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Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R08-86/010
September 1986

EPA

Superfund Record of Decision:

Union Pacific, WY

[redacted]

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(Please read Instructions on the reverse before completing)

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16. ABSTRACT

The Union Pacific Railroad (UPRR) Tie Treating Plant is located southwest of Laramie, Wyoming to the west of Laramie River. UPRR began operations at the site in 1886 and treated railroad ties and other wood products until 1983. Wood preserving agents used by UPRR or its contractor (the J.H. Baxter Company) in the treatment process included zinc chloride (1886-1931), a creosote oil and asphalt-based petroleum/residuum oil mixture (1928-1983), and PCP (1956-1983). During the first 70 years of operation, process wastes from the plant were disposed of in the Laramie Waste Collection ponds. Contamination outside of the collection ponds was initially discovered in October 1981 as a result of RCRA interim status ground water monitoring requirements. Currently, approximately 140 acres of the 700 acre site are contaminated. The contamination ranges from soil saturated with free oil to ground water containing dissolved contaminants. The primary contaminants of concern include: creosote, PCP, and oils.

The selected interim source control remedy is a Contaminant Isolation System which includes: realignment of the Laramie River channel 150 feet further west from the site; a soil-bentonite slurry barrier wall constructed through the alluvium and bedrock around the contaminated areas; a reverse-gradient ground water draining and pumping system; an activated carbon water treatment plant. The treated water will be discharged

(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Union Pacific Railroad, WY Contaminated Media: gw, soil Key contaminants: VOCs, organics, metals, PCP, creosote, oils		

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Union Pacific Railroad, WY

16. ABSTRACT (continued)

to the Laramie River under the authority of an NPDES permit issued and administered by the State of Wyoming; and ground water monitoring. The estimated capital costs for this remedy is $7,000,000 with annual O&M costs of $57,000.

U.S. EPA - Region VIII

RECORD OF DECISION

UNION PACIFIC RAILROAD LARAMIE TIE TREATING PLANT

LARAMIE, WYOMING

September 1986

I. DECLARATIONS SECTION

DOCUMENTS REVIEWED

The following documents contain general and specific information on the cost and effectiveness of remedial alternatives for the Union Pacific Railroad Laramie Tie Treating Plant, Laramie, Wyoming, and constitute the primary record on which I am basing my decision:

- Union Pacific Railroad (UPRR) Remedial Investigation (RI) and Risk Assessment (RA), Final Report, prepared for UPRR by CH2M Hill; dated March 16, 1986 (Appendix A)

- UPRR Feasibility Study (FS), Final Report, prepared for UPRR by CH2M Hill; dated June 30, 1986 (Appendix B)

- EPA Comments on the UPRR RI, RA and FS (Appendix C)

- Agency for Toxic Substances and Disease Registry (ATSDR) Comments on the UPRR RI and RA;

- EPA Community Relations Responsiveness Summary Report, Final Report, prepared by EPA and ICF Corporation; dated September, 1986 (Appendix D)

- Union Pacific Design Documents for the Soil-Bentonite Cutoff Wall, prepared for UPRR by CH2M Hill; dated June, July and October, 1985 (Appendix E)

- EPA-Union Pacific Administrative Orders on Consent issued concurrently in November 1983, under the authority of CERCLA Section 106 and RCRA Section 3008, as amended (Appendix F)

DESCRIPTION OF THE SELECTED REMEDY

The remedy I have selected is an interim source control remedy, a first operable unit pursuant to 40 CFR Section 300.68(c). The remedy is a Contaminant Isolation System designed to mitigate off-site movement of contaminated ground water and surface soils during planning and implementation of more permanent remedies. The major components of the isolation system are:

- re-alignment of the Laramie River channel 150 feet further west from the site to reduce chances of migration of contaminants to the river;

- a soil-bentonite slurry barrier wall constructed through the alluvium and bedrock around the contaminated areas;

- a reverse-gradient ground water draining and pumping system to mitigate off-site seeping of contaminated ground water through the barrier wall;

- an activated carbon water treatment plant to remove contaminants from the ground water that is withdrawn from inside the barrier wall; the treated water will be discharged to the Laramie River under the authority of an NPDES permit issued and administered by the state of Wyoming; and

- a ground water monitoring system to measure the integrity of the system.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that Contaminant Isolation System at the Union Pacific Laramie Tie Treating Plant site is a cost-effective remedy (first operable unit) that is consistent with a permanent remedy [40 CFR Section 300.68(c)]. I have also determined that the action being taken is a cost-effective alternative when compared to the other remedial options reviewed. The State of Wyoming has been consulted and concurs with the approved remedy.

