailLinesEast.mxd

OUC-HA-034
0.12 (0-2)
0.02 (2-3)

OUC-DP-023
0.31 (0-2)
ND (2-4)
ND (5-7)

OUC-HA-033

OUC-HA-035
0.07 (0-2)
0.29 (2-3)

OUC-DP-024
0.04 (0-2)
ND (2-4)
ND (5-7)

P3-66

OUC-SS-061
0.11 (0-0.5)

OUC-HA-036
0.18 (0-0.5)
0.18 (0.5-1.5)

OUC-HA-037
0.10 (0-0.5)
0.01 (0.5-1.5)

OUC-HA-042

OUC-HA-038
0.20 (0-0.5)
0.05 (0.5-1.5)

Rail Lines East AOI

0 80 160
SCALE IN FEET

LEGEND:

LOCATION TYPE
- HISTORICAL SOIL SAMPLE LOCATION
- 2008/2009 SOIL SAMPLE LOCATION

SCREENING RESULT
- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- EXCAVATION BOUNDARY
- (FORMER) INDUSTRIAL USE
- TPH PRESUMPTIVE REMEDY AREA
- LEAD PRESUMPTIVE REMEDY AREA

- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- RAILROAD TRACK
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE

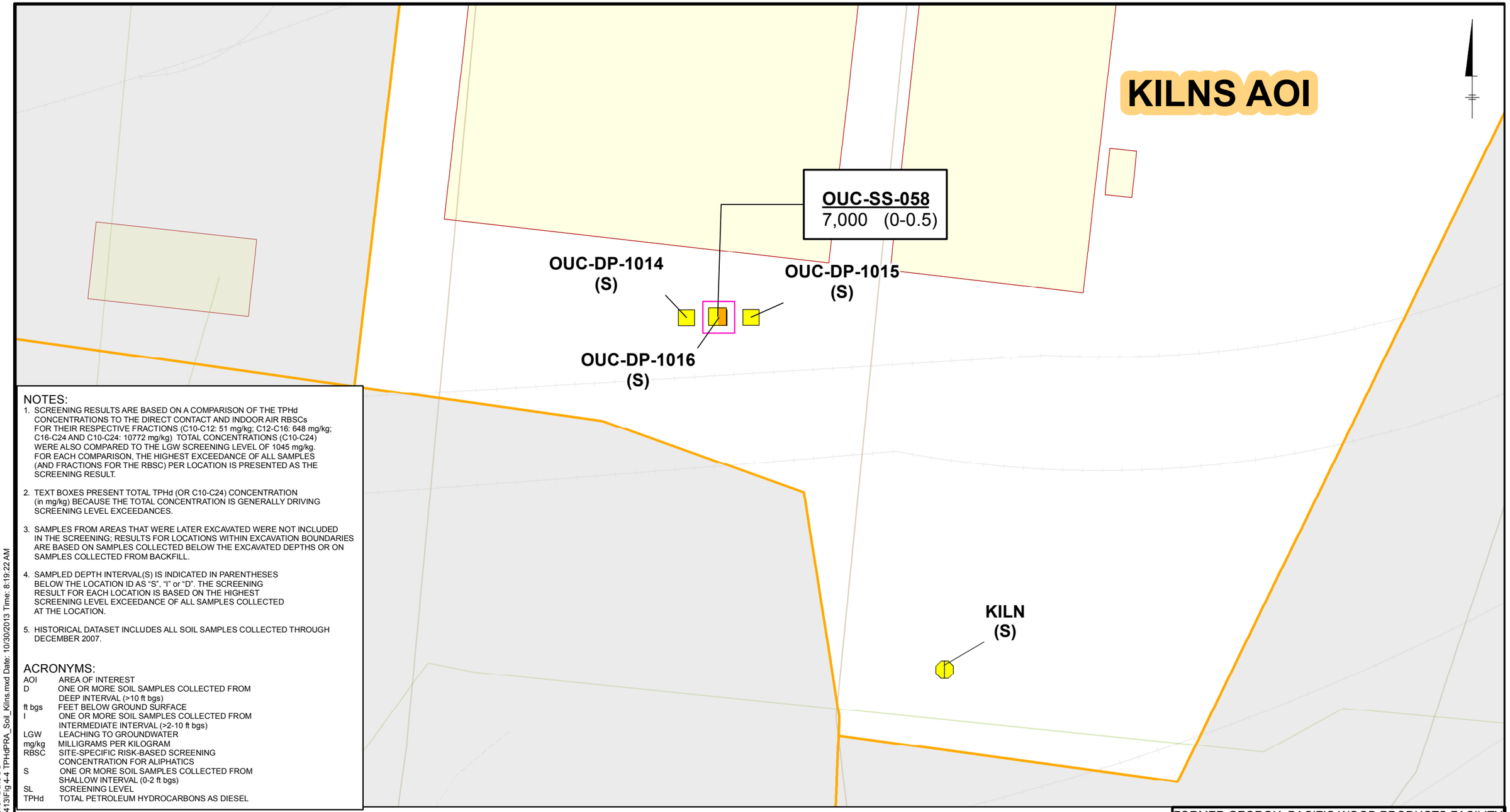
Sample ID: **OUC-SS-058** 0.89 (0-0.5) — Depth (ft bgs)
B(a)P CONCENTRATION IN mg/kg

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

B(a)P TEQ IN SOIL AT RAIL LINES EAST AOI

ARCADIS

FIGURE
4-3b



NOTES:

1. SCREENING RESULTS ARE BASED ON A COMPARISON OF THE TPHd CONCENTRATIONS TO THE DIRECT CONTACT AND INDOOR AIR RBSCs FOR THEIR RESPECTIVE FRACTIONS (C10-C12: 51 mg/kg; C12-C16: 648 mg/kg; C16-C24 AND C10-C24: 10772 mg/kg) TOTAL CONCENTRATIONS (C10-C24) WERE ALSO COMPARED TO THE LGW SCREENING LEVEL OF 1045 mg/kg. FOR EACH COMPARISON, THE HIGHEST EXCEEDANCE OF ALL SAMPLES (AND FRACTIONS FOR THE RBSC) PER LOCATION IS PRESENTED AS THE SCREENING RESULT.
2. TEXT BOXES PRESENT TOTAL TPHd (OR C10-C24) CONCENTRATION (in mg/kg) BECAUSE THE TOTAL CONCENTRATION IS GENERALLY DRIVING SCREENING LEVEL EXCEEDANCES.
3. SAMPLES FROM AREAS THAT WERE LATER EXCAVATED WERE NOT INCLUDED IN THE SCREENING; RESULTS FOR LOCATIONS WITHIN EXCAVATION BOUNDARIES ARE BASED ON SAMPLES COLLECTED BELOW THE EXCAVATED DEPTHS OR ON SAMPLES COLLECTED FROM BACKFILL.
4. SAMPLED DEPTH INTERVAL(S) IS INDICATED IN PARENTHESES BELOW THE LOCATION ID AS "S", "I" or "D". THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION.
5. HISTORICAL DATASET INCLUDES ALL SOIL SAMPLES COLLECTED THROUGH DECEMBER 2007.

