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September 1990

Superfund Record of Decision:

Louisiana-Pacific, CA

50272-101

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Louisiana-Pacific, CA
First Remedial Action

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Louisiana-Pacific (L-P) site is comprised of an active wood processing plant and a landfill in Butte County, Oroville, California. The plant and landfill are 1/2 mile apart, separated by another Superfund site, the Koppers Company site. The plant lies within the Feather River floodplain with the river located 1/2 mile west of the site. Area land use is agricultural, residential, commercial, and industrial. The plant rests on mine tailings created by dredge mining activities conducted from 1900 until 1969. Since 1970, plant activities have included log storage, lumber production, and hardboard manufacturing. Wood wastes have been disposed of onsite at the landfill. Possible sources of contamination at the site include discharge of wastewater and plant process wastes from the site, and contaminants migrating from the adjacent Koppers site. Between 1970 and 1984, a fungicide spray containing pentachlorophenol (PCP) was used onsite to prevent fungal discoloration of cut lumber. In 1973, State investigations discovered PCP and various other contaminants in downgradient ground water and surface water, as well as, sawdust and wood waste at the plant and landfill. In addition, contamination has been detected at the adjacent Koppers Company site

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Louisiana-Pacific, CA
First Remedial Action
Contaminated Media: soil, gw
Key Contaminants: VOCs (toluene), other organics (formaldehyde), metals (arsenic, lead, zinc)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 76
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(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R09-90/053
Louisiana-Pacific, CA
First Remedial Action

Abstract (Continued)

This Record of Decision (ROD) documents an interim remedy and the need to collect additional data on arsenic and formaldehyde levels on and near the site. The primary contaminants of concern affecting the soil and ground water are VOCs including toluene; organics including formaldehyde; and metals including arsenic, lead, and zinc.

The selected interim remedial action for this site includes onsite ground water monitoring; and implementing institutional controls including deed and well permit restrictions, and site access restrictions, such as fencing. The estimated present worth cost for this remedial action is $193,000. There are no significant O&M costs associated with this remedial action.

PERFORMANCE STANDARDS OR GOALS: EPA has determined that before final remedial action goals for the site can be set, additional information is necessary to determine background arsenic levels in soil, and formaldehyde and arsenic levels in ground water. Therefore, no chemical-specific goals are provided for this remedial action.

INTERIM RECORD OF DECISION

LOUISIANA-PACIFIC SUPERFUND SITE
OROVILLE, CALIFORNIA

U.S. Environmental Protection Agency
Region 9
San Francisco, California

September 1990

LOUISIANA-PACIFIC SUPERFUND SITE
INTERIM RECORD OF DECISION

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DECLARATION

SITE NAME AND LOCATION

Louisiana-Pacific Corporation
Oroville, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the interim soil and ground water remedial actions selected for the Louisiana-Pacific (L-P) site in Oroville, California, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of California concurs with the selected remedy.

ASSESSMENT OF THE SITE

The actual or potential release of hazardous substances from this site, if not addressed by implementing the interim response actions selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This interim remedy addresses the principal documented public health threats from the site contamination. Actions have been selected to address risks posed by contaminated surface soil and shallow groundwater at the plant and groundwater beneath the landfill.

The selected soil remedy consists of:

- Deed restrictions on residential use of the L-P plant site, and
- Site access restrictions, e.g., fencing the perimeter of the L-P plant.

The deed restriction is based on existing knowledge of arsenic contamination at the plant. Additional data on levels of arsenic

in soils at or near the site is necessary to determine background and to set appropriate remedial action goals for the site.

The selected groundwater remedy consists of:

- Well permit restrictions to (1) prohibit the drilling of shallow aquifer wells on or near the L-P plant, (2) provide proper seals on deep wells drilled through the shallow aquifer on or near the L-P plant, and (3) prohibit drilling of deep wells at the L-P landfill;
- Monitoring of onsite wells to obtain additional information about the presence of formaldehyde in groundwater at the site, and to obtain additional information about background levels of arsenic; and
- Construction and monitoring of additional offsite wells if formaldehyde is detected above the detection limit during monitoring of onsite wells.

DECLARATION

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action, and is cost effective. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will not be satisfied by this interim action. The final remedial action will address fully the principal threats posed by this site.

9.28.90
Date

John Wise
Daniel W. McGovern
for Regional Administrator

INTERIM RECORD OF DECISION
DECISION SUMMARY

1.0 SITE NAME, LOCATION, DESCRIPTION

The Louisiana-Pacific (L-P) site consists of a wood processing plant and landfill located in Butte County just south of the city limits of Oroville, California (population 10,560)(see Figure 1-1, Site Location Map). Log storage, lumber production, and hardboard manufacturing take place at the plant, and disposal of wood wastes takes place at the landfill. The plant and landfill are located about 1/2 mile apart and are separated by the Koppers Company Superfund site, which is also on the EPA's National Priorities List. Features of the L-P plant and landfill are shown in Figures 1-2 and 1-3, respectively.

The L-P plant lies in the Feather River floodplain at an elevation of about 145 feet. The northern part of the plant is occupied by buildings and paved with asphalt. The central part of the plant has been graded relatively level for log storage. The western margin and southwest corner of the plant retain much of the historic, irregular dredge-tailing topography since modified by quarrying for log-deck base material.

The Feather River is located about 1/2 mile west of the plant at an elevation of 120 feet above sea level. The Feather River floodplain extends from the river to the Baggett-Marysville Road (south and east of the L-P plant - see Figure 1-1) where it ends at a prominent bluff eroded into hills and ravines. The bluff rises 100 to 170 feet above the floodplain to meet the gently rolling upland extending to the south and east.

The landfill operation has filled one of the ravines in the eroded bluff. The effect of the landfill has been the formation of a nearly flat ridge at an elevation of 270 feet where the ravine once was located.

Surface water run-off flows westward from the L-P landfill onto the Koppers site and then into the log deck pond at the southeast corner of the L-P plant. Plant drainage flows generally south into the log deck pond but is complicated by closed drainages where run-off infiltrates to groundwater. Drainage from the log deck pond flows through a chain of three ponds immediately south of the L-P plant boundary, and then west to gravel pit ponds nearer the Feather River.

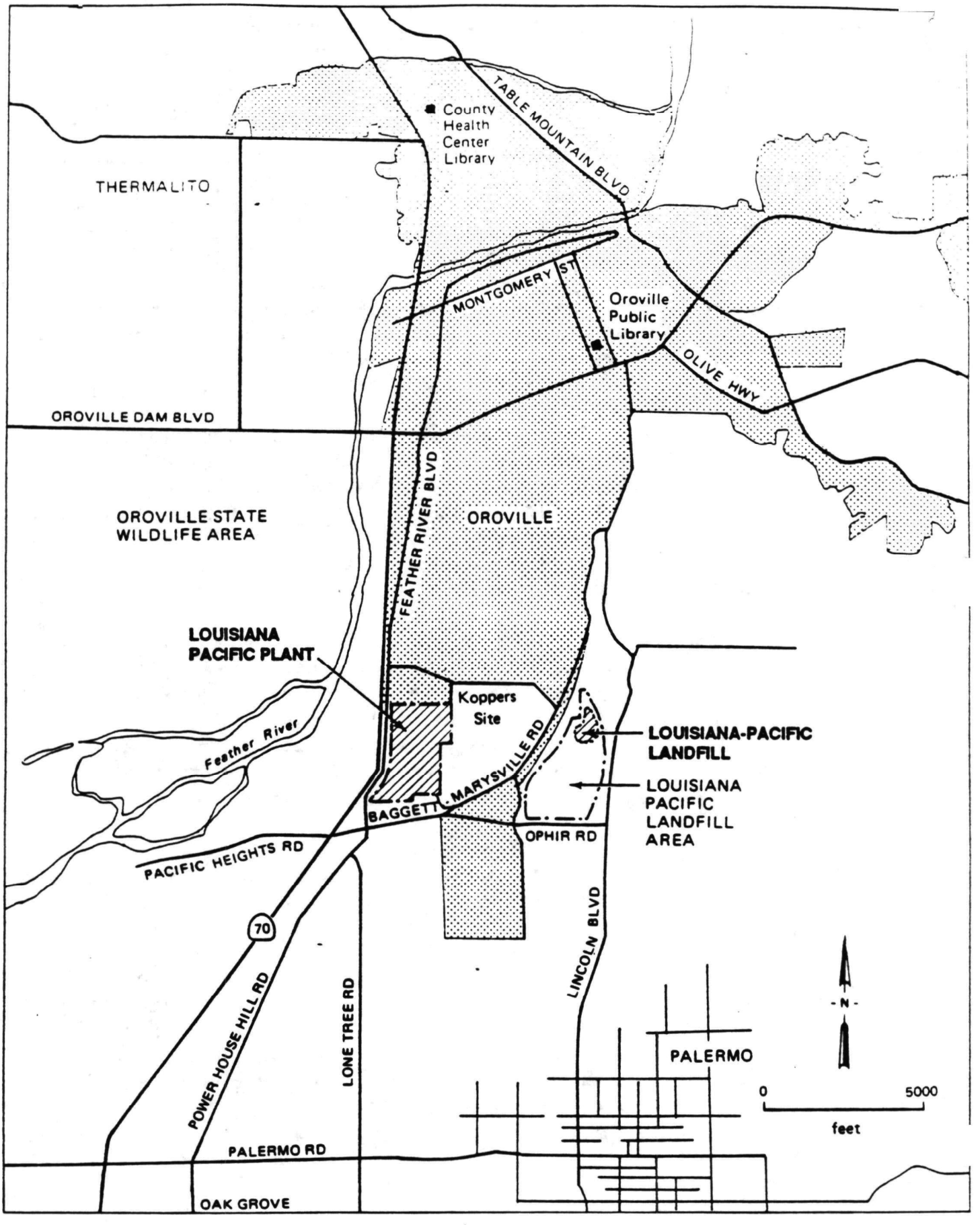

Figure 1-1. SITE LOCATION MAP

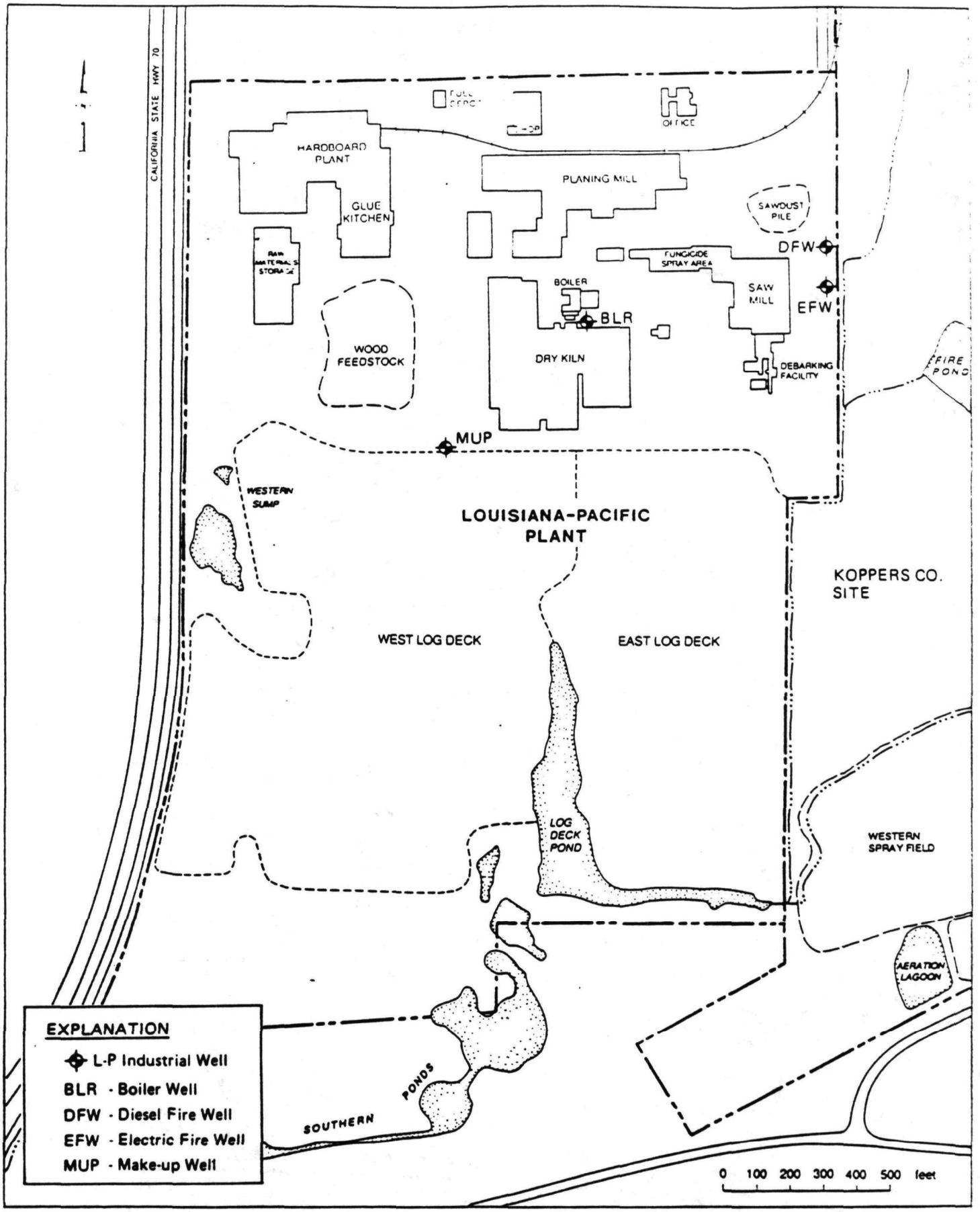

Figure 1-2. L-P PLANT FEATURES

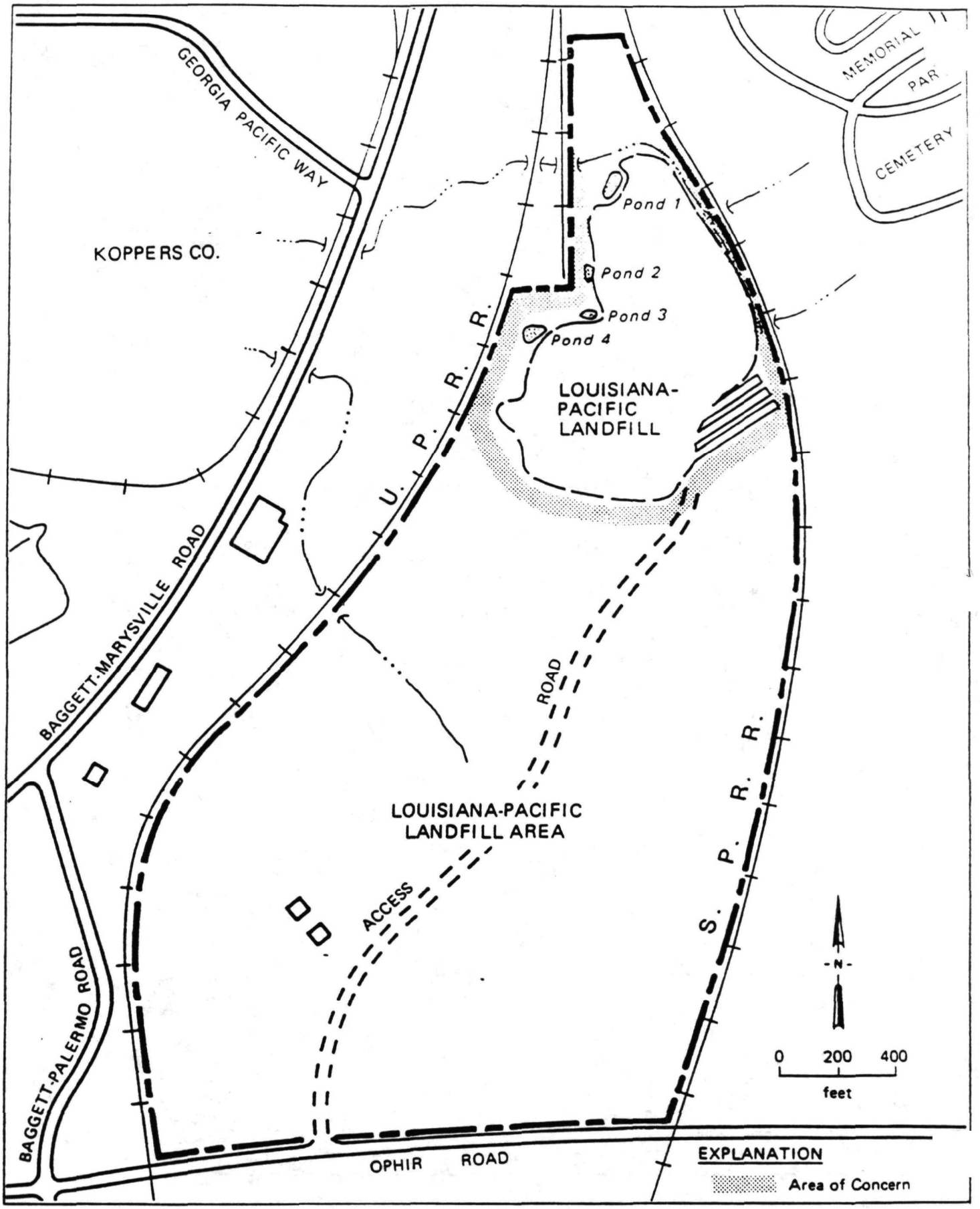

Figure 1-3. L-P LANDFILL FEATURES

The L-P plant is underlain by two aquifers and an intervening clay aquitard. The shallow aquifer that exists beneath most of the northern half of the plant extends from ground surface to depths of 20 to 40 feet. This aquifer is not present at the adjacent Koppers site. Although the shallow aquifer probably existed prior to L-P plant operations, present water levels are higher than would naturally occur due to the sprinkler application of water to the log deck. The permeability of the shallow aquifer varies considerably laterally over the plant. Groundwater in the shallow aquifer appears to move both north and west away from the recharge areas created by the ponds, the boundary ditch and the almost continuous sprinkler irrigation of the log deck. This aquifer is not currently used as a source of water supply.