The remedial action selected will require future operation and maintenance activities to assure the continued effectiveness of the remedy. These activities will be considered part of the approved action.

I have further determined that the Contaminant Isolation System selected herein is only an interim remedy. The responsible party (Union Pacific Railroad) recognizes that more permanent remedies are required, and has identified and partially evaluated some of these in the June 30, 1986 Feasibility Study. Union Pacific will undertake additional feasibility studies and pilot and field tests to evaluate these remedies more fully. These studies will be conducted pursuant to the authority of the Resource Conservation and Recovery Act (42 U.S.C. Section 6901, et seq.). Additional remedial actions will be implemented pursuant to a post-closure care permit or other actions under the Resource Conservation and Recovery Act.

September 26, 1986
Date

Alexandra B. Smith
John G. Welles, for
Regional Administrator

Appendices:

A. Union Pacific Remedial Investigation (RI) and Risk Assessment (RA)
B. Union Pacific Feasibility Study (FS)
C. EPA Comments on the Union Pacific RI, RA and FS
D. EPA Community Relations Responsiveness Summary Report
E. Union Pacific Design Document for the Soil-Bentonite Cutoff Wall
F. EPA-Union Pacific CERCLA and RCRA Administrative Orders on Consent

U.S. EPA-Region VIII
Union Pacific Laramie Tie Treating Plant Record of Decision

List of Figures and Tables

U.S. EPA-Region VIII
Union Pacific Laramie Tie Treating Plant Record of Decision

List of Abbreviations and Acronyms

EPA	Environmental Protection Agency
DEQ	(Wyoming) Department of Environmental Quality
UPRR	Union Pacific Railroad
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
NPL	National Priorities List
NCP	National Contingency Plan
RCRA	Resource Conservation and Recovery Act
NPDES	National Pollutant Discharge Elimination System
USC	United States Code
CFR	Code of Federal Regulations
FR	Federal Register
RI	Remedial Investigation
RA	Risk Assessment
FS	Feasibility Study
CIS	Contaminant Isolation System
PCP	Pentachlorophenol
PNA or PAH	PolyNuclear Aromatics or Polynuclear Aromatic Hydrocarbons
ND	Not detected; below minimum detection limit
CDD	Chlorinated Dibenzodioxin
MCL	Maximum Concentration Limit
RMCL	Recommended Maximum Concentration Limit
ACL	Alternate Concentration Limits

II. SUMMARY OF REMEDIAL ALTERNATIVE SELECTION PROCESS

A. SITE LOCATION AND DESCRIPTION

The Union Pacific Railroad (UPRR) Tie Treating Plant is located southwest of Laramie, Wyoming (population 25,000) (Figure A-1). The approximately 700 acre site is bordered on the east by the UPRR right-of-way, on the north by Interstate Highway 80, and on the west by the Laramie River. The plant site is located less than one-half mile from the nearest residential area and approximately 1.5 miles from downtown Laramie.

The surface of the UPRR site is relatively flat and drains gently to the Laramie River on the west. In 1983, the area was removed from the historic 100 year flood plain by raising and reinforcing the existing levee along the river.

There are four aquifers immediately underlying the site (Figure A-2):

1. Alluvium - approximately 10 to 15 feet thick;
2. Morrison - uppermost bedrock formation, about 125-320 feet thick: siltstones and shales;
3. Sundance - next lower bedrock formation, about 125 feet thick: sandstones; and
4. Chugwater - lowest bedrock formation, about 600-1400 feet thick: siltstones and shales;

All three bedrock formations subcrop to the bottom of the alluvium for at least some of the site. The average dip of the three formations is 4° West and the strike is North 8° East. Of the three formations, the Sundance is the most important in that it immediately underlies the alluvium for much of the heavily contaminated parts of the site and is hydraulically connected to domestic water supply wells in the area.