ACRONYMS:

AOI	AREA OF INTEREST
D	ONE OR MORE SOIL SAMPLES COLLECTED FROM DEEP INTERVAL (>10 ft bgs)
ft bgs	FEET BELOW GROUND SURFACE
I	ONE OR MORE SOIL SAMPLES COLLECTED FROM INTERMEDIATE INTERVAL (>2-10 ft bgs)
LGW	LEACHING TO GROUNDWATER
mg/kg	MILLIGRAMS PER KILOGRAM
RBSC	SITE-SPECIFIC RISK-BASED SCREENING CONCENTRATION FOR ALIPHATICS
S	ONE OR MORE SOIL SAMPLES COLLECTED FROM SHALLOW INTERVAL (0-2 ft bgs)
SL	SCREENING LEVEL
TPHd	TOTAL PETROLEUM HYDROCARBONS AS DIESEL

LEGEND:

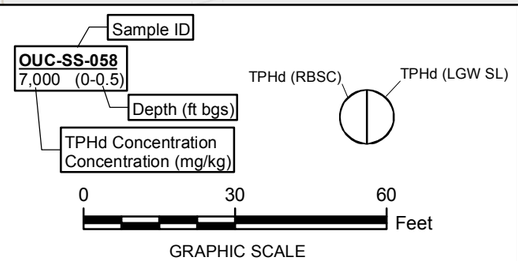
LOCATION TYPE

- HISTORICAL SOIL SAMPLE LOCATION
- 2008/2009 SOIL SAMPLE LOCATION

SCREENING RESULT

- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- (FORMER) INDUSTRIAL USE
- TPH PRESUMPTIVE REMEDY AREA
- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- RAILROAD TRACK
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE



FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

TPHd CONCENTRATIONS IN SOIL AND PRA AT KILNS AOI

ARCADIS

FIGURE 4-4

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
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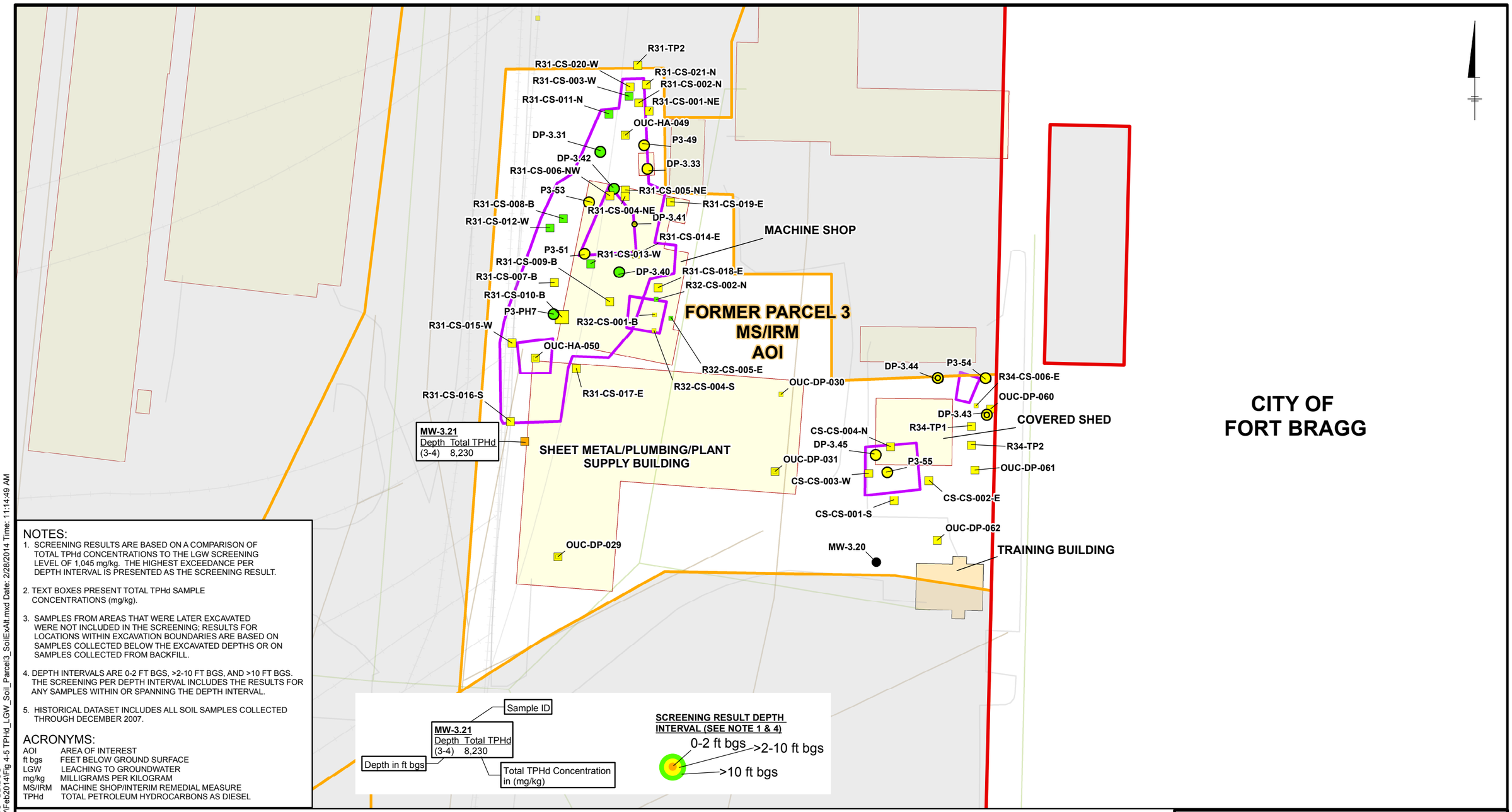

NOTES:

1. SCREENING RESULTS ARE BASED ON A COMPARISON OF TOTAL TPHd CONCENTRATIONS TO THE LGW SCREENING LEVEL OF 1,045 mg/kg. THE HIGHEST EXCEEDANCE PER DEPTH INTERVAL IS PRESENTED AS THE SCREENING RESULT.
2. TEXT BOXES PRESENT TOTAL TPHd SAMPLE CONCENTRATIONS (mg/kg).
3. SAMPLES FROM AREAS THAT WERE LATER EXCAVATED WERE NOT INCLUDED IN THE SCREENING; RESULTS FOR LOCATIONS WITHIN EXCAVATION BOUNDARIES ARE BASED ON SAMPLES COLLECTED BELOW THE EXCAVATED DEPTHS OR ON SAMPLES COLLECTED FROM BACKFILL.
4. DEPTH INTERVALS ARE 0-2 FT BGS, >2-10 FT BGS, AND >10 FT BGS. THE SCREENING PER DEPTH INTERVAL INCLUDES THE RESULTS FOR ANY SAMPLES WITHIN OR SPANNING THE DEPTH INTERVAL.
5. HISTORICAL DATASET INCLUDES ALL SOIL SAMPLES COLLECTED THROUGH DECEMBER 2007.