The regional aquifer extends to depth greater than 300 feet beneath the L-P plant, and it is also present beneath the Koppers site and the L-P landfill. Groundwater movement in the regional aquifer is generally due south. This aquifer serves as a current source of drinking water.

The entire L-P plant is underlain by dredge tailings deposited during gold mining operations in the early 1900s. The tailings consist of unsorted cobble gravel, sand, silt, and clay derived from dredging of the floodplain alluvium. The dredge tailings, which may be as deep as 30 to 45 feet, constitute the shallow aquifer. Beneath the dredge tailings lies older alluvium of similar composition that was deposited by the ancestral Feather River and which constitutes an aquifer of regional extent.

Land use in the vicinity of the site is mixed agricultural, residential, commercial, and industrial. One- to five-acre farms exist, and much of the produce and livestock is raised for home use and not sold commercially. Residential areas are located to the south, southeast, west, and northeast of the site. Three schools are located within a two-mile radius of the site.

2.0 SITE HISTORY AND ENFORCEMENT

Dredge mining for gold in the Feather River basin began around the turn of the century. The Louisiana-Pacific plant area and environs rest on tailings created by the dredger mining ac-

tivities. In 1929, a San Francisco-based mining firm, Natomas Company, purchased the land around the present L-P site from several individuals, and continued dredge operations until 1936. At that time, Butte County issued regulations requiring replacement of topsoil. From 1936 until 1969, no organized dredging activity occurred at the L-P plant area or environs. Georgia-Pacific Corporation purchased the present L-P site in 1969 and completed construction of the sawmill facility in 1970. Louisiana-Pacific Corporation took control of the property in 1973. The hardboard facility was constructed in 1973 and the landfill began operations in 1978.

Between 1970 and 1984, a fungicide spray containing pentachlorophenol (PCP) was used to prevent fungal discoloration of sawn lumber. In 1973, a state agency discovered PCP contamination in local groundwater south of the L-P plant. Since 1973, state agencies have monitored the L-P site, and have detected PCP contamination in surface water, sawdust, and wood waste at the plant and landfill. As a result of this evidence and their use of PCP, L-P was suspected of being partly responsible for the PCP contamination discovered in 1984 in groundwater south of the adjacent Koppers site. In May 1985, the California Department of Health Services requested that EPA take over as lead agency at the L-P site. In February 1986, the L-P site was placed on EPA's National Priorities List (NPL). In December 1986, following unsuccessful RI/FS negotiations with L-P, EPA began remedial investigations of surface water, soil, sediment, groundwater, wood waste, and air at the L-P site for evidence of contaminants. EPA issued a Remedial Investigation (RI) Report in January 1989. Concurrent investigations of air quality were conducted by L-P and the Butte County Air Pollution Control District over a one-year period beginning in 1988. An Endangerment Assessment Report on risks from the L-P site was issued by EPA in September 1989, and a Feasibility Study (FS) Report was issued in May 1990.

Results of the EPA investigations have shown that groundwater, surface water, soil, sediment, and wood waste contain various contaminants used by L-P and Koppers. Concentrations on the L-P plant were found to be highest in an area along the L-P/Koppers boundary. Contaminants in this area will be addressed as part of the Koppers cleanup. Elsewhere on the L-P plant, only arsenic (in surface soil and shallow groundwater) and formaldehyde (in groundwater and air) were found at concentrations high enough to be of potential concern to public health.

Although PCP was detected in surface and subsurface soils, surface waters and groundwater at the L-P site, the concentrations were so low as not to pose a significant threat to human health and the environment.

Correspondence between EPA and L-P can be found in the Administrative Record for this site, an index of which is attached to this Record of Decision.

3.0 COMMUNITY PARTICIPATION

The EPA has encouraged public participation throughout the RI/FS process, in accordance with CERCLA requirements.

Fact sheets were sent out to the public at key progress points in the investigation. Technical exchange meetings were held monthly or bimonthly at L-P during the field work phase of the RI, and representatives of public agencies and local citizen groups were invited to attend. RI/FS documents, including the Remedial Investigation Report, the Endangerment Assessment Report, and the Feasibility Study Report, were sent to local libraries and a representative of a major community group.

Public participation requirements for EPA's selection of the remedy as defined in CERCLA sections 113(k)(2)(B)(i-v) and 117(a) were met by the activities described below.

The proposed plan was distributed using EPA's mailing list for this site. A public comment period on the proposed plan was held between May 14, 1990, and June 13, 1990. Public notice was provided prior to the opening of the public comment period, and this notice appeared in three local newspapers including the Oroville Mercury-Register. Briefings on the proposed plan were given to representatives of community groups and elected officials on May 15, 1990. In reporting on these briefings, the press advertised the proposed plan and public comment period. A formal public meeting was held on May 22, 1990. A transcript of the meeting can be found in the Administrative Record for this site.

The attached response summary provides EPA's responses to written comments submitted during the public comment period and to comments made during the May 22, 1990 public meeting which were not responded to during the meeting.

4.0 SCOPE AND ROLE OF DECISION

There are no current uses of the site which pose a significant risk to human health or the environment. However, future residential use of the site and/or domestic use of the shallow groundwater at the L-P plant or regional groundwater at the L-P landfill could pose an unacceptable health risk. Therefore, EPA is selecting interim remedial actions to address these potential future risks posed by contamination in surface soil and groundwater at the L-P site. These actions are EPA's first remedial activities at the site.

The risks of potential human exposure to surface soil at the L-P plant and groundwater at the plant and the landfill exceed the threshold level of concern. However, additional information is needed to resolve uncertainty about the existence of formaldehyde in groundwater and the background concentrations of arsenic in soil and groundwater.

Additional information is necessary to fully evaluate the relative risk posed by arsenic and formaldehyde contamination at the site. Arsenic is a naturally-occurring element in soil and groundwater, and background concentrations have not been adequately determined for the L-P site. The concentration of arsenic in soil on the log deck appears to be slightly elevated in comparison to the estimated background level for this area. The presence of formaldehyde in groundwater at the plant and landfill has not been conclusively established, and consequently additional monitoring is needed. It is therefore not possible at this time to set remediation goals or select final remedial actions for the site.

In the interim, while additional information is being gathered and analyzed, the selected remedial actions are necessary to prevent the routes of exposure which create potentially significant risks. Specifically, EPA's chosen interim remedy for surface soil employs institutional actions to prevent exposure to contaminated surface soils at the L-P plant. By eliminating the possible exposure pathway created by unrestricted access to and use of the site, the selected interim remedial actions control the health risk posed by arsenic contamination in the plant soils.

The interim remedy for groundwater also employs institutional actions to prohibit domestic use of shallow groundwater on or near the L-P plant and regional groundwater at or near the L-P landfill. A monitoring program will help to define the background levels of arsenic in groundwater, the areal extent of contaminated groundwater and will also indicate any changes in contaminant levels that might influence the selection of a final remedy for the site. In addition, as part of the Koppers cleanup, the use of any wells by L-P or others that interferes with containment or cleanup of the regional aquifer will be discontinued and an alternative water supply will be provided.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Potential Sources of Contamination

Potential sources of contamination at the L-P plant and landfill include the discharge of wastewater and plant process wastes from L-P and contaminants migrating from the adjacent Koppers site.

5.1.1 Wastewater. Wastewater produced during plant processes was discharged prior to late 1988 to a surface pond called the western sump (Figure 1-2). High levels of formaldehyde reported in the sump water were traced to the hardboard plant glue kitchen where a urea-formaldehyde resin was prepared for use in manufacturing hardboard. Formaldehyde entered the wastewater in washwater from the concrete floor of the glue kitchen. Discharge of this washwater was discontinued in October 1988; the washwater is now recirculated in making hardboard.

5.1.2 Process Wastes. Process wastes are released from the L-P plant as sawdust, dust, boiler ash, and wood debris from the log decks. In addition, plant processes release formaldehyde vapors and dust during the hardboard manufacturing process. Sawdust and wood debris are disposed of at the landfill. Boiler ash is disposed of in trenches at the southeastern edge of the landfill. Dust, including particulate emissions from the hardboard plant, may be transported in air to off-site receptors, or may settle on plant roads and then may be re-suspended by wind or vehicular traffic. Dust emissions from the unpaved log deck areas are controlled by water from sprinkler trucks.

5.1.3 Migration of Contaminants from the Koppers Site. Investigations by Koppers at the L-P plant and by consultants to L-P revealed that contamination of the L-P plant area has occurred due to the proximity of the L-P and Koppers Company plants, and water-use practices on the L-P plant. The soil and groundwater beneath the Koppers site is contaminated with wood treatment chemicals used by Koppers, including PCP, isopropyl ether, polynuclear aromatic hydrocarbons (PAHs), arsenic, chromium, and copper.

The L-P/Koppers drainage ditch runs between the two properties and receives surface run-off from the Koppers property and overflow from the Koppers fire pond. The ditch also receives seepage from two areas on the western edge of the Koppers property where unlined surface impoundments were formerly used to store or dispose of chemicals: the creosote pond and Cellon blowdown discharge areas (EPA 1988d). Creosote was shown to exist as an oily phase in the soils in the former creosote pond area, and to have migrated through the vadose zone onto the L-P property. The Cellon process at Koppers involved use of a mixture containing PCP, isopropyl ether (IPE), diesel oil and liquefied butane. These chemicals have been detected in high concentrations in the L-P/Koppers ditch sediments and surface water. Water in the ditch flows south to the L-P log deck pond.

Chemicals from the creosote pond and Cellon discharge area have been shown to have contaminated the regional aquifer beneath both the L-P and Koppers sites. Groundwater from this regional aquifer is pumped from three active wells on the L-P site: the make-up well, the boiler well, and the electric fire well (wells MUP, BRL, and EFW in Figure 1-2). Pumping of the electric fire well causes movement of groundwater towards L-P from the Koppers site, and creosote and Cellon products have migrated towards the L-P property in response to this pumping. Water from the electric fire well discharges directly into the L-P/Koppers drainage ditch and flows to the log deck pond. PCP and IPE have been measured in the electric fire well at levels as high as 200 parts per billion (ppb) and 1,050 ppb, respectively. Use of this water to spray the log decks may have contributed to surface contamination at the L-P site.

Groundwater pumped from the L-P make-up and boiler wells is fed into the plant process distribution pipeline and boiler, respectively. PCP levels in the make-up well (typically less than 1 ppb) have not been significant, as it is farther from con-

tamination sources than the boiler well. Levels of PCP as high as 94 ppb have been measured in the boiler well. From the boiler, excess water is discharged to the wastewater pipeline which leads to the western sump.

The log deck pond received water from the L-P/Koppers ditch and from other portions of the Koppers site. Levels of PCP in Koppers run-off into the log deck pond have been as high as 430 ppb but have typically been measured at levels closer to 50 ppb. PCP levels in the log deck pond itself have ranged from 2 to 260 ppb. Water pumped from the log deck pond may have led to organics and arsenic contamination of the L-P site soils and underlying groundwater via the following cycle. Water is pumped from the log deck pond and is spread over the plant by: 1) sprinkler trucks for dust control and 2) sprinkler irrigation of log piles to reduce fungal discoloration of the wood. Excess water collects on the surface and may flow back to the log deck pond or infiltrate and recharge the shallow aquifer groundwater.

5.2 Nature and Extent of Contamination

Site characterization activities during the remedial investigation involved sampling and chemical analysis of soil, groundwater, surface water, sediment, and wood waste at the L-P plant and landfill, and vapor and airborne particulate matter at the plant.

Based on the past history of chemical use on the L-P and Koppers sites, as discussed in Section 5.1, the following chemicals were initially selected for analysis:

- o Pentachlorophenol (PCP)
- o Isopropyl ether (IPE)
- o Polychlorinated dibenzodioxins/dibenzofurans (PCDDs/PCDFs)
- o Polynuclear aromatic hydrocarbons (PAHs)
- o Arsenic
- o Boron
- o Chromium
- o Copper
- o Mercury
- o Formaldehyde (HCHO)
- o Petroleum hydrocarbons
- o Volatile and semi-volatile organic compounds

Of these chemicals, L-P is known to have used PCP and formaldehyde.

In analyzing for these chemicals and a wide range of other organic and inorganic chemicals in the various environmental media, a large number of chemicals were detected. Chemical concentrations were then evaluated using four criteria (background concentrations; blank concentrations; frequency of detection; and historical use, concentration, toxicity and physiochemical properties) in order to focus the risk assessment on those chemicals that are most likely to pose risks at the L-P site. The resulting subset of 38 chemicals of potential concern for each medium are shown in Table 5-1. Concentrations of the chemicals that were detected in each medium and used to determine site risks are shown in Table 5-2. In addition, formaldehyde was considered to be a contaminant of potential concern in air, based on analyses of vapor and particulate formaldehyde emissions from the hardboard plant and based on analyses of surface dust.

6.0 SUMMARY OF SITE RISKS

The risk assessment (conducted as part of the Endangerment Assessment report) documents the potential risks associated with the L-P site. The major steps in the risk assessment process are identification of contaminants (see Section 5.2), exposure assessment, toxicity assessment and risk characterization. The Endangerment Assessment (EA) is included in the Administrative Record.

Neither the RI nor the EA characterized fully naturally occurring or "background" levels of arsenic in soil. Arsenic concentrations in soil are to be expected because this element occurs naturally in soil and rock. This naturally occurring concentration is referred to as the background concentration. A limited number of soil samples from soil boring P-1 were used to represent background, based on the location of this boring at the northern edge or the L-P plant. Arsenic levels in these samples were 2.5 mg/kg. However, the limited number of samples does not provide an adequate statistical base for determining if the difference between background arsenic levels and those in on-site samples is significant. Another estimate is provided by analyses of soil samples collected in the United States (Shacklette and Boerngen, 1984). Arsenic is reported to range from less than 0.1 to 97 mg/kg in the western U.S. and ranges from 1.8 to 4.5 mg/kg at two sample locations in Butte County.