The alluvial ground water flow patterns for the site are shown in Figures A-3 (dry weather pattern) and A-4 (wet weather recharge pattern). The flow is generally towards the north west corner of the site.

As will be presented in greater detail in section C of this report, the soils and ground water at the Laramie Tie Treating Plant site are generally characterized by gross contamination from creosote oils and pentachlorophenol wood treating wastes.

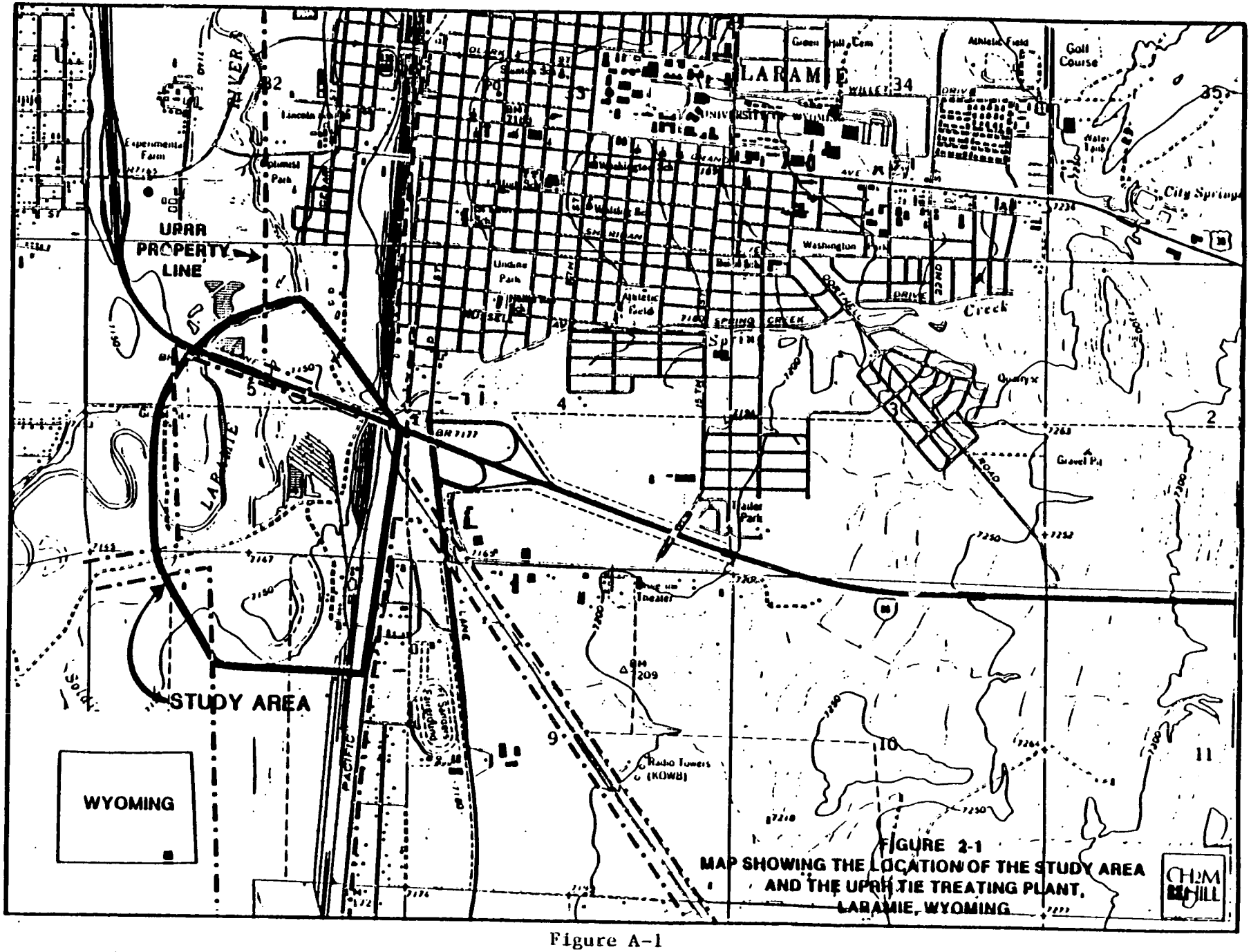
LARAMIE
URRA
PROPERTY
LINE
STUDY AREA
WYOMING
LARAMIE
PACIFIC
SPRING
CREEK
Creek
Golf
Course
City Springs
Gravel Pit
Trailer
Park
Radio Towers
(KOWB)
FIGURE 2-1
MAP SHOWING THE LOCATION OF THE STUDY AREA
AND THE UPRR TIE TREATING PLANT,
LARAMIE, WYOMING
CH2M
HILL