ACRONYMS:

AOI	AREA OF INTEREST
ft bgs	FEET BELOW GROUND SURFACE
LGW	LEACHING TO GROUNDWATER
mg/kg	MILLIGRAMS PER KILOGRAM
MS/IRM	MACHINE SHOP/INTERIM REMEDIAL MEASURE
TPHd	TOTAL PETROLEUM HYDROCARBONS AS DIESEL

LEGEND:

LOCATION TYPE

- HISTORICAL SOIL SAMPLE LOCATION
- 2008/2009 SOIL SAMPLE LOCATION
- MONITORING WELL

SCREENING RESULT

- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- SITE BOUNDARY
- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- EXCAVATION BOUNDARY

- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- RAIL LINE
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE

0 60 120 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

TPHd CONCENTRATIONS IN SOIL AT FORMER PARCEL 3 MACHINE SHOP/IRM AOI - LGW SCREENING LEVEL COMPARISON

ARCADIS

FIGURE 4-5

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
Path: G:\GIS\FortBragg\MXD\OUC_OUD_RAP\Feb2014\Fig 4-5 TPHd_LGW_Soil_Parcel3_SoilExAlt.mxd Date: 2/28/2014 Time: 11:14:49 AM

FORMER HYDRAULIC OIL STORAGE AREA

FORMER PLANER #2

OUD-HA-075 (S I)

OUD-DP-089 (S I)

OUD-HA-074 (S)

OUD-DP-092 (S I)

OUD-HA-073 (S)

OUD-DP-002 (S I)

OUD-DP-001 (S I)

OUD-DP-094 (S I)

OUD-DP-093 (S I)

OUD-HA-076 (S)

OUD-DP-091 (S I)

OUD-DP-090

Depth	C10-C12	C12-C16	C16-C24
(0-0.5)	0.95 J	3.4	10
(0.5-1.5)	0.49 J	3.1	11
(4-5)	3300	11000	22000
(5-6)	0.50 J	1.6	4.6

NOTES:

1. TPHd CONCENTRATIONS SCREENED AGAINST HIGHEST EXCEEDENCE OF RBSCs (DIRECT CONTACT AND INDOOR AIR PATHWAY) FOR THEIR RESPECTIVE FRACTIONS: C10-C12: 51 mg/kg; C12-C16: 648 mg/kg; C16-C24 AND C10-C24: 10772 mg/kg; AND THE LGW CRITERIA FOR TOTAL TPHd (1045 mg/kg).
2. TEXT BOXES PRESENT C10-C12, C12-C16 AND C16-C24 SAMPLE CONCENTRATIONS (in mg/kg) BECAUSE VARIOUS FRACTIONS ARE DRIVING SCREENING LEVEL EXCEEDANCES. C10-C24 IS PRESENTED FOR HISTORICAL SAMPLES (DATA THROUGH DECEMBER 2007) WHERE FRACTION DATA WAS NOT AVAILABLE.
3. DATA FOR EXCAVATED SAMPLES ARE NOT PRESENTED.
4. SAMPLED DEPTH INTERVAL(S) IS INDICATED IN PARENTHESES BELOW THE LOCATION ID AS "S", "I" or "D". THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION.

ACRONYMS:

AOI	AREA OF INTEREST
D	ONE OR MORE SOIL SAMPLES COLLECTED FROM DEEP INTERVAL (>10 ft bgs)
ft bgs	FEET BELOW GROUND SURFACE
I	ONE OR MORE SOIL SAMPLES COLLECTED FROM INTERMEDIATE INTERVAL (>2-10 ft bgs)
LGW	LEACHING TO GROUNDWATER
mg/kg	MILLIGRAMS PER KILOGRAM
RBSC	SITE-SPECIFIC RISK-BASED SCREENING CONCENTRATION FOR ALIPHATICS
S	ONE OR MORE SOIL SAMPLES COLLECTED FROM SHALLOW INTERVAL (0-2 ft bgs)
SL	SCREENING LEVEL
TPHd	TOTAL PETROLEUM HYDROCARBONS AS DIESEL

LEGEND:

LOCATION TYPE

- 2008/2009 SOIL SAMPLE LOCATION

SCREENING RESULT

- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- FORMER STRUCTURE
- (FORMER) INDUSTRIAL USE
- TPH PRESUMPTIVE REMEDY AREA
- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE

Sample ID: **OUD-DP-068**
310 (0-0.5) — Depth in ft bgs
TPHd (C16-C24) Concentration in mg/kg
TPHd (RBSC) / TPHd (LGW SL)

0 30 60 Feet

GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

TPHd CONCENTRATIONS IN SOIL AND PRA AT PLANER #2 AOI

ARCADIS

FIGURE 4-6

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
Path: I:\FortBragg\MXD\OUC_OUD_RAP\Fig 4-6 TPHd_PRA_Planer#2.mxd Date: 7/8/2013 Time: 3:42:37 PM

055

OUD-DP-080
(S I)

OUD-DP-079
(S I)

OUD-DP-018

Depth	C10-C12	C12-C16	C16-C24
(0.5-1.5)	2.9	50	300
(1.5-2.5)	1.9	49	280
(5-6)	0.37	2.1	8.8
(9-10)	690	3900	4500

DP-6.22

Depth	C10-C12	C12-C16	C16-C24
(0-0.5)	<1	4.9	34
(4-4.5)	77	560	930

OUD-DP-019
(S I)

OUD-DP-028
(S I)

OUD-DP-029
(S I)

OUD-DP-017
(S I)

OUD-DP-020
(S I)

MW-6.2
(S I)

P6-13
(S)

SHIPPING OFFICE

OUD-DP-013
(S I)

P6-14

Depth	C10-C24
(0.5-1)	1100

OUD-DP-078
(S I)

DP-6.18
(S I)

OUD-DP-014
(S I)

PIT SOIL

Depth	C10-C12	C12-C16	C16-C24
(5-5.5)	560	2100	2000

FORMER #8
FIBER PLANT AND
STORAGE AREA

P6-11
(S)

DP-6.17
(S I)

OUD-HA-013
(S)

OUD-DP-015
(S I)

DP-6.19
(S I)

DP-6.21
(S I)

DP-6.20
(S)

FORMER #8
FIBER PLANT
WAREHOUSE AND
VEHICLE MAINTENANCE
SHOP AREA

OUD-DP-016
(S I)

P6-12

Depth	C10-C24
(0-0.5)	1200 HY
(2.5-3)	4 HYb

OUD-HA-011
(S)

NOTES:
1. TPHd CONCENTRATIONS SCREENED AGAINST HIGHEST EXCEEDENCE OF RBSCs (DIRECT CONTACT AND INDOOR AIR PATHWAY) FOR THEIR RESPECTIVE FRACTIONS: C10-C12: 51 mg/kg; C12-C16: 648 mg/kg; C16-C24 AND C10-C24: 10772 mg/kg; AND THE LGW CRITERIA FOR TOTAL TPHd (1045 mg/kg).
2. TEXT BOXES PRESENT C10-C12, C12-C16 AND C16-C24 SAMPLE CONCENTRATIONS (in mg/kg) BECAUSE VARIOUS FRACTIONS ARE DRIVING SCREENING LEVEL EXCEEDANCES. C10-C24 IS PRESENTED FOR HISTORICAL SAMPLES (DATA THROUGH DECEMBER 2007) WHERE FRACTION DATA WAS NOT AVAILABLE.
3. DATA FOR EXCAVATED SAMPLES ARE NOT PRESENTED.
4. SAMPLED DEPTH INTERVAL(S) IS INDICATED IN PARENTHESES BELOW THE LOCATION ID AS "S", "I" or "D". THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION.