Table 5-1
Chemicals of Potential Concern at the Louisiana-Pacific Site

Chemical	PLANT SOILS	LANDFILL SOILS	PLANT GROUND-WATER	LANDFILL GROUND-WATER	SEDIMENTS	SURFACE WATER	SURFACE DUST
Acetone		X					
Benzoic Acid		X					
beta-BHC	X						
Bis(2-ethylhexyl)phthalate							X
2-Butanone		X					
Butylbenzyl phthalate	X						
Chlordane	X						
Di-n-octyl phthalate	X						X
Ethyl benzene		X					
Formaldehyde	X	X	X	X			X
2-Hexanone		X					
Isopropyl ether			X				
Methylene chloride	X	X					
4-Methyl-2-pentanone		X					
2-, and 4-Methyl-phenols		X					
PAHs	X	X					X
PCDDs/PCDFs	X				X		X
Pentachlorophenol	X	X	X	X	X	X	X
Phenol		X					
Styrene		X					
Tetrachloroethene		X					
Tetrachlorophenols (Total)		X				X	
Toluene		X					
3,4,5-Trichlorophenol						X	

Table 5-1
Chemicals of Potential Concern at the Louisiana-Pacific Site

Chemical	PLANT SOILS	LANDFILL SOILS	PLANT GROUND-WATER	LANDFILL GROUND-WATER	SEDIMENTS	SURFACE WATER	SURFACE DUST
Antimony	X						
Arsenic	X		X		X	X	
Barium			X			X	
Beryllium	X				X	X	
Boron	X		X	X	X	X	X
Chromium	X				X	X	
Copper	X	X			X	X	
Lead				X	X	X	
Manganese	X		X	X		X	
Mercury					X	X	
Nickel	X	X			X	X	
Silver			X	X			
Vanadium						X	
Zinc	X	X		X	X	X	X

Table 5-2
Concentrations of Chemicals of Potential Concern

Chemicals	Plant Surface Soil Geo. Mean	Plant Surface Soil Max.	Landfill Surface Soil Geo. Mean	Landfill Surface Soil Max.	Plant Surface Dust Geo. Mean	Plant Surface Dust Max.
ORGANICS	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
ACETONE	--	--	4,400	7,300	--	--
BENZOIC ACID	--	--	(a)	(a)	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	--	--	--	--	890	25,000
2-BUTANONE (MEK)	--	--	5,800	13,000	--	--
BUTYL BENZYL PHTHALATE	200	460	--	--	--	--
b-BHC	2.6	2.6	--	--	--	--
CHLORDANE	(a)	(a)	--	--	--	--
DI-N-OCTYL PHTHALATE	(a)	(a)	--	--	52,000	130,000
ETHYL BENZENE	--	--	1,600	2,100	--	--
FORMALDEHYDE	4,200	7,900	11,000	20,000	41,000	340,000
2-HEXANONE	--	--	(a)	(a)	--	--
ISOPROPYL ETHER	--	--	--	--	--	--
METHYLENE CHLORIDE	12	44	1,600	1,600	--	--
4-METHYL-2-PENTANONE	--	--	(a)	(a)	--	--
2-METHYL PHENOL (o-CRESOL)	--	--	72	72	--	--
4-METHYL PHENOL (p-CRESOL)	--	--	160	160	--	--
PAHS - CARCINOGENIC	--	--	--	--	--	--
PAHS - NONCARCINOGENIC	--	--	1,240	1,240	730	6,100
PCDDS/PCDFs (TEs) - EPA	0.0029	0.051	--	--	0.00019	0.0064
PCDDS/PCDFs (TEs) - INTERNATIONAL	(0.021)	(0.22)	--	--	(0.0012)	(0.027)
PENTACHLOROPHENOL	12,000	12,000	(a)	(a)	130	400
PHENOL	--	--	(a)	(a)	--	--
STYRENE	--	--	(a)	(a)	--	--
TETRACHLOROETHENE	--	--	(a)	(a)	--	--
TETRACHLOROPHENOLS (TOTAL)	--	--	(a)	(a)	--	--
TOLUENE	--	--	4,400	16,000	--	--
3,4,5-TRICHLOROPHENOL	--	--	--	--	--	--

(a) - Selected as a chemical of potential concern based on its detection in subsurface soils - not detected in surface soils.

( ) - Concentrations of PCDDs/PCDFs in parentheses were calculated using International TEFs.
Concentrations of PCDDs/PCDFs without parentheses were calculated using EPA TEFs.

Table 5-2
Concentrations of Chemicals of Potential Concern

Chemicals	Plant Surface Soil Geo. Mean	Plant Surface Soil Max.	Landfill Surface Soil Geo. Mean	Landfill Surface Soil Max.	Plant Surface Dust Geo. Mean	Plant Surface Dust Max.
INORGANICS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
ANTIMONY	28	49	--	--	--	--
ARSENIC	5.6	13	--	--	--	--
BARIUM	--	--	--	--	--	--
BERYLLIUM	1.3	3.1	--	--	--	--
BORON	18	52	--	--	27	69
CHROMIUM	41	150	--	--	--	--
COPPER	74	350	35	44	--	--
LEAD	--	--	--	--	--	--
MANGANESE	500	1,700	--	--	--	--
MERCURY	--	--	--	--	--	--
NICKEL	87	150	110	160	--	--
SILVER	--	--	--	--	--	--
VANADIUM	--	--	--	--	--	--
ZINC	110	250	45	45	43	250

Table 5-2
Concentrations of Chemicals of Potential Concern

Chemicals	Off-site Pond Sediments (L-P RI Data) Geo. Mean	Off-site Pond Sediments (L-P RI Data) Max.	L-P Off-site Ponds Sediments (Dames & Moore data) Geo. Mean	L-P Off-site Ponds Sediments (Dames & Moore data) Max.	L-P Log Deck Pond Sediments (L-P RI Data) Geo. Mean	L-P Log Deck Pond Sediments (L-P RI Data) Max.
ORGANICS	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
ACETONE	--	--	--	--	--	--
BENZOIC ACID	--	--	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	--	--	--	--	--	--
2-BUTANONE (MEK)	--	--	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--	--	--
b-BHC	--	--	--	--	--	--
CHLORDANE	--	--	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--	--	--
ETHYL BENZENE	--	--	--	--	--	--
FORMALDEHYDE	--	--	--	--	--	--
2-HEXANONE	--	--	--	--	--	--
ISOPROPYL ETHER	--	--	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--
2-METHYL PHENOL (o-CRESOL)	--	--	--	--	--	--
4-METHYL PHENOL (p-CRESOL)	--	--	--	--	--	--
PAHS - CARCINOGENIC	--	--	5.2	7.0	--	--
PAHS - NONCARCINOGENIC	--	--	--	--	--	--
PCDDS/PCDFs (TEs) - EPA	0.025	0.028	0.0084	0.18	0.31	0.44
PCDDS/PCDFs (TEs) - INTERNATIONAL	(0.21)	(0.28)	(0.049)	(0.29)	(1.2)	(1.7)
PENTACHLOROPHENOL	54	570	23	470	1,000	6,200
PHENOL	--	--	--	--	--	--
STYRENE	--	--	--	--	--	--
TETRACHLOROETHENE	--	--	--	--	--	--
TETRACHLOROPHENOLS (TOTAL)	--	--	--	--	--	--
TOLUENE	--	--	--	--	--	--
3,4,5-TRICHLOROPHENOL	--	--	--	--	--	--

( ) - Concentrations of PCDDs/PCDFs in parentheses were calculated using International TEFs.
Concentrations of PCDDs/PCDFs without parentheses were calculated using EPA TEFs.

Table 5-2
Concentrations of Chemicals of Potential Concern

Chemicals	Off-site Pond Sediments (L-P RI Data) Geo. Mean	Off-site Pond Sediments (L-P RI Data) Max.	L-P Log Deck Pond Sediments (Dames & Moore data) Geo. Mean	L-P Log Deck Pond Sediments (Dames & Moore data) Max.	L-P Log Deck Pond Sediments (L-P RI Data) Geo. Mean	L-P Log Deck Pond Sediments (L-P RI Data) Max.
INORGANICS	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
ANTIMONY	--	--	--	--	--	--
ARSENIC	47	86	9.8	36	35	47
BARIUM	--	--	--	--	--	--
BERYLLIUM	3.0	3.0	--	--	1.5	1.5
BORON	450	980	--	--	200	250
CHROMIUM	72	95	37	95	560	2,100
COPPER	73	88	22	49	220	610
LEAD	50	65	--	--	30	51
MANGANESE	--	--	--	--	--	--
MERCURY	0.50	0.96	--	--	1.3	1.3
NICKEL	130	240	--	--	94	150
SILVER	--	--	--	--	--	--
VANADIUM	--	--	--	--	--	--
ZINC	160	390	--	--	180	230

Table 5-2
Concentrations of Chemicals of Potential Concern

Chemicals	Plant Groundwater Geo. Mean	Plant Groundwater Max.	Landfill Groundwater Geo. Mean	Landfill Groundwater Max.
ORGANICS	(ug/L)	(ug/L)	(ug/L)	(ug/L)
ACETONE	--	--	--	--
BENZOIC ACID	--	--	--	--
BIS(2-ETHYLHEXYL) PHTHALATE	--	--	--	--
2-BUTANONE (MEK)	--	--	--	--
BUTYL BENZYL PHTHALATE	--	--	--	--
b-BHC	--	--	--	--
CHLORDANE	--	--	--	--
DI-N-OCTYL PHTHALATE	--	--	--	--
ETHYL BENZENE	--	--	--	--
FORMALDEHYDE	100	650	18	45
2-HEXANONE	--	--	--	--
ISOPROPYL ETHER	8.4	12	--	--
METHYLENE CHLORIDE	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--
2-METHYL PHENOL (o-CRESOL)	--	--	--	--
4-METHYL PHENOL (p-CRESOL)	--	--	--	--
PAHS - CARCINOGENIC	--	--	--	--
PAHS - NONCARCINOGENIC	--	--	--	--
PCDDS/PCDFs (TEs) - EPA	--	--	--	--
PCDDS/PCDFs (TEs) - INTERNATIONAL	--	--	--	--
PENTACHLOROPHENOL	0.84	3.2	0.63	1.1
PHENOL	--	--	--	--
STYRENE	--	--	--	--
TETRACHLOROETHENE	--	--	--	--
TOLUENE	--	--	--	--
TETRACHLOROPHENOLS (TOTAL)	--	--	--	--
3,4,5-TRICHLOROPHENOL	--	--	--	--

( ) - Concentrations of PCDDs/PCDFs in parentheses were calculated using International TEFs.
Concentrations of PCDDs/PCDFs without parentheses were calculated using EPA TEFs.

Table 5-2
Concentrations of Chemicals of Potential Concern

	Plant Groundwater		Landfill Groundwater	
	Geo. Mean	Max.	Geo. Mean	Max.
	(ug/L)	(ug/L)	(ug/L)	(ug/L)
ANTIMONY	--	--	--	--
ARSENIC	5.9	39	--	--
BARIUM	130	250	--	--
BERYLLIUM	--	--	--	--
BORON	700	850	110	9,500
CHROMIUM	--	--	--	--
COPPER	--	--	--	--
LEAD	--	--	8.3	60
MANGANESE	1,700	3,900	61	520
MERCURY	--	--	--	--
NICKEL	--	--	--	--
SILVER	1.5	5.7	4.8	6.3
VANADIUM	--	--	--	--
ZINC	--	--	41	160

Background levels of arsenic in groundwater also were not characterized in the RI.

In the absence of a more complete characterization of background levels of arsenic, EPA cannot assess the risk posed by the site to human health and the environment. In addition, without establishing background levels for arsenic levels in the soil and groundwater at the site EPA cannot fully evaluate remedial alternatives.

In addition, there is a high degree of uncertainty associated with the presence of formaldehyde in groundwater samples taken during drilling, as field blanks collected on the same days as samples from five of the six sample locations were found to contain formaldehyde concentrations ranging from 16 to 48 µg/L. Furthermore, formaldehyde was not detected during monitoring at these same drill hole locations after well construction, well development, and purging. Therefore, additional monitoring is necessary to conclusively establish the presence or absence of formaldehyde. If formaldehyde is not present in groundwater, the only contaminant of concern is arsenic. If formaldehyde is present, EPA may consider the cumulative risks posed by these two contaminants in selecting remedial actions for the site.

The EA did, however, identify potential risks associated with exposure to contaminants at the site at the levels detected during the RI. The procedures used to identify these risks are described below.

Under the EA, the potential pathways of human exposure to contaminants of concern on the L-P site were identified and divided into five current-use and eight future-use exposure scenarios. These scenarios are described in Table 6-1. The future use scenarios assumed the highest use of the property or "maximum exposure use scenario" -- residential use of the plant and landfill and use of the shallow groundwater (at the plant) and regional groundwater (at the landfill) as sources of domestic water supply. EPA evaluated the use associated with the highest (i.e., most significant) risk in order to be protective of human health. EPA believes that at this time it is reasonable to evaluate such risks based on currently available information.

Exposure was assessed for both an average case and a maximum plausible case for each exposure scenario. For the average case, geometric mean concentrations are used, together with what are

Table 6-1. SUMMARY OF POTENTIAL HEALTH RISKS IDENTIFIED BY THE ENDANGERMENT ASSESSMENT: LOUISIANA–PACIFIC SITE[a]

Exposure Pathway Scenarios	Total Upperbound Lifetime Excess Cancer Risks		Non-Carcinogenic Hazard Index (CDI : RfD)		Chemicals with Hazard Index > 1	Chemicals with Total Upperbound Lifetime Excess Cancer Risks	
	Average Exposure	Maximum Exposure	Average Exposure	Maximum Exposure	Average Exposure	$> 1 \times 10^{-6}$ Average Exposure	$> 1 \times 10^{-4}$ Maximum Exposure
Current Use:							
CU1 Exposure of Adult Trespasser to Surface Dust-Plant	2×10^{-11} (7×10^{-11})	2×10^{-8} (6×10^{-8})	< 1 (< 1)	< 1 (< 1)			
CU2 Exposure of Adult Trespasser to Surface Soils-Landfill	3×10^{-12}	3×10^{-10}	< 1	< 1			
CU3 Exposure of Child Resident to Offsite Pond Sediments							
• WCC Data	4×10^{-7} (4×10^{-7})	3×10^{-6} (4×10^{-6})	< 1 (< 1)	< 1 (< 1)			
• D&M Data	8×10^{-8} (9×10^{-8})	3×10^{-6} (4×10^{-6})	< 1 (< 1)	< 1 (< 1)			
CU4 Exposure of Adult Resident by Inhalation of Offsite Dust	1×10^{-9} (1×10^{-9})	9×10^{-8} (1×10^{-7})	< 1 (< 1)	< 1 (< 1)			
CU5 Exposure of Adult Resident by Inhalation of Offsite Hardboard Plant Emissions:							
• Pacific Heights Rd.	1×10^{-6}	9×10^{-6}	--	--			
• South Fence Lane	7×10^{-8}	3×10^{-6}	--	--			
• Predominant Wind	6×10^{-6}	5×10^{-5}	--	--		HCHO	

Table 6-1. SUMMARY OF POTENTIAL HEALTH RISKS IDENTIFIED BY THE ENDANGERMENT ASSESSMENT: LOUISIANA-PACIFIC SITE[a]

Exposure Pathway Scenarios	Total Upperbound Lifetime Excess Cancer Risks		Non-Carcinogenic Hazard Index (CDI : RfD)		Chemicals with Hazard Index > 1	Chemicals with Total Upper-bound Lifetime Excess Cancer Risks	
	Average Exposure	Maximum Exposure	Average Exposure	Maximum Exposure	Average Exposure	$> 1 \times 10^{-6}$ Average Exposure	$> 1 \times 10^{-4}$ Maximum Exposure
Future Use:							
FU1 Exposure of Child Resident to Onsite Surface Soils-Plant	4×10^{-6} (4×10^{-6})	4×10^{-5} (7×10^{-5})	< 1 (< 1)	= 1 (> 1)		Arsenic Arsenic	
FU2 Exposure of Child Resident to Onsite Surface Soils-Landfill	6×10^{-9}	4×10^{-8}	< 1	< 1			
FU3 Exposure of Child Resident to Log Deck Pond Sediments-Plant	7×10^{-7} (1×10^{-6})	9×10^{-6} (3×10^{-5})	< 1 (< 1)	< 1 (> 1)			
FU4 Exposure of Adult Resident by Ingestion of Shallow Ground-water-Plant	2×10^{-5}	9×10^{-4}	< 1	= 1		Arsenic	Arsenic
FU5 Exposure of Adult Resident by Inhalation of Volatilized Organics from Shallow Groundwater-Plant	2×10^{-5}	3×10^{-4}	< 1	< 1		HCHO	HCHO

Table 6-1. SUMMARY OF POTENTIAL HEALTH RISKS IDENTIFIED BY THE ENDANGERMENT ASSESSMENT: LOUISIANA–PACIFIC SITE[a]

Exposure Pathway Scenarios	Total Upperbound Lifetime Excess Cancer Risks		Non-Carcinogenic Hazard Index (CDI : RfD)		Chemicals with Hazard Index > 1	Chemicals with Total Upperbound Lifetime Excess Cancer Risks	
	Average Exposure	Maximum Exposure	Average Exposure	Maximum Exposure	Average Exposure	$> 1 \times 10^{-6}$ Average Exposure	$> 1 \times 10^{-4}$ Maximum Exposure
Future Use: (continued)							
FU6 Exposure of Adult Resident by Ingestion of Regional Groundwater-Landfill	2×10^{-8}	2×10^{-7}	< 1	> 1			
FU7 Exposure of Adult Resident by Inhalation of Volatilized Organics from Regional Groundwater-Landfill	5×10^{-6}	4×10^{-5}	--	--		HCHO	
FU8 Exposure of Adult Resident by Inhalation of Onsite Dust-Plant	4×10^{-7} (4×10^{-7})	3×10^{-6} (3×10^{-6})	< 1 (< 1)	< 1 (< 1)			

CDI : RfD Chronic Daily Intakes Reference Dose

HCHO Formaldehyde

(4×10^{-7}) Potential risk values in brackets were calculated using international method for calculating 2, 3, 7, 8 TCDD equivalents. These values are not used by EPA to assess risk but are included as a check on the unbracketed values.