Figure A-1

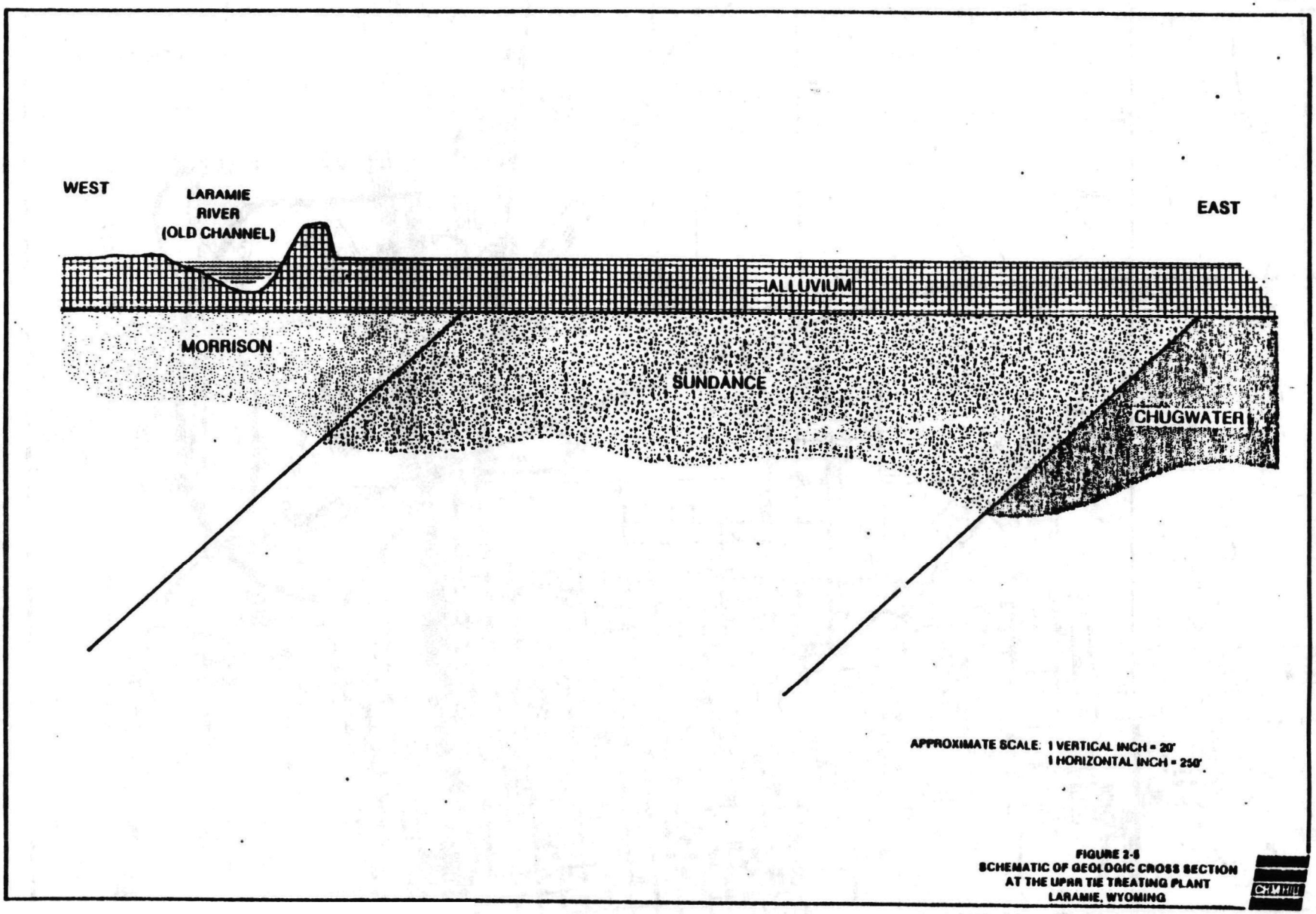

Figure A-2

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