ACRONYMS:

AOI	AREA OF INTEREST
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ft bgs	FEET BELOW GROUND SURFACE
I	ONE OR MORE SOIL SAMPLES COLLECTED FROM INTERMEDIATE INTERVAL (>2-10 ft bgs)
LGW	LEACHING TO GROUNDWATER
mg/kg	MILLIGRAMS PER KILOGRAM
RBSC	SITE-SPECIFIC RISK-BASED SCREENING CONCENTRATION FOR ALIPHATICS
S	ONE OR MORE SOIL SAMPLES COLLECTED FROM SHALLOW INTERVAL (0-2 ft bgs)
SL	SCREENING LEVEL
TPHd	TOTAL PETROLEUM HYDROCARBONS AS DIESEL

LEGEND:

LOCATION TYPE
- HISTORICAL SOIL SAMPLE LOCATION
- 2008/2009 SOIL SAMPLE LOCATION

SCREENING RESULT
- NOT DETECTED
- DETECTED ≤ BELOW SCREENING LEVEL
- DETECTED > SCREENING LEVEL
- DETECTED > 10 X SCREENING LEVEL

- AOI BOUNDARY
- OTHER OPERABLE UNITS/AOIs
- STRUCTURE
- (FORMER) INDUSTRIAL USE
- PREVIOUS GEOPHYSICAL INVESTIGATION
- PAVED ROADWAY
- UNPAVED ROADWAY
- FORMER RAIL LINE
- PLANT DRAIN SYSTEM LINE
- SANITARY SEWER LINE
- FORMER TRANSFORMER LOCATION (APPROXIMATE)

Sample ID: **OUD-DP-068** 310 (0-0.5) — Depth in ft bgs
TPHd (C16-C24) Concentration in mg/kg
TPHd (RBSC) / TPHd (LGW SL)

0 50 100 Feet
GRAPHIC SCALE

FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

OPERABLE UNITS C AND D REMEDIAL ACTION PLAN

TPHd CONCENTRATIONS IN SOIL
AT FORMER SHIPPING OFFICE/TRUCK SHOP AOI

ARCADIS

FIGURE
4-7

CITY: Highlands Ranch DIV/GROUP: AIT GIS DB:BCG
Path: I:\FortBragg\MXD\OUC_OUD_RAP\092413\Fig 4-7 TPHd_FrmShippingOffice_Soil.mxd Date: 10/30/2013 Time: 8:18:19 AM

Appendix A

Administrative Record List

Appendix A
Administrative Record

Operable Units C and D Remedial Action Plane
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Date	Author	Receiver	Title of Document
1962	Union Lumber Company	--	Miscellaneous Site Maps of the Fort Bragg Sawmill (only partial copies of originals were available)
06/1982	California Department of Water Resources	Public	Mendocino County Coastal Ground Water Study. June.
10/1988	United States Environmental Protection Agency	Public	Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) under CERCLA. Report No. EPA/540/G-89/004.
1995	Department of Toxic Substances Control	Public	Remedial Action Plan Policy, DTSC Guidance Document No. EO-95-007-PP.
02/1995	Kennedy/Jenks Consultants	North Coast Regional Water Quality Control Board	Limited Soil and Groundwater Investigation Report. Prepared for Georgia-Pacific Sawmill Facility, Fort Bragg, California
04/01/1998	TRC Companies Inc.	Georgia-Pacific Corporation	Letter from Mr. Mohammad Bazargani, Project Manager, and Dr. Jonathan Scheiner, Senior Project Scientist, to Mr. Larry L. Lake, Environmental Site Coordinator, Georgia-Pacific Corporation, re: Report of Findings, Preliminary Investigation Demolition Support Services, Georgia-Pacific Fort Bragg Facility, Fort Bragg, California. Project No. 97-734
02/2003	Hygenics Environmental Services	North Coast Regional Water Quality Control Board	Asbestos and Lead Based Paint Inspection Report, Georgia Pacific Site, 90 West Redwood Avenue, Fort Bragg, California
03/2003	TRC Companies Inc.	North Coast Regional Water Quality Control Board	Archaeological Survey of the Georgia Pacific Lumber Mill Fort Bragg, California
03/2004	TRC Companies Inc.	North Coast Regional Water Quality Control Board	Phase I Environmental Site Assessment, Georgia-Pacific California Wood Products Manufacturing Division, 90 West Redwood Avenue, Fort Bragg, California
05/14/2004	TRC Companies Inc.	North Coast Regional Water Quality Control Board	Phase II Environmental Site Assessment, Georgia-Pacific, 90 West Redwood Avenue, Fort Bragg, California
06/2004	BACE Geotechnical	North Coast Regional Water Quality Control Board	Engineering Geologic Reconnaissance Report, Planned Blufftop Access Trail, Georgia-Pacific Property, Fort Bragg, California
10/2004	TRC Companies Inc.	North Coast Regional Water Quality Control Board	Additional Site Assessment Report, Georgia Pacific Former Sawmill Site, 90 West Redwood Avenue, Fort Bragg, California
11/03/2004	TRC Companies Inc.	North Coast Regional Water Quality Control Board	Letter from Mr. Mohammad Bazargani, P.E., Senior Associate, and Mr. Steve Kemnitz, Project Scientist, to Mr. Craig Hunt, California Regional Water Quality Control Board, North Coast Region, re: Groundwater Monitoring Report, Third Quarter 2004, Georgia Pacific Former Sawmill Site, 90 West Redwood Avenue, Fort Bragg, California. Project No. 41-0419-13
01/2005	California Environmental Protection Agency	Public	Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties.
06/2005	Acton•Mickelson•Environmental, Inc.	North Coast Regional Water Quality Control Board	Work Plan for Additional Site Assessment, Georgia-Pacific California Wood Products Manufacturing Facility, 90 West Redwood Avenue, Fort Bragg, California.
02/2006	Blackburn Consulting, Inc.	North Coast Regional Water Quality Control Board	Letter from Mr. Rick Sowers, PE, CEG, Senior Project Manager, and Mr. Tom Blackburn, GE, Principal, to Mr. John Mattey, Acton•Mickelson•Environmental, Inc., re: Geotechnical Evaluation, Bearing Support for Heavy Equipment Loads, Georgia-Pacific Mill Site, Fort Bragg, California
07/2006	Acton•Mickelson•Environmental, Inc.	North Coast Regional Water Quality Control Board	Dioxin Sampling and Analysis Report, Georgia-Pacific California Wood Products Manufacturing Facility, 90 West Redwood Avenue, Fort Bragg, California
08/2006	Acton•Mickelson•Environmental, Inc.	North Coast Regional Water Quality Control Board	Data Transmittal Report, Georgia-Pacific California Wood Products Manufacturing Facility, 90 West Redwood Avenue, Fort Bragg, California
09/2006	Acton•Mickelson•Environmental, Inc.	North Coast Regional Water Quality Control Board	Soil and Water Sampling, Area Southwest of Planer #2, Former Georgia-Pacific California Wood Products Manufacturing Facility, Fort Bragg, California
09/22/2006	Department of Toxic Substances Control	Georgia-Pacific Corporation	Review of revised Shed Stockpile Characterization Data Memorandum
09/25/2006	Department of Toxic Substances Control	Georgia-Pacific Corporation	Receipt of Ash Pile Work Removal and Disposal Work Plan