-- No chemical with non-carcinogenic toxicity criteria were evaluated for this exposure pathway.

a Based on Table 0-1 (Clement 1989)

< Less than

> Greater than

considered to be the most likely exposure conditions. For the maximum plausible case, the highest measured concentrations are generally used, together with high, although plausible, estimates of exposure parameters such as frequency and duration of exposure and quantity of contaminated media contacted. The exposure assumptions are described in detail in the EA.

The toxicity assessment looks at both carcinogenic and noncarcinogenic effects of chemicals present at the site. Cancer Potency Factors (CPFs) are used to estimate excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

The potential noncarcinogenic effect of a single contaminant in a single medium is expressed as the hazard quotient (HQ), the ratio of the estimated intake to the contaminant's reference dose. The reference dose (RfD) is an estimate of the maximum human chronic daily exposure level that is likely to be without deleterious effects during a lifetime.

The last step in the risk assessment process is risk characterization, when information from the preceding steps is combined to determine the risks associated with the current and future use scenarios. In this case, the risk characterization step involved calculating the potential risks posed by arsenic and formaldehyde in soil and groundwater at the concentrations detected during the Remedial Investigation.

For cancer risks, CPFs are multiplied by the estimated intake of a potential carcinogen to provide an upper-bound estimate of the excess cancer risk associated with exposure at that intake level. Cancer risks calculated in the Endangerment Assessment are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6}). The term "cancer risk" as used in risk assessment is an upper-bound estimate of the potential excess cancer risk posed by exposure to contamination at the site under the conditions of exposure specified in the risk assessment. Therefore, a cancer risk of 1×10^{-6} means that exposure to site-related contamination may increase an individual's chances of developing cancer by as much as one-in-one-million over the background cancer incidence. Since this is an upper-bound estimate, the actual risk is likely to be lower and may

even be as low as zero in some cases.

For non-carcinogenic effects, the Hazard Index (HI) is generated by adding the HQs for all contaminants within a medium or across all media to which a given human population may reasonably be exposed. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposure within a single medium or across media. A hazard index of less than or equal to 1 (≤ 1) indicates that it is unlikely for even sensitive populations to experience adverse health effects.

In the absence of certainty regarding the presence of formaldehyde, and without having fully identified background levels of arsenic, it is not possible to characterize fully the risks posed by the L-P site. Therefore, the results of the process described above are estimated risks of exposure to soil and groundwater. The estimated risk levels for each exposure pathway are shown for carcinogenic risks (total upper-bound lifetime excess cancer risks) and for noncarcinogenic risks (Hazard Index) in Table 6-1 for all current and future use scenarios.

6.1 Risk Levels of Concern

In general, risk levels of concern are those that represent a significant potential threat to human health. As stated in Section 300.430(e) of the National Contingency Plan (55 FR 8848), acceptable exposure levels for known or suspected carcinogens are generally those concentration levels that represent an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}. For noncarcinogens, the acceptable exposure level is generally one for which the Hazard Index does not exceed a value of 1.

Exposure pathway scenarios at the L-P site for which estimated risks exceed the threshold of 1×10^{-6} are shown in Table 6-2. Of all the 38 chemicals evaluated in the risk assessment, only arsenic and formaldehyde had concentrations high enough to pose risks exceeding the levels of concern and thus be considered for remedial action.

6.2 Chemical Levels of Concern

For each of the five exposure pathway scenarios shown in Table 6-2, a carcinogenic-risk-based "residual concentration" was calculated for the average and maximum cases (shown in columns 6 and 7, respectively). These residual concentrations correspond

Table 6-2. RISK-BASED RESIDUAL CONCENTRATIONS AND CORRESPONDING SAMPLE LOCATIONS AND CONCENTRATIONS

Exposure Pathway Scenarios[a]	Medium and Location	Chemical (units)	Concentration Used in EA/ Corresponding Upperbound Lifetime Excess Cancer Risk		Cancinogenic Risk-Based Residual Concentrations		Sample Number/Concentration (depth or location) > Risk-Based Residual Concentration	
			Average Exposure	Maximum Exposure	Average Exposure Cancer Risk 1×10^{-6}	Maximum Exposure Cancer Risk 1×10^{-4}	Average Exposure	Maximum Exposure
CU5 Current Exposure of Adult Resident by Inhalaton of Hardboard Plant Emissions	Air Offsite North of Plant	HCHO ($\mu g/m^3$)	$7.8/6 \times 10^{-6}$	—	1.2	—	Of three locations only the predominant wind direction to the north exceeded residual concentration	—
FU1 Future Exposure of Child Resident by Contact with Surface Soil-Plant	Surface Soil Plant	Arsenic (mg/kg)	$5.6/4 \times 10^{-6}$	—	1.4	—	All samples analyzed/ Range 2.2–12.6	—
FU4 Future Exposure of Adult Resident by Ingestion of Shallow Groundwater Plant	Shallow Groundwater Plant	Arsenic (µg/L)	$5.9/2 \times 10^{-5}$	$39/9 \times 10^{-4}$	0.30[b]	4.3	All samples analyzed/ Range 1.9JL–38	ML-1/5.6JL (8-28 ft) ML-5/38 (7–27 ft) W-4/5.0JL (25–35 ft)
FU5 Future Exposure of Adult Resident by Inhalation of Volatilized Organics from Shallow Groundwater-Plant	Shallow Groundwater Plant	HCHO (µg/L)	$100/2 \times 10^{-5}$	$650/3 \times 10^{-4}$	5[b]	217	All samples in which it was detected/Range 17J to 650J	W-4/650J (28 ft) W-9/420J (12 ft)
FU7 Future Exposure of Adult Resident by Inhalation of Volatilized Organics from Groundwater-Landfill	Regional Groundwater Landfill	HCHO (µg/L)	$18/5 \times 10^{-6}$	—	3.6	—	W-2A/14 (150 ft) W-2A/27(185 ft) W-3B/45 (209 ft)	—

a Only exposure pathway scenarios for chemical concentrations which exceed a potential cancer risk of 1×10^{-6} for average exposure, 1×10^{-4} for maximum exposure, and an average exposure hazard index of 1 are listed

b These residual concentrations are below detection limits — 1.1 µg/L for arsenic and 10 µg/L for HCHO

— Concentration is less than the threshold level of concern; ie, $< 1 \times 10^{-6}$ for average exposure, $< 1 \times 10^{-4}$ for maximum exposure

7.8/ Concentration used in EA to calculate potential health risk

/6 x 10^{-6} Lifetime upperbound excess cancer risk corresponding to concentration used in EA

J Estimated concentration

L Result is greater than or equal to method detection limit but less than contract required quantitation limit

HCHO Formaldehyde

to the concentration of a contaminant that would pose either a 1×10^{-6} or a 1×10^{-4} cancer risk for the average or maximum plausible exposure case, respectively, in each scenario. The residual concentrations represent levels above which a chemical in a specific medium may pose a potential threat to human health.

For each of the exposure scenarios, existing concentrations of the chemical of concern were compared with the residual concentrations; those where the residual concentration was exceeded are shown in the last two columns in Table 6-2.

Arsenic concentrations in soil and shallow groundwater, and certain physical and chemical characteristics of groundwater at the plant, are presented in Tables 6-3 and 6-4, respectively. Maps showing the sample locations and concentrations of arsenic and formaldehyde in surface soil and shallow groundwater at the plant are presented in Figures 6-1 through 6-3.

The five exposure pathway scenarios in which chemical concentrations are estimated to pose a cancer risk to human health in excess of 1×10^{-6} for the average exposure case are discussed in the following sections.

6.3 Exposure to Hardboard Plant Emissions (CU5)

Under current-use scenario CU5 (exposure of an off-site adult resident by inhalation of hardboard plant emissions that migrate off-site), concentrations of gaseous formaldehyde in air at three locations near the L-P plant were evaluated in the risk assessment. The concentrations of gaseous formaldehyde used to determine inhalation risks at the three locations were based on results of hardboard plant air sampling and air modeling. The three locations were selected based on locations of residential areas and meteorological data. These locations are:

- Trailer park west of the L-P site
- L-P property southern fenceline
- Receptor located north of the L-P plant, the predominant downwind direction.

The adult resident receptor north of the plant was found to have a potential risk above the threshold level of concern for average exposure, based on annual average gaseous formaldehyde

Table 6-3. ARSENIC CONCENTRATIONS IN SOIL AND SHALLOW GROUNDWATER L-P PLANT

Sample Location	Concentration in Soil[a]		Concentration in Shallow Groundwater[b] LC = 0.30 µg/L Monitoring Samples µg/L (depth)
	Surface Soil mg/kg (depth) LC = 1.4 mg/kg	Subsurface Soil mg/kg (depth)	
P-1	2.5J (2 ft)	10.3 (10 ft)	NC
P-2	< 2.1J	22.8 (10 ft)	NC
P-3	9.8J (0 ft)	16.7 (5 ft)	NC
P-4	12.6J (0 ft)	14.7 (10 ft)	NC
P-6	NC	1.4LJ (10 ft)	NC
TP-1	3.2 (0 ft)	4.2 (5 ft); 4.1 (8 ft)	NC
W-1	3.8 (2 ft)	11.6 (5 ft)	NA
W-4	4.2 (0 ft)	2.9 (5 ft)	5.0JL (25–35 ft)
W-5	3.4 (0 ft)	4.0 (5 ft); 3.7 (10 ft)	NA
W-6 *	7.3J (0 ft)	78.5 (10 ft)	NA
W-7 *	10.8 (0 ft)	13.0 (5 ft)	NA
W-8	2.2JL (0 ft)	3.7 (5 ft); 2.8 (10 ft)	2.8JL (14.5–24.5 ft)
W-9 *	26.4 (0 ft)	22.5 (5 ft)	NA
ML-1	NC	NC	5.6JL (8–28 ft)
ML-3	NC	NC	1.9JL (9–29 ft)
ML-5	NC	NC	38.0 (7–27 ft)

a Detection limit for arsenic in soil is 0.4 mg/kg (ppm)

b Detection limit for arsenic in groundwater is 1.1 µg/L (ppb)

LC Level of concern, based on average exposure scenarios

NA Not applicable; well taps regional aquifer

NC. Not collected

J Estimated concentration

L Result is greater than or equal to method detection limit but less than contract required quantitation limit

* Sample located in the area to be remediated by Koppers

Table 6-4. CERTAIN PHYSICAL CHARACTERISTICS OF GROUNDWATER FROM PLANT MONITORING WELLS

Well No.	Spec Cond. @ 25 ° C	Boron (µg/L)	Arsenic (µg/L)	Temp °C	Depth to Water (feet)	Screen Interval (feet)	Aquifer Designation
ML-1	2,050	725	5.6JL	23	6.8	6 - 30	Shallow
ML-2	680	482	< 1.1	18	26.7	140 - 166	Regional
ML-3	690	702	1.9JL	22	10.8	8 - 31	Shallow
ML-4	650	445	< 1.1	19	33.0	131 - 156	Regional
ML-5	670	864	38	22	6.4	5 - 28	Shallow
ML-6	850	333	< 1.1	19	36.9	64 - 79	Regional
ML-7	625	854	< 1.1	21.5	22.1	18 - 43	Upper Regional
MW-20A	690	275	< 1.1	20	36.7	72 - 82	BU '
MW-20B	600	531	< 1.1	19	36.4	113 - 123	BL '
MW-21A	950	497	< 1.1	16.5	30.4	78.5 - 88.5	BU '
MW-21B	680	338	< 1.1	20	30.7	124 - 134	BL '
MW-22A	590	614	< 1.1	16	28.3	65.5 - 75.5	BU '
MW-22B	720	575	< 1.1	17	27.1	120 - 130	B '
MW-22C	500	3,840	1.9JL	20.5	28.3	175.5 - 185.5	C '
W-1	720	1,170	< 1.1	20	32.3	173.5 - 193.5	C '
W-4	2,600	740	5.0JL	21	15.3	25 - 35	Shallow
W-5	780	235	< 1.1	19	33.6	121.5 - 139	Regional
W-6	610	233	1.2JL	20	33.6	78 - 88	Regional
W-7	720	1,070	< 1.1	17	30.2	43 - 53	Upper Regional
W-8	800	559	2.8JL	23	6.6	14.5 - 24.5	Shallow
W-9	700	577	1.9JL	18	31.6	45 - 55	Upper Regional

(oval) Significant information from wells tapping the shallow aquifer

B ' Dames & Moore designation for Regional Aquifer; U - Upper, L - Lower
C ' Dames & Moore designation for Deep Regional Aquifer
J Estimated concentration
L Result is greater than or equal to the method detection limit but less than the contract required quantitation limit

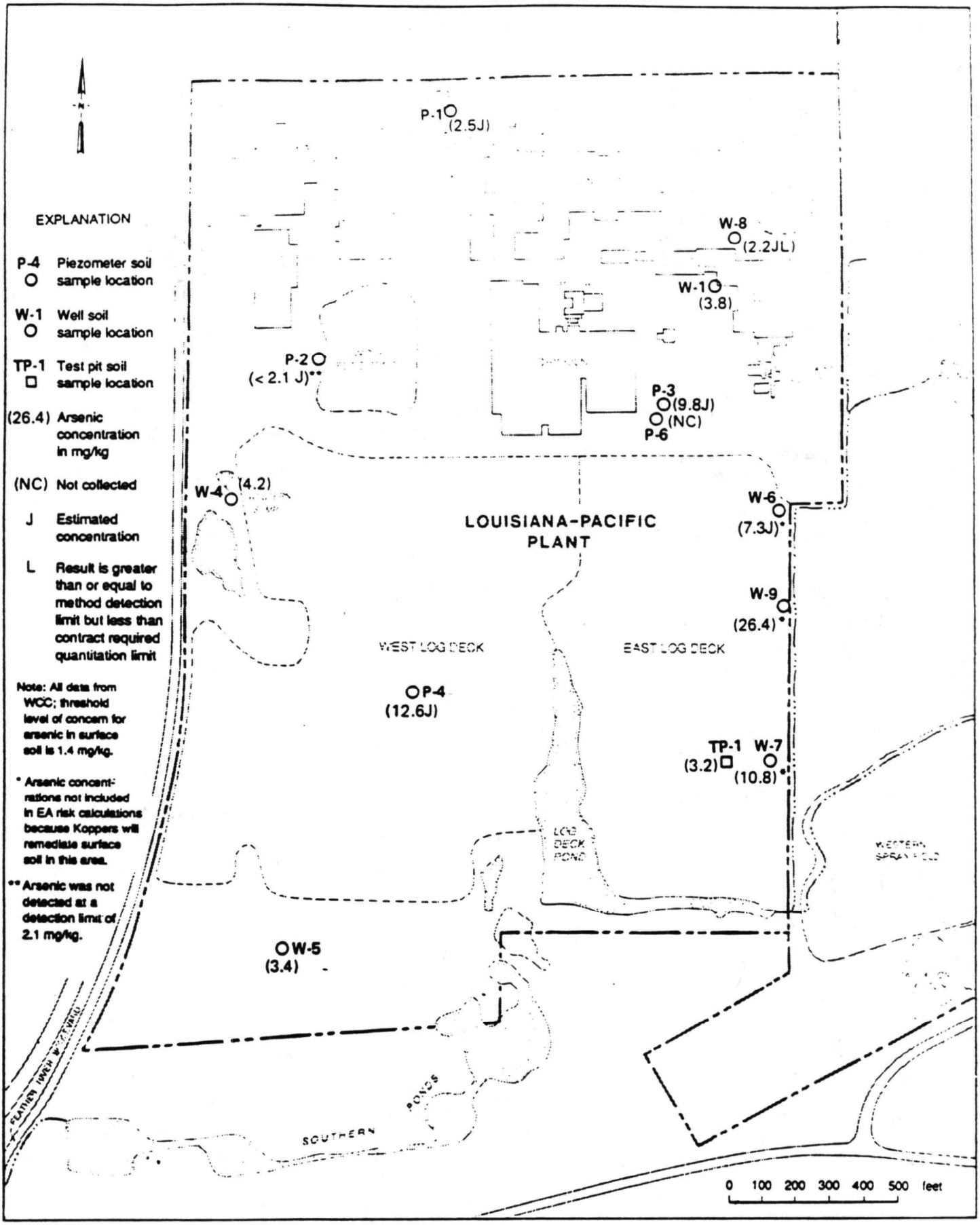

Figure 6-1. ARSENIC DISTRIBUTION IN SURFACE SOIL L-P PLANT

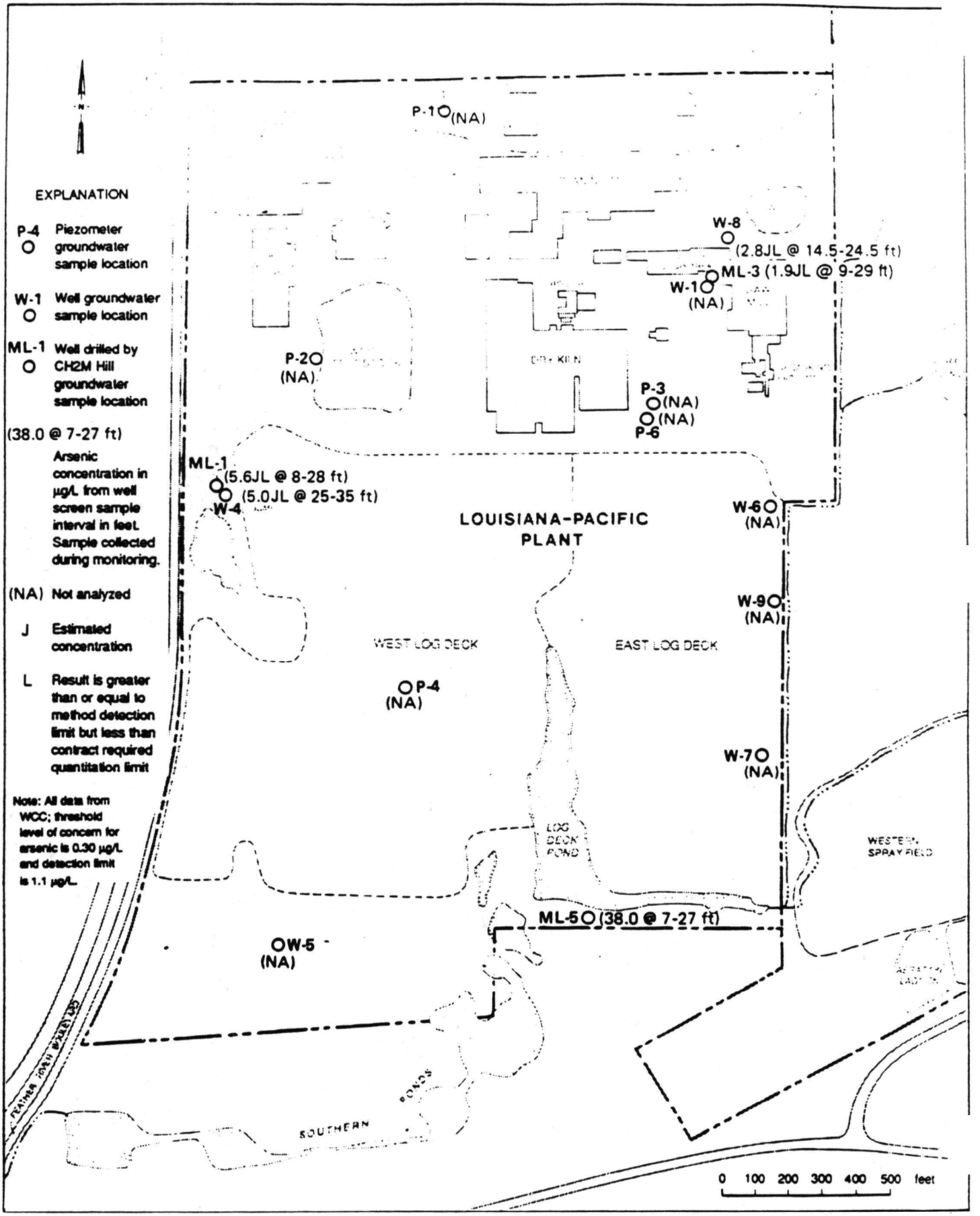

Figure 6-2. ARSENIC DISTRIBUTION IN SHALLOW GROUNDWATER L-P PLANT

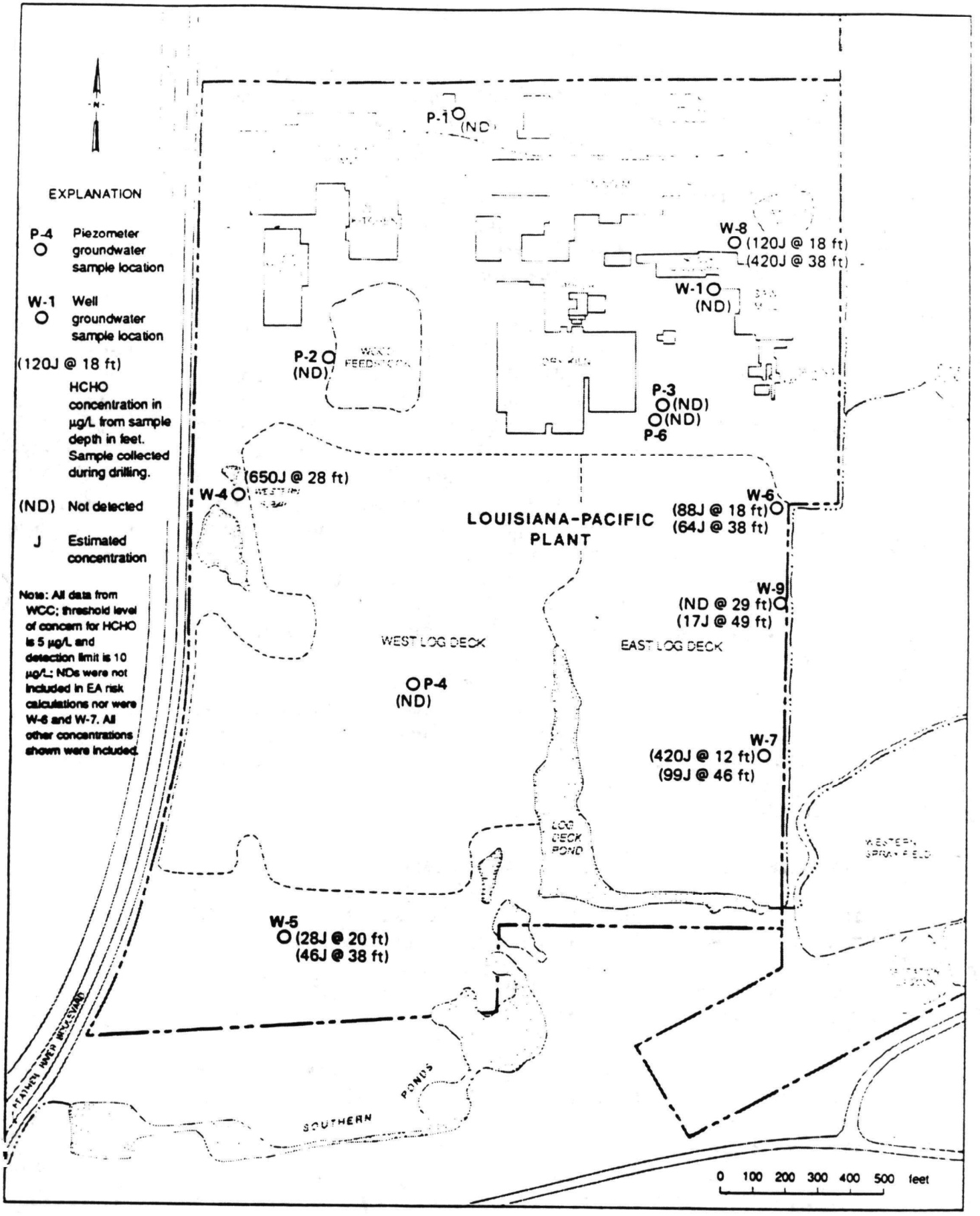

Figure 6-3. FORMALDEHYDE DISTRIBUTION IN SHALLOW GROUNDWATER L-P PLANT

emission rates. The potential upper-bound excess lifetime cancer risk was calculated to be 6 x 10^{-6} for an annual average gaseous formaldehyde concentration of 7.8 $\mu g/M^3$ at the northern receptor.

Exposure to airborne emissions from the hardboard plant was fully characterized in the RI, and the risks associated with this exposure were fully evaluated in the EA. Therefore, no additional information is necessary to identify these risks.

6.4 Exposure to Surface Soil at the Plant (FU1)

Under future-use scenario FU1 (exposure of a child resident by contact with plant surface soil) concentrations of arsenic exceeded the threshold of concern in the average exposure case (Table 6-2). Arsenic concentrations detected in surface soil samples from Wells W-6, W-7, and W-9 were not included in the risk assessment calculation because EPA's Record of Decision (ROD) for the Koppers site calls for cleanup of soils by Koppers along the eastern side of the L-P plant where these wells are located. All remaining surface soil samples analyzed for arsenic were above the 1.4 mg/kg residual concentration (that is, the level associated with a cancer risk of less than or equal to 1 x 10^{-6}) (Tables 6-2 and 6-3, and Figure 6-1) with a maximum concentration of 12.6 mg/kg.

Although there is insufficient to establish remedial action goals for the site, there is no uncertainty that the concentrations of arsenic present in the soil at the site pose a potential public health risk in excess of the threshold level of concern under this future use scenario.

6.5 Ingestion of Groundwater at the Plant (FU4)

In future-use scenario FU4 (exposure of adult resident by ingestion of shallow groundwater from beneath the plant), the risk of exposure to arsenic was found to exceed the residual concentrations for both a cancer risk of 1 x 10^{-6} for the average exposure case and 1 x 10^{-4} for the maximum exposure case (Tables 6-2 and 6-3, Figure 6-2).

The risk assessment was based upon arsenic concentrations in groundwater sampled from five plant monitoring wells tapping the shallow aquifer. These wells are W-4, W-8, ML-1, ML-3, and ML-5. All the other monitoring wells tap the regional aquifer (Table 6-4). Of the five wells, four had arsenic concentrations in groundwater ranging from 1.9 to 5.6 $\mu g/L$. Well ML-5 had a concentration of 38 $\mu g/L$, significantly higher than the others.

ML-5 lies approximately 60 feet south of the log deck pond (Figure 6-2). It is likely that this high level of arsenic is related to the well's proximity to the log deck pond, where both surface water and pond sediments are known to contain arsenic. The water level in Well ML-5 appears to fluctuate in response to water level changes in the log deck pond, suggesting that groundwater in the well and surface water in the pond are in hydraulic communication. One possible explanation for the higher arsenic levels in ML-5 is that reducing conditions in the pond sediment could result in the release of arsenic in its more mobile reduced ionic state. The arsenic then might move into the area of Well ML-5 when the log deck pond level is higher than groundwater levels - that is, when the gradient and flow direction are from the pond to the well.

Although there is insufficient information to establish remedial action goals for the site, there is no uncertainty that the concentrations of arsenic present in the groundwater at the site pose a potential public health risk in excess of the threshold level of concern under this future use scenario.

6.6 Inhalation of Volatiles in Groundwater at the Plant (FU5)

In future-use scenario FU5 (exposure of adult resident by inhalation of volatilized organics from shallow groundwater beneath the plant), the potential risk of exposure to formaldehyde was estimated to exceed a cancer risk of 1×10^{-6} for the average exposure case and 1×10^{-4} for the maximum exposure case (Table 6-2, Figure 6-3). The risk assessment was based upon formaldehyde concentrations in groundwater samples collected from shallow depths (less than 50 feet) during drilling. Six of 12 sample locations (Wells W-4, W-5, W-6, W-7, W-8, and W-9) had formaldehyde concentrations above detection limits during drilling. These samples had formaldehyde concentrations ranging from 17J to 650J µg/L.

Sample locations W-6, W-7, and W-9 were excluded from the risk assessment because EPA's 1989 ROD for the Koppers site required cleanup of the groundwater along the eastern side of the L-P plant where these wells are located. Concentrations of formaldehyde in the three wells used in the risk assessment (W-4, W-5, and W-8) ranged from 28J to 650J µg/L.

As discussed above, additional monitoring is necessary to determine conclusively whether formaldehyde exists in the shallow

groundwater at the L-P plant at the levels detected. However, formaldehyde is a carcinogen even at levels lower than those detected. The detected levels of formaldehyde pose a potential threat to public health from exposure to groundwater at the site under this future use scenario.

6.7 Inhalation of Volatiles in Groundwater at the Landfill (FU7)

In future-use scenario FU7 (exposure of adult resident by inhalation of volatilized organics from the regional aquifer at the landfill), formaldehyde was estimated to exceed a cancer risk 1 x 10^{-6} for the average exposure case, Table 6-2). The risk assessment was based upon formaldehyde concentrations in three of four samples of groundwater collected during drilling of Wells W-2A and W-3B at the landfill. These samples had formaldehyde concentrations of 14J, 27, and 45 µg/L at depths of 150, 185, and 209 feet, respectively. Formaldehyde was not detected in adjacent Wells W-2 and W-3 after they were completed and sampled as monitoring wells.

The presence of formaldehyde in groundwater beneath the landfill is uncertain because it was not detected during monitoring. Therefore, additional monitoring is necessary to conclusively establish the presence or absence of formaldehyde in groundwater beneath the landfill. However, the information presented above is sufficient to establish a potential threat to public health from exposure to the groundwater beneath the L-P landfill under this future use scenario.

6.8 Environmental Risks

The Remedial Investigation and the Endangerment Assessment both looked at potential environmental receptors on or near the site. The Feather River Wildlife Refuge is located on the western side of the Feather River and may be a habitat of certain threatened or endangered species of wildlife. However, no such species are known to inhabit the site, primarily due to the disturbed, industrial nature of the area. Contaminants of concern were not been detected in Feather River surface water or sediments in EPA's 1986 sampling done as part of the Koppers RI.