Appendix A
Administrative Record

Operable Units C and D Remedial Action Plane
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Date	Author	Receiver	Title of Document
12/2006	Blasland, Bouk & Lee, Inc.	Department of Toxic Substances Control	Current Conditions Report, Georgia-Pacific Wood Products Manufacturing Facility, Fort Bragg, California
03/2007	ARCADIS BBL	Department of Toxic Substances Control	Response to Agency Comments on the Current Conditions Report, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
06/2007	ARCADIS BBL	Department of Toxic Substances Control	Ex-Situ Bioremediation Pilot Study. Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
09/2007	ARCADIS BBL	Department of Toxic Substances Control	Quality and Addurance Protection Plan, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
01/2008-08/2008	Johnson, P. and D. Heitmeyer	ARCADIS U.S., Inc.	Personal communications with Judith Nedoff, ARCADIS
05/2008	ARCADIS BBL	Department of Toxic Substances Control	Site-Wide Risk Assessment Work Plan, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
06/2008	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Interim Action Remedial Action Plan, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
01/2008	Department of Toxic Substances Control	ARCADIS BBL	Review of Site Investigation Work Plan, Operable Unit D
01/2009	ARCADIS U.S., Inc.	Mendecino County Department of Environmental Health	Removal of Small Underground Storage Tank Near Planer #2 Building, Former Georgia-Pacific Wood Products Manufacturing Facility, Fort Bragg, California
07/2009	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Site Investigation Work Plan, Operable Unit D, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
08/14/2009	Stantec Consulting Corporation	Craig Hunt, California Regional Water Quality Control Board, North Coast Region	Letter from Caron R. Stolleti, Project Scientist, and Ed Simonis, PG, Senior Geologist, to Mr. Craig Hunt, California Regional Water Quality Control Board, North Coast Region re: Work Plan for Additional Groundwater Investigation and Well Installation, 76 Service Station No. 2211, 225 North Main Street, Fort Bragg, California
09/08/2009	Department of Toxic Substances Control	Georgia-Pacific Corporation	Georgia-Pacific, Site Investigation Work Plan, Operable Unit D, Dated July, 2009
01/2010	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Site Investigation Report Operable Units C and D, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
04/2010	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Interim Action Completion Reports, Operable Units C & E, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
2011	City of Fort Bragg	Public	Mill Site Specific Plan.
2011	Environmental Resources Management	Department of Toxic Substances Control	RCRA Facility Investigation Work Plan – Skunk Train, Fort Bragg, CA
01/2011	Department of Toxic Substances Control	Georgia-Pacific Corporation	Completion of OU C and D Follow-on investigation field work.
02/2011	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Remedial Investigation Operable Units C and D, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
03/18/2011	Department of Toxic Substances Control	Georgia-Pacific Corporation	Final In-Situ Chemical Oxidation Pilot Study Work Plan, Planer #2 Area of Interest (AOI), Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
04/07/2011	Department of Toxic Substances Control	Georgia-Pacific Corporation	Summary of Phase I Treatability Study, In-Situ Chemical Oxidation Pilot Study, Planer #2 Area of Interest, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California, Dated March 29, 2011
04/12/2011	Department of Toxic Substances Control	Georgia-Pacific Corporation	Approval of Revised Remedial Investigation Operable Units C and D, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California, Dated February 2011
01/2012	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Feasibility Study Operable Units C and D, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
02/17/2012	Department of Toxic Substances Control	Georgia-Pacific Corporation	Final Feasibility Study, Operable Units C and D, Dated January, 2012, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
11/2012	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Operable Units C/D Data Gaps Soil Investigation Results, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
12/2012	Department of Toxic Substances Control	Department of Toxic Substances Control	Georgia-Pacific OU-C/D data gaps investigation results

Appendix A
Administrative Record

Operable Units C and D Remedial Action Plane
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Date	Author	Receiver	Title of Document
2013	Environmental Resources Management	Department of Toxic Substances Control	RCRA Facility Investigation Results
03/2013	ARCADIS U.S., Inc.	Department of Toxic Substances Control	Monitored Natural Attenuation Technical Report, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
04/17/2013	Department of Toxic Substances Control	Georgia-Pacific Corporation	Monitored Natural Attenuation Technical Report, Dated March 7, 2013, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California
undated	TRC Companies Inc.	The City of Fort Bragg	Phase II Determination of Significance Standing Structures Georgia Pacific Lumber Mill Fort Bragg, California. Draft Report.
undated	TRC Companies Inc.	The City of Fort Bragg	Site Specific Treatment Plan for Cultural Resources. Draft Report.

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Appendix B

Risk Based Target Level (RBTL) Development

Introduction

As described in Section 3.3 of the Operable Units C and D (OU-C and OU-D) Remedial Action Plan, risk-based target levels (RBTLs) for the protection of potential human exposures to soil were derived for the identified compounds of concern (COC). These chemical-specific remedial action goals will be used to evaluate remedial action effectiveness following implementation in OU-C and OU-D. Consistent with DTSC guidance for risk-based cleanups, chemical-specific remedial action goals will be applied based on a conservative estimate of the average concentration (e.g., 95% Upper Confidence Limit on the mean) of a COC across an exposure area. These remedial action goals are calculated using parameters specific to the receptors and conditions in these OU-C and OU-D AOIs.

Goals for soil include values for residential, commercial/industrial, construction, and utility workers for each COC within the OU-C AOIs. Recreational goals were also included for use in OU-D.

The approach for calculating site-specific RBTLs is provided below for human receptors. RBTLs were calculated for dioxins/furans (as tetrachlorodibenzo-*p*-dioxin toxic equivalents [TCDD TEQs]) and pentachlorophenol because both constituents were identified in presumptive remedy areas (PRAs). An RBTL was calculated for lead because a baseline risk due to lead exposure was identified in areas subject to planned land use controls (LUCs). Additionally, an RBTL was calculated for benzo(a)pyrene based on its presence above screening levels at individual locations in areas subject to LUCs.

RBTLs are reflective of overall site risk and should be compared to post-remedy exposure estimates (i.e. 95% Upper Confidence Limits) and not individual samples to evaluate whether post-remedy conditions are protective of human receptors.