The potential risks to terrestrial and aquatic species of plants and animals associated with the chemicals of potential concern at the L-P site were assessed in the EA. The method used in the assessment of risks to aquatic organisms and plants was to compare the concentrations of contaminants (in each of the media such as surface water, soil, and sediment that the species might

encounter) with toxicity reference values (TRVs) for those species. Risks to terrestrial animals were assessed by comparing estimated doses (calculated based on geometric mean and maximum contaminant concentrations) to TRVs. Where Ambient Water Quality Criteria (AWQC) have been developed or proposed by EPA, these were used as TRVs in the assessment of risks to aquatic life.

A summary of the comparison of contaminant concentrations and estimated doses to TRVs and AWQC is presented in Table 6-5. The general conclusions regarding the potential for environmental risks are summarized below.

The potential for toxic effects on aquatic organisms was present in each of the four locations of surface waters evaluated: 1) the L-P log deck pond, 2) the off-site ponds south of the L-P plant, 3) other surface waters at the L-P plant, and 4) the leachate collection ponds at the landfill. Some of the chemicals which exceed TRVs or AWQC appear to come from the Koppers facility, and others may be the result of the mineral content of the soils in this area.

The L-P log deck pond receives run-off from the log deck and also from the adjacent Koppers Superfund Site. Historically, run-off from the Koppers site has been significantly contaminated with chemicals used in the wood treating processes, which include many of the chemicals listed in section "A" of Table 6-5. As the cleanup remedy at Koppers is implemented, water quality in the log deck pond should improve substantially.

The off-site ponds are downgradient of the log deck pond and as a result receive run-off from both the L-P site and Koppers, as well as from other commercial facilities (including a junk yard) adjacent to the ponds. Available data are not sufficient to determine which of these may be the source(s) of the chemicals in these ponds which exceed TRVs or AWQC.

The other surface water samples taken at the L-P plant were primarily wet weather samples of run-off and small run-off collection "ponds". The only dry weather samples were from the ditch along the L-P/Koppers boundary and from the western sump. Water quality in the ditch will be improved by the soil cleanup to be conducted in that area as part of the Koppers remedy. The western sump is essentially a small industrial pond that receives blowdown from the L-P boilers and run-off from the log deck.

Table 6-5. Summary of Potential Environmental Effects

A. Chemicals Detected in Surface Waters at Concentrations Exceeding TRVs[a] or AWQC[b]

RECEPTOR	L-P Log Deck Pond	Off-Site Ponds	Other Surface Waters at the L-P Plant	Landfill Ponds
Terrestrial Animals				
Quail	None	None	Aluminum* Barium* Iron* Mercury*	None
Rabbit	None	None	Aluminum* Barium* Chromium* Iron* Mercury* Nickel*	None
Aquatic Life	PCP Aluminum Boron Chromium(VI) Copper Iron Lead Manganese Vanadium	Aluminum Boron Copper Iron Lead Manganese Vanadium	Aluminum Arsenic Barium Beryllium Boron Cadmium Chromium(VI) Chromium(III) Copper Iron Lead Manganese Mercury Nickel Vanadium Zinc	Barium Boron Chromium(VI) Copper Iron Manganese Vanadium

[a]TRVs: Toxicity Reference Values
[b]AWQC: Ambient Water Quality Criteria
None: No chemicals exceeded TRVs
* : Only the maximum doses exceeded TRVs

Table 6-5. Summary of Potential Environmental Effects (concluded)

B. Chemicals Detected in Surface Soils at Concentrations Exceeding TRVs[a]

RECEPTOR	L-P Log Deck Pond	Off-Site Ponds	Other Surface Waters at the L-P Plant	Landfill Ponds
Terrestrial Plants	- -	- -	Antimony Boron* Chromium* Copper Manganese* Nickel* Zinc	Nickel

[a]TRVs: Toxicity Reference Values
[b]AWQC: Ambient Water Quality Criteria
- - : Not evaluated for this location
* : Only the maximum doses exceeded TRVs

Risks to terrestrial wildlife were evaluated by estimating the effects on two indicator species (rabbits and quail) from ingestion of surface water at the L-P site. Estimated doses to quail and rabbits based on geometric mean concentrations of contaminants are below the TRVs for all sampling areas. Maximum doses to these animals exceeded TRVs for one or more chemicals at the plant only.

Risks to terrestrial plants were evaluated at the L-P plant and the landfill. The geometric mean concentrations of the chemicals of concern at the plant are less than the TRVs except for antimony, copper and zinc. At the landfill, only the maximum concentration of nickel in surface soil exceeded the TRV. The landfill surface soils are primarily soil excavated locally and placed over the landfill material as a cap. Risks from organic chemicals were not assessed because of insufficient information on plant toxicity.

The environmental risks posed by the Site do not warrant any interim remedial action.

6.9 Risks to be Addressed by Interim Remedial Action

The potential future residential use of the L-P site poses risks of human exposure to surface soil at the L-P plant and groundwater at the plant and the landfill exceed the threshold level of concern. However, additional information is needed to resolve uncertainty about the existence of formaldehyde in groundwater and the background concentrations of arsenic in soil and groundwater. It is therefore not possible at this time to set remediation goals or select final remedial actions for the site. The interim remedial actions selected in this Record of Decision are necessary to eliminate the potential for exposure to contaminated soil and groundwater prior to selection of a final remedy.

7.0 DESCRIPTION OF ALTERNATIVES

Remedial alternatives were not developed for hardboard plant emissions discussed in Section 6.3 because EPA determined that it was appropriate to evaluate these emissions under the Clean Air Act.

Until data on background concentrations of arsenic in soil and groundwater and the presence or absence of formaldehyde in groundwater are obtained, the actual risks posed by exposure to soil and groundwater at the site cannot be fully characterized, and alternatives for addressing such risks cannot be identified and evaluated. Alternatives identified and evaluated in the Feasibility Study may be considered in selecting a final remedy for this site after the necessary additional data is obtained.

For purposes of preventing exposure to contaminated soil and groundwater at the site, EPA evaluated several interim institutional controls.

To prevent access to contaminated soil at the L-P plant, EPA considered site access restrictions such as perimeter fencing and deed restrictions on future residential use of the site. This alternative is more effective in preventing possible future residential use than no action, and is implementable. The cost of this alternative is estimated to be $193,000 based on the cost of fencing the perimeter of the plant.

To prevent domestic use of shallow groundwater at the L-P plant and regional groundwater at the L-P landfill, EPA considered institutional restrictions on the drilling of wells and extraction of groundwater. This alternative is effective in protecting human health by preventing potential exposure to contaminated groundwater. Such restrictions on use are implementable through the Butte County well drilling permit program at no significant cost. Additional monitoring will be performed to define the areal extent of contamination, including the construction of additional offsite monitoring wells if formaldehyde is detected at the detection limit during monitoring of existing onsite wells. If additional wells are needed the estimated capital costs of these wells is $119,000, and the estimated net present worth cost is $411,000.

Variations on these alternatives were evaluated in the Feasibility Study and presented in the proposed plan as EPA's preferred alternative to addressing risks posed by the site. <u>See</u> discussion under Section 11.0 DOCUMENTATION OF SIGNIFICANT CHANGES.

8.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) AND TO-BE-CONSIDERED CRITERIA

Remedial actions selected under CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), must ensure protection of human health and the environment. SARA specifies that any selected remedial action must achieve a level or standard of cleanup that meets legally applicable or relevant and appropriate requirements, standards, criteria, or limitations (ARARs).

ARARs are generally separated into three categories: (1) ambient or chemical-specific requirements that set health- or risk-based concentration limits or ranges for particular chemicals; (2) performance, design, or action-specific requirements that govern particular activities; and (3) location-specific requirements. ARARs for the L-P site are discussed in sections 8.1 through 8.3.

The wastes on the site are not hazardous wastes as defined in the Resource Conservation and Recovery Act (RCRA). None of the remedial alternatives involves the placement of such wastes and consequently the RCRA land disposal restrictions (LDRs) are not triggered.

No formal determination of the presence of wetlands was made during the RI/FS. The log deck pond and surrounding area would be potential candidates for such a designation. The institutional controls described in this Record of Decision do not involve the construction of facilities on or management of such areas, and otherwise have no adverse effect on such areas.

8.1 Contaminant-Specific ARARs

The potential contaminant-specific ARARs that apply or are relevant and appropriate to the L-P site are presented in Table 8-1. These are subdivided into Safe Drinking Water Act Maximum Contaminant Levels (MCLs) promulgated by the federal government and by the State of California, and Ambient Water Quality Criteria (AWQC) for drinking water and for fresh water aquatic organisms.

These contaminant-specific ARARs must be considered for any groundwater remedial actions. There are no contaminant-specific ARARs for soil at the L-P site.

Table 8-1. POTENTIAL CONTAMINANT-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) LOUISIANA-PACIFIC SITE

Chemical	Safe Drinking Water Act MCLs[a] (µg/L)	Ambient Water Quality Criteria (AWQC) (µg/L	
		Drinking Water Only[b]	Fresh Water Aquatic Organisms Only[c]
Benzene	5(1)[d]	0(0.67)	—
Ethylbenzene	(680)[d]	2,400	—
Isopropyl Ether	—	—	—
Methylene Chloride	—	—	—
Pentachlorophenol	220[i]	1,010	20.00/13.00[e]
Tetrachlorophenol	—	1.0	—
PAHs Carcinogenic	—	0(0.0031)	—
Noncarcinogenic	—	—	—
PCDDs/PCDFs	—	0(0.00000018)[g]	—
Toluene	—	15,000	—
Xylenes	(1,750)[d]	—	—
Formaldehyde	—	—	—
Arsenic	50	0(0.25)	360.00/190.00[f]
Barium	1,000	—	—
Boron	—	750[h]	—
Chromium	50	50	16.00/11.00[j] 1700/210[j]
Copper	1,000	1,000	18/12[k]
Nickel	—	15.4	1400/160[k]

a Standards are primary Maximum Contaminant Levels (MCLs), and are based on health-related considerations, and technological and economic feasibility of control, except for copper. For copper, the MCL is an SMCL or Secondary Maximum Contaminant Level based on organoleptic effects

b Adjusted EPA Ambient Water Quality Criteria (AWQCs) for drinking water only. AWQCs for potential carcinogens are set at zero; values in parentheses are concentrations associated with 10^{-6} excess lifetime cancer risk. Criterion for copper is based on organoleptic considerations

c Two values are given (e.g. 20.00/13.00) 20.00 = acute value or 1 hour exposure per 3 years; 13.00 = chronic value or 4 days exposure per 3 years

d Parenthetical value is a California state maximum contaminant level

e Values are pH-dependent; based on pH of 7.8

f Values for Arsenic (+3)

g For 2, 3, 7, 8-TCDD. Dioxin/furan toxicity equivalents are also used in determining 2, 3, 7, 8 TCDD levels

h Boron AWQC is based on protection of sensitive crops during long-term irrigation

i EPA proposed maximum contaminant level goal

j Values for both Chromium (+6) on upper line, and chromium (+3) on lower line; Cr(+3) is hardness dependent (100 mg/L used)

k Values for Copper and Nickel are hardness-dependent; based on hardness of 100 mg/L of $CaCO_3$

8.1.1 Federal Drinking Water Standards. Potential drinking water standards at the L-P site include Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs), and Secondary Maximum Contaminant Levels (SMCLs). As stated in CERCLA Section 121(d)(1), MCLGs are potential cleanup standards when these levels "are relevant and appropriate under the circumstances" and are not a zero value. In general, the relevant and appropriate standards to establish groundwater cleanup levels at the site are the Federal Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act (Table 8-1, Column 2).

There is no MCL for formaldehyde. The MCL for arsenic is 50 ppb, which is not exceeded at this site. Therefore the selected interim remedial action will comply with the ARAR for groundwater.

8.1.2 State Drinking Water Standards. California Drinking Water Standards establish enforceable limits for substances that may affect health or aesthetic qualities of water and apply to water delivered to customers. The state's Primary Standards are based on federal National Interim Primary Drinking Water Regulations. Currently, for contaminants found at this site, or known to be present on the adjacent Koppers site, California has promulgated MCLs for benzene, ethylbenzene, and xylenes (values in parentheses in Column 2 of Table 8-1).

8.1.3 Ambient Water Quality Criteria. Adjusted EPA Ambient Water Quality Criteria (AWQCs) for drinking water are potential ARARs for the L-P site (Table 8-1, Column 3). For potential carcinogens, AWQCs are set at zero. For certain contaminants, concentrations associated with a 10^{-6} excess lifetime cancer risk are also shown (values in parentheses) in Column 3 of Table 8-1.

8.2 Action-Specific ARARs

The interim remedial actions described in this Record of Decision do not trigger any action-specific ARARs.

8.3 Location-Specific ARARs

8.3.1 Fault Zone. The L-P site is not located within 61 meters (200 feet) of an identified fault. Therefore, the fault zone requirement of 40 CFR Section 264.18(a) is satisfied.

8.3.2 Floodplain. Under 40 CFR Section 264.18(b), hazardous waste treatment facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood, unless one of the exemptions listed in the regulation applies. The L-P site is located in a 100-year floodplain of the Feather River. The interim remedial actions described in this Record of Decision do not include treatment, and therefore the requirements of 40 CFR Section 264.18(b) are not triggered.

8.4 To-Be-Considered Criteria

In establishing remedial alternatives, EPA considers various procedures, criteria, advisories, and resolutions. These "to-be-considered" criteria (TBCs) do not carry the weight of ARARs, but may be relevant to the cleanup of a site. The only such criterion relevant to the interim remedial actions described in this Record of Decision is the California Department of Health Services' Recommended Drinking Water Action Level for formaldehyde, which is 30 ppb.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The interim actions described in this Record of Decision represent a cost-effective means of preventing potential exposure to contaminated soil and groundwater at the site. Because these institutional controls do not represent the final remedial actions at the site, they have not been compared to other remedial actions which may be selected in a final Record of Decision. These measures have, however, been evaluated against EPA's nine evaluation criteria:

1) Overall protection of human health and the environment

The institutional controls prevent contact with contaminated surface soil and groundwater, thereby limiting human exposure and reducing potential future risks below the level of concern.

2) Compliance with ARARs

There are no ARARs, criteria or guidance that apply to arsenic in surface soil. The MCL for arsenic in groundwater, 50 ppb, is not exceeded at this site. There are no ARARs for formaldehyde in groundwater. The California Recommended Drinking Water Action Level, a TBC criteria for establishing remedial action goals at

Superfund sites, for formaldehyde is 30 ppb. The interim institutional controls will not meet this standard.

3) Short-term effectiveness in protecting human health and the environment

The risks associated with soil and groundwater contamination at this site are future risks. The interim institutional controls reduce these risks below the level of concern, and implementation of these controls will not create any short-term risks.

4) Long-term effectiveness and permanence in protecting human health and the environment

The institutional controls are effective as long as they are enforced by EPA or local authorities. Because this is an interim remedial action, these measures are not intended to be permanent, but only to prevent exposure during selection of final remedial measures.

5) Reduction of toxicity, mobility, or volume of contaminants by treatment

The institutional controls do not meet the statutory preference for treatment to reduce toxicity, mobility, or volume of contaminants. Once the risks from exposure to site-related contaminants has been finally characterized, the need to treat these contaminants can be assessed.

6) Technical and administrative feasibility of implementation

The institutional controls can be readily implemented. The deed and well use restrictions can be obtained through Butte County. Site access restrictions can be implemented by Louisiana Pacific.

7) Capital, operation, and maintenance costs

The capital cost associated with implementing site access restrictions is estimated to be $193,000, based on the cost of fencing the perimeter of the site. No significant long-term operation and maintenance costs are associated with this action. The deed and well use restrictions can be implemented at no significant cost. If additional offsite monitoring wells are required to determine the presence or absence of formaldehyde in

groundwater, the estimated capital cost of such wells is $119,000, and the estimated net present worth cost is $411,000.

8) Community acceptance

Except for a letter from a member of the Oroville City Council expressing the opinion that the site should be deleted from the National Priorities List, all community concerns were expressed during a public meeting on the proposed plan. Community members raised the following major concerns:

- all site contamination should be cleaned up, rather than using institutional controls that allow contaminants to be left in place;
- something should be done about plant air emissions;
- institutional controls should not create a permanent industrial zoning for the site; and
- since the levels of contamination are so low, the process to remove the site from the NPL should begin as soon as possible.

Responses to all comments are set forth in the Response Summary which accompanies this Record of Decision.

9) State Acceptance

The State of California supports the interim remedial actions proposed by EPA. In its comments on the proposed plan, the State Department of Health Services provided several suggestions for implementing the selected remedy during RD/RA. These concerns will be taken into consideration during implementation.

10.0 SELECTED REMEDY

10.1 Selected Soil Remedy

EPA has determined that additional information is needed to determine background levels of arsenic in soil and to set remedial action goals for the site. During the time that additional information is collected and analyzed, however, the potential risk of exposure to contaminated surface soil at the site remains. Therefore, to eliminate the potential for exposure to contaminants from the site, EPA has selected to employ institu-

tional actions as an interim remedial action. Such institutional actions consist of:

- o Deed restriction on future residential use of the L-P plant
- o Site access restrictions, e.g., fencing the perimeter of the L-P..

The total capital and present-worth costs of the institutional actions are estimated to be $193,000.

The deed restrictions are necessary to prevent future residential use of the site. Despite current zoning restrictions and the presence of the L-P facility at the site, residential development may occur at the site. Zoning restrictions are not permanent, and L-P could sell the property to residential developers. The site is near other residential property and is otherwise suited for residential use. Substantial time may be required to collect and analyze the additional information necessary to make a final remedial determination at this site. The deed restrictions are therefore appropriate interim measures.

The site access restrictions are necessary to prevent current access to the site by trespassers, particularly children who live near the site. L-P has acknowledged that incidents of trespassing have occurred at the site. The levels of arsenic in the soil pose a potentially unacceptable risk to such trespassers.

Additional sampling will be conducted to determine background concentrations of arsenic in surface soil on and near the L-P plant.

10.2 Selected Groundwater Remedy

EPA has determined that additional information is needed to obtain additional information about the presence of formaldehyde, to obtain information about background levels of arsenic in groundwater, and to set remedial action goals for the site. During the time that additional information is gathered and analyzed, however, the potential risk of exposure to contaminated groundwater remains. Therefore, to eliminate the potential for exposure to contaminants, EPA has selected to employ institutional actions at the site. Such institutional actions consist of:

- o Well permit restrictions to (1) prohibit the drilling of shallow aquifer wells on or near the L-P plant, (2) provide proper seals on deep wells on or near the L-P plant which are drilled through the shallow aquifer, and (3) prohibit drilling of deep wells at the L-P landfill.

The institutional controls for groundwater evaluated in the Feasibility Study and described in the proposed plan as part of the proposed final remedy included installation of five offsite groundwater monitoring wells to determine the areal extent of contamination. However, for purposes of this interim remedial action, EPA has determined that additional monitoring at existing wells may be sufficient to determine the presence or absence of formaldehyde in the shallow aquifer. Therefore the selected remedy does not require construction of additional off-site monitoring wells unless formaldehyde is detected above the detection limit during monitoring at existing on-site wells. The well permit restrictions can be implemented without significant cost.

The well permit restrictions are necessary to prevent domestic use of the shallow groundwater associated with the L-P plant and the regional aquifer beneath the landfill. Such domestic use could take place despite deed and site access restrictions, since these aquifers may extend beyond the boundaries of the L-P property.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The proposed plan for the L-P site was released for public comment in May, 1990. EPA's preferred alternatives and remedial objectives were documented in the plan. At that time, EPA proposed that the institutional controls described above represent the final remedial action at the site, with ongoing monitoring to assess the effectiveness of and continued need for these controls. EPA has reviewed all written and verbal comments received during the public comment period. Several commenters favored complete cleanup of the site, and some were concerned that imposing deed and well use restrictions would permanently inhibit flexible development of the L-P property. Other commenters felt that, because the information on background levels of arsenic and the existence of formaldehyde is inconclusive, no remedial action should be taken at all.

The selection of interim institutional controls will prevent exposure to contaminated soil and groundwater while additional information is obtained which will allow EPA to establish what remedial goals, if any, are appropriate for this site. The change from a final to an interim remedy does not fundamentally alter the scope, performance, or cost of the selected remedial actions.

The institutional controls for groundwater evaluated in the Feasibility Study and described in the proposed plan as part of the proposed final remedy included installation of five offsite groundwater monitoring wells to determine the areal extent of contamination. However, for purposes of this interim remedial action, EPA has determined that additional monitoring at existing wells may be sufficient to determine the presence or absence of formaldehyde in the shallow aquifer. Therefore the selected remedy does not require construction of additional off-site monitoring wells unless formaldehyde is detected above the detection limit during monitoring at existing on-site wells.

12.0 STATUTORY DETERMINATIONS

The selected remedies are protective of human health and the environment as required by Section 121 of CERCLA. Potential risks from exposure to contaminated surface soil and groundwater are prevented by institutional actions that prohibit residential development of the site and restrict the drilling of groundwater wells. The selected remedies comply with ARARs and relevant TBCs.

The selected remedies are the most cost-effective approaches available to protect human health and the environment. The selected remedies use institutional actions to eliminate the potential for direct human exposure to surface soil and groundwater. These are the only contaminant pathways of concern.

The five-year review required by Section 121 of CERCLA is applicable to the selected remedies. Additional monitoring will be performed to establish the presence or absence of formaldehyde in groundwater and to establish background levels of arsenic in soil and groundwater.

RESPONSE SUMMARY

LOUISIANA-PACIFIC CORPORATION SUPERFUND SITE

OROVILLE, CALIFORNIA

Environmental Protection Agency
Region 9
San Francisco, California

September 1990

Response to Public Comments
on the
Proposed Plan and Feasibility Study
for the
Louisiana-Pacific Corporation Superfund Site
Oroville, California

I. INTRODUCTION

The United States Environmental Protection Agency ("EPA") held a public comment period from May 14 through June 13, 1990 on EPA's Feasibility Study ("IFS") and Proposed Plan for the Louisiana-Pacific ("L-P") Superfund Site in Oroville, California. The purpose of the public comment period was to provide interested parties with an opportunity to comment on the FS and Proposed Plan. The FS and Proposed Plan were made available on May 14, 1990 at the Butte County Health Department Library in Oroville and at the Meriam Library, California State University at Chico. By May 14, 1990, fact sheets containing EPA's Proposed Plan had been mailed to all interested parties. Notification of the public comment period was published in Oroville, Chico and Sacramento area newspapers.

A public meeting was held on May 22, 1990 at the Palermo School in Palermo, California. At this meeting, EPA representatives described the alternatives evaluated, presented EPA's preferred alternative and answered questions about the evaluation of the L-P site and the remedial alternatives under consideration.

Section 113(k)(2)(B)(iv) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") requires that EPA respond to significant comments on EPA's Proposed Plan. This Response Summary provides a review and summary of significant comments on the FS and the Proposed Plan. In addition to summarizing significant concerns and questions, the Response Summary presents EPA's responses to those concerns.

II. OVERVIEW OF THE RECORD OF DECISION

During the process of developing a proposed plan for soil and ground water contamination, EPA evaluated several alternatives. EPA's preferred alternatives are described below.

Ground Water Alternative - Institutional Action

EPA's selected remedial actions for ground water call for well permit restrictions while additional ground water monitoring is conducted. Within five years, EPA will conduct a review of the entire site to determine if any additional response actions are necessary.

The proposed well permit restrictions will prohibit future

on-site and off-site use of both shallow ground water on or near the L-P plant and deep ground water at the landfill, thereby preventing exposure from domestic use of such water. If future monitoring shows that arsenic and/or formaldehyde, either singly or in combination, are present at levels that trigger the need for additional remedial actions, then EPA will evaluate possible responses.

Soil Alternative - Institutional Action

The public health risk from contaminated soil is a future risk associated with residential use of the L-P plant site. Such development is currently prohibited by the Butte County zoning ordinance which allows only industrial use of the site. EPA has selected remedial actions that would result in restrictions to site access (for example, fencing) and, via the property deed, a more reliable prohibition against future residential use of the plant site.

The selection of these remedial actions for soils is based on existing data about arsenic contamination at the site. If, in the future, additional data about background levels of arsenic in soils at the site show that the concentrations at the plant do not exceed background, then the remedy will be revised.

III. SUMMARY OF COMMENTS AND AGENCY RESPONSES

Both written and verbal comments were received by the Environmental Protection Agency (EPA) during the public comment period of May 14 - June 13, 1990. These comments and the EPA responses are presented in this section of the Response Summary. These comments, which include statements, questions and concerns, are grouped into the following subject categories:

A. General Community Concerns
B. Deed Restrictions
C. Well Permit Restrictions
D. Fencing
E. Air Emissions
F. Arsenic in Soil
G. Formaldehyde in Groundwater
H. Endangerment Assessment
I. Ground water Monitoring
J. Sources of Contamination

The originators of comments are identified in parentheses by last name, company or agency abbreviations. Written comments were received from the following individuals and agencies:

- Louisiana-Pacific Corporation (L-P)
- Beazer East, Inc. (formerly Koppers Company Inc.)
- Jim P. Carpenter, Director of Parks & Trees, City of Oroville
- State of California Department of Health Services ("DHS")

Verbal comments were received from four individuals and transcribed during the public meeting held May 22, 1990 in Palermo, California. Those comments that were documented in the meeting transcript (available in the Administrative Record) and not answered during the meeting are responded to herein. They were received from the following individuals:

- Ron Harmon
- Donna Ielati
- Ms. Bluford
- Deborah Daugherty.

After the close of the public comment period, additional information was submitted by Louisiana-Pacific Corporation in support of their written comments. This information did not substantially change EPA's responses to their initial comments. A copy of their submittal has been placed in the Administrative Record.

A. General Community Concerns

A.1) Every effort must be made towards removing L-P from the Superfund list. The process to remove this site from the list should be initiated. (Carpenter)

RESPONSE: Because of the potential health risks associated with future use scenarios, EPA is proposing limited controls and monitoring and therefore will not seek to delist the site now. Pursuant to CERCLA Section 121(c), EPA will, within five years, review the data collected through the proposed monitoring program and re-evaluate soil and ground water conditions at the site to determine if continuation of the institutional controls is necessary and/or if any other response actions are needed. If no further response actions are required, EPA will initiate the process to delete the site from the National Priorities List ("NPL"). This process (described in Section 300.425(e) of the National Contingency Plan, 55 FR 8845, March 8, 1990) includes consultation with the state and an opportunity for public review and comment on the delisting proposal.

A.2) I support total clean-up of the L-P site. (Daugherty)

RESPONSE: EPA believes that the proposed remedy is protective of public health and the environment. The proposed institutional actions are an effective means of managing the relatively low levels of contamination and associated public health risk present at this site. The remedies were selected for this site using the nine criteria described in the Proposed Plan, including the two threshold criteria 1) protection of human health and the environment and 2) compliance with applicable or relevant and appropriate requirements ("ARARs"). The only contaminant-specific, relevant and appropriate requirement for chemicals of concern at this site is the Safe Drinking Water Act's Maximum Contaminant Level ("MCL") for arsenic in drinking water. The MCL is not exceeded by existing arsenic concentrations in shallow ground water at the plant.

B. Deed Restrictions

B.1) My concern is that we have created a permanent industrial zoning by putting a deed restriction on L-P's property so that it can be used for no other purpose. (Harmon)

RESPONSE: The proposed deed restriction would prohibit only residential use of the site and would not restrict future use of the site for other purposes such as commercial or retail activities. Additionally, the restriction is not necessarily permanent. For example, if L-P elected to remove all arsenic in soils to levels that would be protective of human health and the environment (assuming those levels exceed background), EPA would remove the deed restriction.

B.2) A deed restriction at the site is inappropriate because it will permanently impair future uses of the property based on a knowledge of risk assessment that may change in the future. (L-P)

RESPONSE: The deed restriction is proposed based on existing knowledge of contamination at the site and the risk it poses to human health and the environment. Additional information is necessary to characterize fully the risk posed by the site. EPA will obtain and evaluate the necessary information before making a final remedial determination at the site.

C. Well Permit Restrictions

C.1) Well permit restrictions are unnecessary because California law prohibits the construction of domestic wells near industrial ponds or solid waste disposal sites. (L-P)

RESPONSE: The language in the California regulations is general in nature when it comes to defining "near", and the enforcing agency is left with substantial discretion to make that determination. The use of well permit restrictions over a defined geographical area will allow EPA to ensure that exposure to contamination in the shallow aquifer does not occur.

C.2) The shallow aquifer will require several additional monitoring wells off-property to more accurately determine its extent before placing well permit restrictions. (DHS)

RESPONSE: The RI did not involve any off-property wells screened in the shallow aquifer, and thus the extent of this aquifer is not known. EPA will require additional off-property monitoring wells as part of the continued ground

water monitoring.

D. Fencing

D.1) Fencing at the L-P site is not justified under CERCLA. The Endangerment Assessment ("EA") did not find any significant health risk which could be abated or reduced by fencing the site. The only use scenario which was found to pose a significant future risk was future residential development of the site. Although there have been reported incidents of trespassing and the current industrial uses may justify fencing of the site for safety reasons, these factors are outside the province of CERCLA. (L-P)

RESPONSE: Potential exposure of children to surface soil in a future residential use of the site was considered in the EA to be a significant health risk. Children currently living in nearby residential areas could gain access and face a similar health risk if the site remains unsecured. To prevent this potential exposure, the proposed plan calls for preventing unauthorized access to the site by, for example, fencing.

E. Air Emissions

E.1) What is going to be done about the pollution that's coming over in the air from L-P? (Ielati, Bluford)

RESPONSE: During EPA's Remedial Investigation (RI), data were collected on airborne dust and particulates as well as formaldehyde emissions from the hardboard plant. These data have recently been reviewed by EPA's Air and Toxics Division ("ATD") which concluded that at this time there are no federal, state or local air regulations which require further air emission controls at this site.

Primary responsibility for regulating air emissions from L-P and other industries in the Oroville area rests with the Butte County Air Pollution Control District ("BCAPCD"). Currently, L-P has several permits from the District that regulate emissions from the sawmill, planing mill, boilers and hardboard plant. These permits contain:

(a) specific numerical limits on stack gases such as carbon monoxide (CO), hydrocarbons, nitrogen oxides (NOx), sulfur oxides (SOx), and particulates;
(b) numerical limits on particulate emissions from cyclones and baghouses, including separate limits on the fiberdryer cyclones at the hardboard plant;
(c) opacity limits;
(d) a requirement that fugitive dust emissions (from rooftops, sawdust piles, roadways, plant grounds, etc.) not create a public nuisance outside the

plant boundaries, including requirements for regular cleaning to control fugitive dust and a 4-hour time limit to clean up after upsets;

(e) requirements for the use of certain air pollution control equipment on the boilers;

(f) source testing requirements, ranging from annual testing of the newest boiler to testing every other year on the fiberboard plant; and

(g) a requirement for continuous monitoring of boiler emissions.

BCAPCD staff review the monitoring and stack test data provided by L-P and, as resources permit, they inspect L-P's operations to evaluate permit compliance. In the past, L-P has been cited and fined by BCAPCD for several permit violations.

E.2) We support EPA's decision that air emissions from ongoing plant operations should be regulated exclusively under the Clean Air Act and Butte County Air Pollution Control District authorities. (Beazer)

RESPONSE: The proposed plan does not state a general policy that air emissions from ongoing process operations should be regulated exclusively under the Clean Air Act. However, in this case EPA has determined that the hardboard plant emissions should be regulated under the Clean Air Act.

F. Arsenic in Soil

F.1) The arsenic soil data from the L-P Remedial Investigation ("RI"), either standing alone or combined with the background arsenic data from the Koppers RI, indicate that arsenic concentrations in soil at the L-P site are within background levels. Statistical analysis of the geometric distributions of the various groupings of the data indicate no significant differences between the background concentrations and the plant site. (L-P)

RESPONSE: Neither the RI for L-P nor the one for Koppers gathered sufficient data to determine actual background arsenic levels for these two sites. In fact, as stated in the Koppers Record of Decision, additional sampling will be conducted as part of the remedial design in order to establish background levels of arsenic in soils at the Koppers site.