Human Health

Receptors and Exposure Intervals

RBTLs were developed for the human health receptors identified in the Site-Wide Risk Assessment Work Plan (RAWP) (ARCADIS BBL 2008): resident (adult/child), construction worker, utility/trench worker, occasional (adult/child) recreator, and passive (adult) recreator. In addition, a commercial/industrial worker was included to reflect current site activities. Human receptors in terrestrial areas were assumed to be exposed to constituents of concern (COCs) via the dermal, ingestion, and dust inhalation exposure pathways. It was assumed that human receptors could potentially come into contact with soil located between 0 and 2 feet below grade. It was also assumed that during future subsurface work, construction workers and utility workers may also come into contact with soil located up to 10 feet below grade in terrestrial areas.

Exposure Parameters

Exposure parameters used to develop RBTLs are consistent with those presented in the approved Site-Wide RAWP (ARCADIS BBL 2008). Table 1 presents exposure parameters selected for each human receptor.

Toxicity Values

Toxicity values selected for use in the human health RBTL equations were selected in accordance with the hierarchy presented in the approved Site-Wide RAWP (ARCADIS BBL 2008). Table 2 presents toxicity values used to develop the human health RBTLs.

RBTL Calculation

Exposure parameters and toxicity values were used to back-calculate the soil concentration that would result in human health cancer risks equal to $1x10^{-6}$, and noncancer cumulative hazard equal to 1. The estimated human health RBTLs for benzo(a)pyrene is based on potential cancer and non-cancer effects for the human receptors outlined above. The lower of the cancer and non-cancer endpoints for each COC was selected as the final RBTL for each chemical and receptor. The lowest RBTL was then selected as the primary human health RBTL, as this value is protective of each of the evaluated receptors. Consistent with methods outlined by United States Environmental Protection Agency (USEPA) (1991 and 2004) and in the Site-Wide RAWP (ARCADIS BBL 2008), Cancer-based RBTLs and non-cancer based RBTLs were estimated using the equations presented below. RBTLs are presented in Table 3.

$$C(mg/kg) = \frac{TR \times AT_c}{EF\left[\left(\frac{IFS \times CSF_o}{10^6\, mg/kg}\right) + \left(\frac{SFS \times ABS \times CSF_o}{10^6\, mg/kg}\right) + \left(\frac{InhF \times CSF_i}{PEF}\right)\right]}$$

Where:

C = Soil concentration (equivalent to the RBTL)

TR = Target lifetime excess cancer risk (1×10^{-6} unitless)

AT_c = Averaging time for carcinogens

EF = Exposure frequency

IFS = Soil ingestion factor: $\frac{ED \times IRS}{BW}$ (milligrams per year/kilograms per day [mg-yr/kg-day])
where ED = Exposure duration (years); IRS = Incidental soil ingestion rate (mg/day); and BW = Body weight (kg)

CSF_o = Oral cancer slope factor (milligrams per kilogram per day [mg/kg-day])$^{-1}$

SFS = Dermal exposure factor: $\frac{ED \times AF \times SA}{BW}$ (mg-yr/kg-day) where ED = Exposure duration (years); AF = Skin adherence factor (mg/cm^2-day); SA = Exposed skin surface area (cm^2); and BW = Body weight (kg)

ABS = Absorption factor (unitless)

InhF = Inhalation exposure factor: $\frac{ED \times IRA}{BW}$ (mg-yr/kg-day) where ED = Exposure duration (years); IRA = Air inhalation rate (m^3/day); and BW = Body weight (kg)

CSF_i = Inhalation cancer slope factor (mg/kg-day)$^{-1}$

PEF = Particulate emission factor (m^3/kg).

Lead risks for soil were evaluated using the USEPA Adult Lead Methodology Spreadsheet (USEPA 2003 and 2007) for adult receptors and the California Environmental Protection Agency (CalEPA) DTSC LeadSpread 8 model (DTSC 2011) for child receptors (occasional recreator). Lead hazards were evaluated only for exposure units in which the maximum detected lead concentration exceeded the site-specific background concentration (ARCADIS 2011). In accordance with recent CalEPA guidance (CalEPA, 2009; DTSC 2010), the lead evaluation uses a threshold of an increase in blood-lead levels of 1 micrograms per deciliter (µg/dL) from baseline conditions. Lead health-based screening levels for soil are presented in Section 9.6 of the approved OU-C and OU-D Remedial Investigation Report (ARCADIS 2011). Lead RBTLs are presented in Table 3.

ARCADIS BBL. 2008. Site-Wide Risk Assessment Work Plan. Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Revised June 2008.

ARCADIS U.S., Inc. 2011a. Remedial Investigation Report, Operable Units C and D, Former Georgia-Pacific Wood Products Facility, Fort Bragg California. Prepared for Georgia-Pacific LLC. ARCADIS U.S., Inc. April 2010. Revised March.

USEPA. 1991. Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). Interim. Publication 9285.7-01B. EPA 540/R-92/003. U.S. Environmental Protection Agency. December.

USEPA. 2003. Adult Lead Methodology (ALM) Spreadsheet. U.S. Environmental Protection Agency, Technical Review Workgroup for Lead, Adult Lead Committee. Available online at: http://www.epa.gov/superfund/programs/ lead/ products.htm

USEPA. 2004. Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment. EPA/540/R/99/005. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response.

USEPA. 2007. Ecological Screening Levels (Eco-SSLs). Updated. U.S. Environmental Protection Agency, Available at: http://www.epa.gov/ecotox/ecossl/.

Table 1
Human Receptor Exposure Parameters
Risk-Based Target Level Development
Appendix B