As part of their comments on this issue, L-P used a standard statistical test known as a "t-test" to compare the geometric means of a number of different groups of soils data with "background soil concentrations" from the L-P and Koppers sites. They concluded that there was no statistically significant difference in the L-P plant and background soil concentrations.

Due to the small number of background samples taken at the L-P site (3 samples from one boring), it is not appropriate to perform a statistical analysis on these data. In general, as the number of background samples decreases, the probability of a Type II statistical error (i.e., a false negative) increases. A Type II error would be to make the conclusion that the means of the plant and background soils are not significantly different, when they are in fact different (see page 4-9 of EPA's Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual, December 1989).

F.2) In their 1984 paper on the concentrations of elements in surface soils, Shacklette and Boerngen do not state that the regional background concentration of arsenic in the Northern Sacramento Valley ranges from 4.1. to 16 mg/kg as is reported in the EA and Feasibility Study (FS). (L-P)

RESPONSE: The regional background range of 4.1 to 16 mg/kg was inferred from data presented in the report by Shacklette and Boerngen. In that report, the authors show (on a map) ranges of arsenic concentrations found within surficial material in the western U.S. The range stated in the FS is based on three sample locations on the map nearest to Oroville. In the actual data tables used in preparing the map, the two arsenic levels reported for sample locations in Butte County are 1.8 and 4.5 mg/kg (see Table 1 in USGS Open

File Report #81-197). In any case, as L-P notes, Shacklette and Boerngen caution against the use of the document to determine site-specific background concentrations.

F.3) The FS states (p. 2-21) that higher arsenic concentrations appear in areas that have received irrigation water from the log deck pond and from surface water run-off from Koppers. The soil data do not support this conclusion. There is substantial horizontal and vertical variation of arsenic concentrations which appears to be independent of plant location. (L-P)

RESPONSE: The FS statement quoted in the comment is based on arsenic concentrations in 12 samples of surface soil. Five of the twelve sample points (P-1, P-2, W-1, W-5 and W-8 on Figure 2.2-1 of the FS) are located away from areas receiving sprinkler irrigation and run-off from Koppers; arsenic concentrations at these points range from less than 2.2 to 3.8 mg/kg. Surface soil samples collected on the fringe of these areas (P-3 and W-4) had arsenic concentrations of 4.2 and 9.8J mg/kg. Surface soil samples collected from within the areas of run-off from Koppers and sprinkler irrigation (P-4, TP-1, W-6, W-7 and W-9) had arsenic concentrations ranging from 3.2 to 26.4 mg/kg. The three highest arsenic concentrations (W-7, P-4, and W-9) were 10.8, 12.6J. and 25.4 mg/kg, respectively. These arsenic concentrations support the statement in the FS:

> "It appears that the location of higher arsenic concentrations at the L-P plant are in the log deck areas that have received either sprinkler irrigation of water pumped from the log deck pond or surface run-off from the Koppers site."

G. Formaldehyde in Groundwater

G.1) Only 10 of the 29 samples taken during the well drilling measured positive for formaldehyde, and most of these samples have significant quality control problems. The fact that the subsequent ground water monitoring samples did not have these problems and that all of the 34 samples measured negative for formaldehyde is sufficient to determine that there is no formaldehyde in ground water at the L-P site. (L-P)

RESPONSE: Because of the limited amount of data available, the issue of whether or not formaldehyde is present in ground water can not be resolved at this time. The suggestion by L-P that the sampling protocol for samples collected during drilling of monitoring wells may have resulted in false positives is one reason to question the presence of formaldehyde. On the other hand, the results from L-P's own investigation of ground water quality suggest that formaldehyde may, in fact, be present in ground water. Additional ground water monitoring samples will be collected and analyzed for formaldehyde.

G.2) Since formaldehyde is highly degradable in the environment, it is essentially self-treating and therefore no remedial action is necessary to eliminate its presence in ground water. (L-P)

RESPONSE: Formaldehyde is indeed a reactive organic compound in nature. In many situations its natural degradation rate will be appreciable and sufficient to reduce its concentration to very low levels in a relatively short period of time. However, in some situations, such as under anaerobic (i.e., oxygen-deficient) conditions in soil, it can be more persistent. Anaerobic conditions may exist in portions of the shallow ground water based on organic odors observed while drilling some of the wells and piezometers completed during the remedial investigation (e.g., W-6, W-7, P-1, and P-2). The limited and conflicting data available on formaldehyde concentrations in ground water are not sufficient to determine whether it is present or the rate at which formaldehyde may be degrading. As such, it would be premature to conclude that remedial action is unnecessary if formaldehyde is present.

G.3) In the detailed analysis of alternatives, the FS should note that natural degradation should eliminate any formaldehyde that is present in ground water. It should also note that the proposed Maximum Contaminant Level Goal ("MCLG") for arsenic is 50 parts per billion (ppb). (L-P)

RESPONSE: While it is true that formaldehyde will generally

degrade naturally, there are no site-specific data on which to base an estimate of how long this would take at the L-P site. Additional monitoring should provide information on whether formaldehyde is present and how quickly it may degrade.

In 1985, EPA proposed a Recommended Maximum Contaminant Level ("RMCL") for arsenic of 0.05 mg/L (50 ppb), the same as the existing Maximum Contaminant Level ("MCL"). See 50 Fed. Reg. 46960 (Nov. 13, 1985). The RMCL was never finalized. EPA is gathering and evaluating data which may lead the Agency to propose a new MCL and and new MCLG for arsenic in the future.

H. Endangerment Assessment (EA)

H.1) The EA should have discussed the sensitivity of the risk estimates to the use of qualified data. The EA and FS should point out that much of the data which resulted in findings of potential significant risk come from data groups that are among the highest in terms of percentage of qualified data. (L-P)

RESPONSE: Of the chemicals of potential concern identified in the EA, arsenic in surface soil and formaldehyde in ground water represented the majority of the risk. L-P has compiled data to show that 24% of the arsenic soil analyses used to calculate a geometric mean concentration for the L-P plant soils had J flags assigned by EPA. According to L-P, 76% of the formaldehyde analyses were assigned J qualifiers.

As described in the EPA data validation packages, the J flags for arsenic data were assigned because instrument calibration and/or spike recovery were outside of the acceptable range. The maximum arsenic value (23 mg/kg) was not assigned a qualifier. Thus, although use of these J-flagged values may have increased the uncertainty in the risk assessment, a large impact on the final risk analysis was not expected. There is no indication of a consistent bias in the data that would indicate over- or underestimation of concentrations.

Data validation qualifiers for formaldehyde were assigned because formaldehyde was detected in the travel blank and in the DNPH reagent blank for the analytical method. EPA data validation staff corrected the method detection limit for the samples accompanying these blanks to ten times the amount detected in the blanks. This adjustment should eliminate the potential for a positive bias in concentration due to blank contamination. Nevertheless, a lower degree of confidence should be placed in these analyses.

EPA believes that the discussion of the uncertainty as-

sociated with the analytical data presented in Section 5 of the EA was adequate according to EPA guidance at the time the report was prepared (i.e., prior to the issuance of the revised guidance in 1990). The selected remedy for the L-P site requires additional sampling for formaldehyde in ground water due to the high uncertainty associated with these data.

H.2) The EA did not evaluate the excess risk of cancer presented by arsenic in the L-P plant soils based on the difference between the mean plant concentration and the mean background concentration. Rather, it calculated the risk based on the mean plant concentrations only. (L-P)

RESPONSE: According to EPA guidance at the time the EA was prepared, distinguishing between site-related and background contributions to risk was considered a risk management task to be addressed in selecting remedial alternatives for the site. The purpose of the EA is to evaluate the risk posed by existing levels of contaminants and to present data about background levels of those contaminants without trying to separate the risks associated with each.

H.3) The shallow ground water is not a realistic pathway for future exposures. (L-P)

RESPONSE: During investigation of the L-P site, the shallow aquifer was found in places to be sufficiently permeable to yield a significant water supply to shallow wells, if they were to be drilled. The permeable portion of the aquifer was found to extend to depths of 50 feet below land surface. Since shallow wells are less expensive than deep wells, there might also be an economic incentive to tap the shallow aquifer for a domestic water supply.

Current water well standards, published by the California Department of Water Resources ("DWR") in 1990, specify a minimum 20 feet depth for the annular seal for individual domestic wells. Furthermore, the well standards allow the minimum seal depth to be reduced to as little as 10 feet at well sites where the water to be pumped is at a depth less than 20 feet, as it is at the L-P plant. Butte County now relies on the DWR standards for permitting wells. Therefore, without special provisions to the contrary, the present standards would allow domestic wells to be drilled which could draw ground water from the shallow aquifer for domestic use. Thus, a realistic pathway in shallow ground water does exist, and special provisions like a permit restriction are needed to prevent the drilling of shallow wells for domestic use on or near the L-P plant.

L-P infers that the FS describes the shallow aquifer as

non-potable. The statement in the FS that "shallow ground water is typically non-potable" was intended only as a remark about shallow ground waters in general and not a claim that this specific shallow aquifer is non-potable.

H.4) The formaldehyde sampling data appears to have been improperly evaluated in the chemical characterization portion of the Endangerment Assessment ("EA"). (L-P)

RESPONSE: As noted earlier (see response to comment G.1), the uncertainty in the formaldehyde data was recognized in the EA and considered in selection of the remedy.

H.5) Because of the non-volatility of formaldehyde, the approach taken in the EA essentially assumes that an average exposure consists of inhaling 2.0 liters of water from the shallow ground water while showering. (L-P)

RESPONSE: The exposure scenario in the EA assumed that inhalation of formaldehyde during showering corresponds to the dose received from ingestion (not inhalation) of 2 liters/day of water. This approach was based on EPA Region IX guidance concerning exposure to volatile organics while showering (Risk Assessment Guidance for Superfund Human Health Risk Assessment, U.S. EPA Region IX Recommendations (Interim Final), December 1989, p. 9). The discussion by L-P of the volatility of formaldehyde is essentially correct, except that it should be noted that formaldehyde in aqueous solution exists in an equilibrium between the methylene glycol and free forms, so that some volatilization may occur.

H.6) EPA has not considered whether the background concentrations of arsenic in surrounding areas which are subject to future residential development present a greater or lesser risk than residential development of the L-P site. (L-P)

RESPONSE: In the absence of an adequate study of background arsenic levels in soils in the vicinity of the site, a comparison of site risks with the risks posed by such background levels in surrounding areas cannot be made. The existing data do show that the arsenic levels on the log deck are elevated relative to other areas at the plant. Therefore, until additional data are available concerning background levels, EPA is proposing a conservative response which is protective of public health. If sampling of surface soil in the area surrounding the site (to establish background arsenic concentrations) demonstrates that the on-site arsenic concentrations do not exceed background levels, then EPA would reevaluate the selected remedy.

I. Groundwater Monitoring

I.1) Continued ground water monitoring is unnecessary since the potential future use of ground water which constitutes the basis for this proposed action will not occur. Further, the best data collected by EPA indicates that formaldehyde is not present in ground water and that arsenic concentrations do not exceed MCLs. (L-P)

RESPONSE: As noted earlier (see response to comment 11), EPA does not agree that sufficient reasons exist to assume that the future use of shallow ground water will not occur. The presence of formaldehyde in shallow ground water has not been established conclusively, and additional monitoring is needed to settle the matter (see response to Comments G.1 and G.2). Existing data do show that the maximum observed arsenic level in shallow ground water is below the MCL, and thus this ARAR for ground water remedial action is met.

J. Sources of Contamination

J.1) L-P has used relatively low quantities of chemicals at the fungicide spray system, and formaldehyde was discharged from the Hardboard plant in small quantities. (L-P)

RESPONSE: While it may be true that the quantities of chemicals used by L-P are relatively low compared to Koppers, the focus of CERCLA (Superfund) actions is on the amount of chemicals released into the environment. Insufficient data exist to accurately determine the amount of formaldehyde released at the site, and the washwater discharge from the hardboard plant is only one of several potential sources.

J.2) The FS implies (p. 1-14) that L-P may have used arsenic, chromium and boron. L-P never used these substances. Note also that petroleum products are not CERCLA hazardous substances. (L-P)

RESPONSE: Samples from the L-P site were analyzed for arsenic, chromium and boron because they are present in compounds used in the wood treating industry and may represent a threat to human health and the environment. It is true that certain petroleum products are excluded from the definition of hazardous substances under CERCLA Section 101(10).

J.3) The soil sample from soil boring SB-1 is not really a surface soil sample. (L-P)

RESPONSE: Soil Sample SB-1 (see Figure 1.2-8 of the FS) was collected through a hole cut in the concrete floor of the sawmill building at a location where liquid from the fungicide spray area was likely to have accumulated and where joints in the concrete were observed. The sample consisted of soil collected from beneath the concrete, and appeared to represent the original ground surface upon which the concrete was poured. The purpose of this sample was to evaluate possible pentachlorophenol ("PCP") contamination of soil beneath the former fungicide spray area. Therefore, SB-1 is similar to surface soil samples collected from beneath the asphalt covering the northern third of the plant site.

J.4) EPA should delete the statements that suggest the Koppers facility is the sole source of the chemicals in ground water at, and downgradient of, the L-P facility and the chemicals detected along the Koppers/L-P boundary. (Beazer)

RESPONSE: EPA did not intend to suggest that Koppers is the sole source of all chemicals in the ground water at, and downgradient of, the Louisiana-Pacific site, and along the Koppers/L-P boundary. In evaluating contamination at the L-P site during the risk assessment and the Feasibility Study, for purposes of selecting an appropriate response to contamination at the L-P site, EPA did not include contamination which was to be addressed by remedial actions taken in connection with the Koppers site.

J.5) The potential source areas of PCP and other chemicals at the L-P facility have not been adequately investigated. Wells placed in the shallow and regional aquifers downgradient of the fungicide spray area may thus reveal significantly higher concentrations of chemicals originating from the fungicide spray operations. (Beazer)

RESPONSE: There were four wells installed specifically to evaluate potential ground water contamination from pentachlorophenol ("PCP") used at the L-P fungicide spray area, which is located in the sawmill. Two wells were completed for L-P (ML-3 and ML-4) and two were completed for EPA (W-1 and W-8). Three of the wells are located south of the sawmill (ML-3, ML-4, and W-1). Well W-8 is located north of the sawmill and downgradient of the fungicide spray area. In addition, a soil sample (SB-1) was collected from beneath the floor of the fungicide spray area and analyzed for PCP.

Chemical tests of soil and ground water samples from these wells and the soil samples from SB-1 detected PCP at concentrations below soils and ground water cleanup standards

proposed for the Koppers site. Furthermore, no other samples of ground water or soil from the L-P plant show concentrations of PCP above cleanup standards except along the L-P/Koppers boundary (wells MW-20A), MW-20B, W-6, W-7, and W-9). This pattern of PCP distribution indicates that 1) the L-P fungicide spray area is not a significant source of PCP contamination, and 2) the probable source for PCP along the L-P/Koppers boundary is on the Koppers site (see response to comment 24).

J.6) The FS (page 1-10) states that in 1973 the Regional Water Quality Control Board found surface water contamination at several locations on the L-P site. Note that the Koppers facility discharged its wastewater into the L-P log deck pond. A comparison of concentrations in the Koppers effluent stream with those found at the L-P plant indicate that Koppers is the source of the contamination. (L-P)

RESPONSE: Koppers discharges its wastewater into a drainage ditch which then flows into the L-P log deck pond. This log deck pond is one of several surface water bodies that were present on the L-P property in 1973. Although Koppers' wastewater discharge may have been one source of contamination in the log deck pond, chemicals used by L-P were also detected in surface waters at the L-P site.

J.7) The FS (page 1-12) should note that L-P used relatively small quantities of PCP and that it was used in a recycle system. The total quantities used at L-P should be compared to the total quantities used at Koppers. (L-P)

RESPONSE: EPA did receive and evaluate information on PCP use by both Koppers and L-P. However, the focus of our CERCLA (Superfund) investigation is on the amount of PCP and other contaminants released into the environment, which is not always directly related to the volume of material used.