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Parameter	Symbol	Units	Residential		Commercial / Industrial Worker	Construction Worker	Utility / Trench Worker	Recreational Visitor		
			Child	Adult				Passive Recreator		Frequent User
			RME	RME	RME	RME	RME	Child	Adult	Adult
General Factors										
Averaging Time (cancer)	ATc	days	25,550 [a,b]	25,550 [a,b]	25,550 [a,b]	25,550 [a,b]	25,550 [a,b]	25,550 [a,b]	25,550 [a,c]	25,550 [a,c]
Averaging Time (non-cancer)	ATnc	days	2,190 [a,b]	8,760 [a,b]	9,125 [a,b]	365 [a,b]	2,555 [a,b]	2,190 [a,c]	8,760 [a,c]	8,760 [a,c]
Body Weight	BW	kg	15 [b,d]	70 [b,c,d]	70 [b,c,g,h]	70 [b,c,g,h]	70 [b,c,g,h]	15 [b,c,f]	70 [c,d]	70 [c,d]
Exposure Frequency	EF	days/year	350 [b,c,d]	350 [b,c,d]	250 [b,c,g,h]	250 [g,h]	20 [PJ]	50 [PJ,6]	50 [PJ,6]	200 [PJ,7]
Exposure Time	ET	hours/day	24 [c,g]	24 [c,g]	8 [c]	8 [c]	8 [c]	1 [PJ,7]	1 [PJ,6]	1 [PJ,6]
Exposure Duration	ED	years	6 [b,c,d]	24 [b,c,d]	25 [b,c,g,h]	1 [j]	7 [i]	6 [PJ,6]	24 [PJ,6]	30 [PJ,6]
Groundwater - Ingestion (Oral)										
Groundwater Ingestion Rate	IRgw	L/day	1 [b,d]	2 [b,c]	2 [j]	--	--	--	--	--
Groundwater - Dermal Contact										
Exposed Skin Surface Area	SSAgw	cm²	6,600 [d]	18,000 [d]	--	2,500 [d,1]	2,500 [d,1]	--	--	--
Exposure Time	ETgw	hours/day	1.0 [d]	0.58 [d]	--	1 [PJ,2]	1 [PJ,2]	--	--	--
Surface Water - Dermal Contact										
Exposed Skin Surface Area	SA	cm²	--	--	--	--	--	750 [PJ,3]	3,000 [PJ,3]	--
Soil - Ingestion (Oral)										
Incidental Soil Ingestion Rate	IRs	mg/day	100 [e]	50 [g]	100 [j]	330 [f]	330 [f]	50 [PJ,4]	25 [PJ,4]	25 [PJ,4]
Soil - Dermal Contact										
Exposed Skin Surface Area	SA	cm²	2,800 [d]	5,700 [d]	3,300 [d,9]	2,500 [d,1]	2,500 [d,1]	750 [PJ,3]	3,000 [PJ,3]	3,000 [PJ,3]
Skin Adherence Factor	AF	mg/cm²-day	0.04 [d]	0.01 [d]	0.2 [d]	0.8 [j]	0.8 [j]	0.2 [f]	0.07 [f]	0.2 [PJ,8]
Soil - Inhalation of Dust										
Particulate Emission Factor	PEF	m³/kg	1.32E+09 [h]	1.32E+09 [h]	1.32E+09 [h]	1.00E+06 [j]	1.00E+06 [j]	1.32E+09 [h]	1.32E+09 [h]	1.32E+09 [h]
Breathing Rate	BR	m³/day	8.3 [e]	20 [g]	13.6	20	20	1.2	1.6	3
Breathing Rate per hour	BR	m³/hour	0.35	0.83	1.7 [e, j]	2.5 [e]	2.5 [e]	1.2 [e,6]	1.6 [e,6]	3 [PJ,8]

Notes:

a. The averaging period for cancer risk is the expected lifespan of 70 years expressed in days. The averaging period for non-cancer risk is the
b. USEPA (1989) Risk Assessment Guidance for Superfund.
c. USEPA (1991b) Standard Default Exposure Factors.
d. USEPA (2004c) Risk Assessment Guidance for Superfund, Vol I, Part E, Supplemental Guidance Dermal Risk Assessment.
e. USEPA (1997a) Exposure Factors Handbook.
f. USEPA (2002b) Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.
g. CalEPA (1992) Supplemental Guidance for Human Health Multimedia Risk Assessment of Hazardous Waste Sites and Permitted Facilities.
h. USEPA (2004a) Region 9 Preliminary Remediation Goals 2004 Update (alternatively, site specific data may be used to modify this value).
i. CalEPA (2000) Air Toxics Hot Spots Program Risk Assessment Guidelines, Part IV Technical Support Document for Exposure Assessment
j. CalEPA (2005a) Note: Recommended Department of Toxic Substances Control (California) Default Exposure Factors for Use in Risk Assessment at California Military Facilities.

Table 1
Human Receptor Exposure Parameters
Risk-Based Target Level Development
Appendix B

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Notes (continued):

1. Based on sum of typically exposed body parts of workers: face, forearms, and hands (surface area values are the average between male and female [50th percentile] from USEPA, 2004a). For the CTE scenario, assume long sleeve shirts, therefore subtracting contribution from forearms.
2. Based on assumption that workers will exit excavation area for pit dewatering if groundwater collects in any abundance.
3. Based on the assumption of a jogger/walker scenario, the values for exposed skin surface area for adult and child were calculated using the average of two clothing scenarios recommended by USEPA (2004c): Central tendency mid range (only face and hands exposed [1306 cm^2] and (head, hands, forearms, and lower legs [4849 cm^2] (Exposure Factors Handbook [EFH] 1997a). Due to significant temperature changes seasonally, the jogger/walker is assumed to be wearing short-sleeve shirt and shorts during warmer seasons (spring and summer) and long-sleeve shirt and pants during cooler seasons (fall and winter). The child exposed skin surface area is based on the adult surface area
4. The soil ingestion rate is based on 50% of the recommended USEPA (1997a) values for residential child and adult. Based on studies by Calabrese et al., (1989; as cited in USEPA 1997a) soil accounts for about 50% of the daily ingestion rate, while the other 50% is attributed to indoor house dust; therefore, for the recreational receptors, the ingestion rate was divided by half to account for only the outdoor exposure at the site. Furthermore, this value is considered conservative given that it is based on a 24-hour worker is onsite 5 days per week compared to the resident, which is 7 days per week, therefore using the residential ingestion rate is considered a conservative estimate for the worker receptor.
in moderate activities such as walking.
7. Frequent User (Adult joggers/walkers) are expected to visit the site 1 hour per day and up to 4 days per week for 30 years.
8. Department of Toxic Substances Control (California) recommended value per Comments dated September 14, 2007.
and forearms (average of male and female for 50 percentile from Table 6-2 and 6-3 of USEPA, 1997a). For the CTE scenario, long-sleeve shirts are assumed, therefore subtracting the contribution from forearms.
10. The CTE scenario assumes light activities for commercial/industrial worker and moderate activities for construction and trench/utility workers as presented in Table 5-23 (USEPA, 1997a).

Cal/EPA = California Environmental Protection
cm^2 = squared centimeter(s)
CTE = central tendency exposure
EFH = Exposure Factors Handbook
kg = kilogram(s)
L = liter
m^3 = cubic meter(s)
mg = milligram(s)
PJ = professional judgment (see text)
RME = reasonable maximum exposure
USEPA = U.S. Environmental Protection Agency

Table 2
Human Receptor Exposure Parameters
Risk-Based Target Level Development
Appendix B

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Constituent		ABSd (unitless)	[ref]	Oral CSF[a] (mg/kg/day)$^{-1}$	[ref]	Adjustment Factor[b]	[ref]	Dermal CSF (mg/kg/day)$^{-1}$	[ref]	Inhalation Unit Risk[a] (IUR) (mg/m^3)$^{-1}$	[ref]	Oral RfD (mg/kg/day)[a] Subchronic	[ref]	Chronic	[ref]	Adjustment Factor[b]	[ref]	Dermal RfD (mg/kg/day)[b] Subchronic	Chronic	Inhalation RfC (mg/m^3)[a] Subchronic	[ref]	Chronic	[ref]
Lead	c	0.01	*Cal/EPA*	NA	*CAL-1*	1	*RAGS E*	NA	*CAL-1*	NA		NA		NA		1	*RAGS E*	NA	NA	NA		NA	
Pentachlorophenol		0.25	*Cal/EPA*	8.1E-02	*CAL-1*	1	*RAGS E*	8.10E-02	*CAL-1*	8.30E+01	*CAL-2*	3.0E-02	*H*	5.0E-03	*I-RSL*	1	*RAGS E*	3.0E-02	5.0E-03	NA		NA	
Benzo(a)pyrene	d	0.13	*RAGS-E*	7.3E+00	*I-RSL*	1	*RAGS E*	7.3E+00	*I-RSL*	1.10E+00	*CAL-2*	NA		3.0E-02	*I-RSL*	1	*RAGS E*	NA	3.0E-02	NA		NA	
Dioxin TEQ (Mammals)	v (9-8)	0.03	*RAGS-E*	1.3E+05	*CAL-1*	1	*RAGS E*	1.30E+05	*CAL-1*	3.80E+04	*CAL-2*	7.0E-10	*c*	7.0E-10	*I-RSL*	1	*RAGS E*	7.0E-10	7.0E-10	4.0E-08	*c*	4.0E-08	*CAL-3*

Notes:

ABSd = dermal absorption efficiency for dermal contact with constituents in soil
CalEPA = California Environmental Protection Agency
CSF = cancer slope factor
IUR = Inhalation Unit Risk
(mg/kg/day)$^{-1}$ = inverse milligrams per kilogram per day (risk per unit dose)
(mg/kg/day) = milligrams per kilogram per day
(mg/m^3)$^{-1}$= inverse milligrams per cubic meter
mg/m^3 = milligrams per cubic meter.
NA = not available
RfC = reference concentration (mg/m^3)
RfD = reference dose
TEQ = toxic equivalent
USEPA = U.S. Environmental Protection Agency

a Priority order for selecting toxicity criteria: CalEPA, IRIS, PPRTV, NCEA, HEAST
b The oral-to-dermal adjustment factor (oral absorption efficiency) was used to calculate the dermal CSF and RfD values:
CSF (dermal) = CSF (oral)/Adjustment Factor (oral absorption efficiency).
RfD (dermal) = RfD (oral) * Adjustment Factor (oral absorption efficiency).
c Evaluated using blood lead modeling, as described in the text.
d Pyrene value used as surrogate.

References *[ref]* :

c chronic value used
CAL -1 Cal/EPA (2009).Toxicity Criteria Database. July.
CAL-2 Cal/EPA (2008).OEHHA Cancer Potency List.
CAL-3 Cal/EPA (2008).OEHHA Chronic Reference Exposure Levels. December 2008.
CalEPA CalEPA. 1994. Preliminary Endangerment Assessment Manual. Department of Toxic Substance Control. June 1999 version.
C-RSL CalEPA; value taken from USEPA (2009) Regional Screening Levels Table. December 2009 revision.
H USEPA (1997b) Health Effects Assessment Summary Tables [HEAST].
I-RSL IRIS; value taken from USEPA (2013) Regional Screening Levels Table. November 2013 revision.
RAGS E USEPA. 2004. Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final. Office of Emergency and Remedial Response, Washington, DC. EPA/540/R/99/005. OSWER 9852.7-02EP. PB99-963312. July.

Table 3
Human Receptor Exposure Parameters
Risk-Based Target Level Development
Appendix B

Remedial Action Plan Operable Units C and D
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

COC	Units	Risk Based Target Level (RBTL)					
		Resident (Adult/Child)	Commercial Worker	Construction Worker	Utility Worker	Passive Recreator	Occassional Recreator
Lead	mg/kg	1.02E+02	3.95E+02	1.85E+02	1.85E+02	NA	NA
Dioxin TEQ (mammals)	mg/kg	5.00E-05	2.00E-04	1.41E-03	2.52E-03	NA	NA
Pentachlorophenol	mg/kg	9.34E+00	1.25E+01	3.57E+00	6.38E+00	NA	NA
Benzo(a)pyrene	mg/kg	1.53E-01	2.11E-01	1.66E+00	2.97E+00	1.53E+00	3.96E-01

Notes:

The passive and occassional recreator exposure scenarios were not calculated for OU-C COCs because they were not applicable to the projected future use of that area of the site.

COC = constituent of concern
mg/kg = milligram per kilogram
NA = not applicable
OU = operable unit
TEQ = toxicity equivalence units

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Appendix C

TPHd Leaching to Groundwater
Remedial Goals Calculation

Appendix C
TPHd Leaching to Groundwater Remedial Goal Calculation

Operable Units C and D Remedial Action Plane
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Sample ID	Sample Depth (ft bgs)	Sample Date	Total Diesel - Soil (mg/kg)	Total Diesel - Leachate (mg/L)	AOI	Chromatograph Type	Notes
OUD-DP-090	4 to 5 ft	10/27/2009	36,300	0.018	Planer 2	D/MO	
OUD-DP-018	9 to 10 ft	6/26/2009	9,090	0.746	Shipping & Truck Shop	Diesel	Break point. Leachate concentrations
MW-3.21-3-4	3 to 4 ft	10/30/2009	8,230	ND	Parcel 3/MS IRM	D/MO	above are typically above reporting
MESW-CS-005	9 to 9.5 ft	7/6/2009	7,990	0.788	West of IRM	Diesel	limit; below are estimated values
OUC-DP-074	6 to 7 ft	7/1/2009	3,330	0.301	West of IRM	Diesel	<----- below reporting limit
OUC-DP-063	10 to 11 ft	6/29/2009	2,730	0.069	West of IRM	D/MO	<----- Remedial Goal Selection
MESW-CS-007	9 to 9.5 ft	7/6/2009	1,480	0.091	West of IRM	Diesel	
OUC-DP-071	10.5 to 11.5 ft	6/30/2009	1,045	0.0098	West of IRM	Diesel	<-----Screening Level Selection
MESW-CS-001	9 to 9.5 ft	7/6/2009	512	ND	West of IRM	D/MO	
OUD-HA-075	3 to 4 ft	6/23/2009	479	0.027	Planer 2	Lub Oil	
OUD-DP-056	0 to 1 ft	6/22/2009	444	0.0292	Planer 2	Lub Oil	
OUD-DP-018	0.5 to 1.5 ft	6/26/2009	352.9	0.032	Shipping & Truck Shop	Hydraulic	
OUD-HA-088	0.5 to 1.5 ft	7/13/2009	333	ND	Sewer Line	Lub Oil	
OUD-DP-068	0 to 0.5 ft	6/24/2009	323.8	0.019	Haz Waste	Hydraulic	
OUD-HA-088	0 to 0.5 ft	7/13/2009	295.7	0.11	Sewer Line	Lub Oil	<-----This value drives 99% Leachate
OUD-HA-010	0.5 to 0.5 ft	6/22/2009	265	0.014	Shipping & Truck Shop	D/MO	Concentration for all values below 2,730
OUC-DP-054	0 to 0.5 ft	6/22/2009	149.9	0.013	UST	Diesel	soil concentration

Notes:

AOI = area of interest
bgs = below ground surface
D/MO = diesel/motor oil
ft = feet
mg/kg = milligram(s) per kilogram
mg/L = milligram(s) per liter
ND = not detected above laboratory reporting limits

Values in green have chromatographs like diesel or diesel/motor oil mixtures and are several feet bgs, typically in smear zone and have concentrations similar to AST AOI

Values in yellow have chromatographs unlike diesel or are shallow surface samples and have concentrations lower than AST AOI

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Appendix D

California Environmental Quality Act,
Initial Study and Negative Declaration