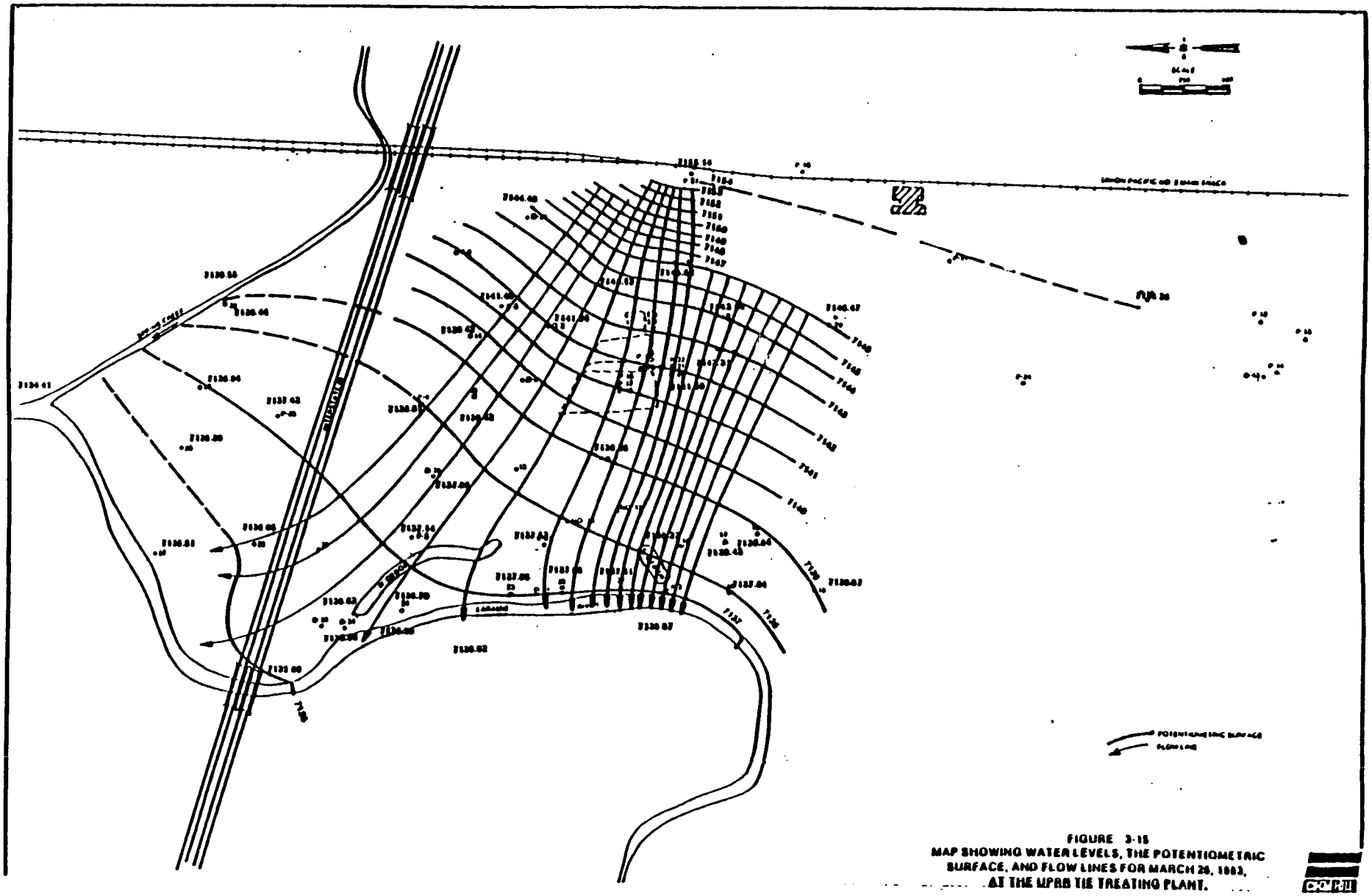

Figure A-3

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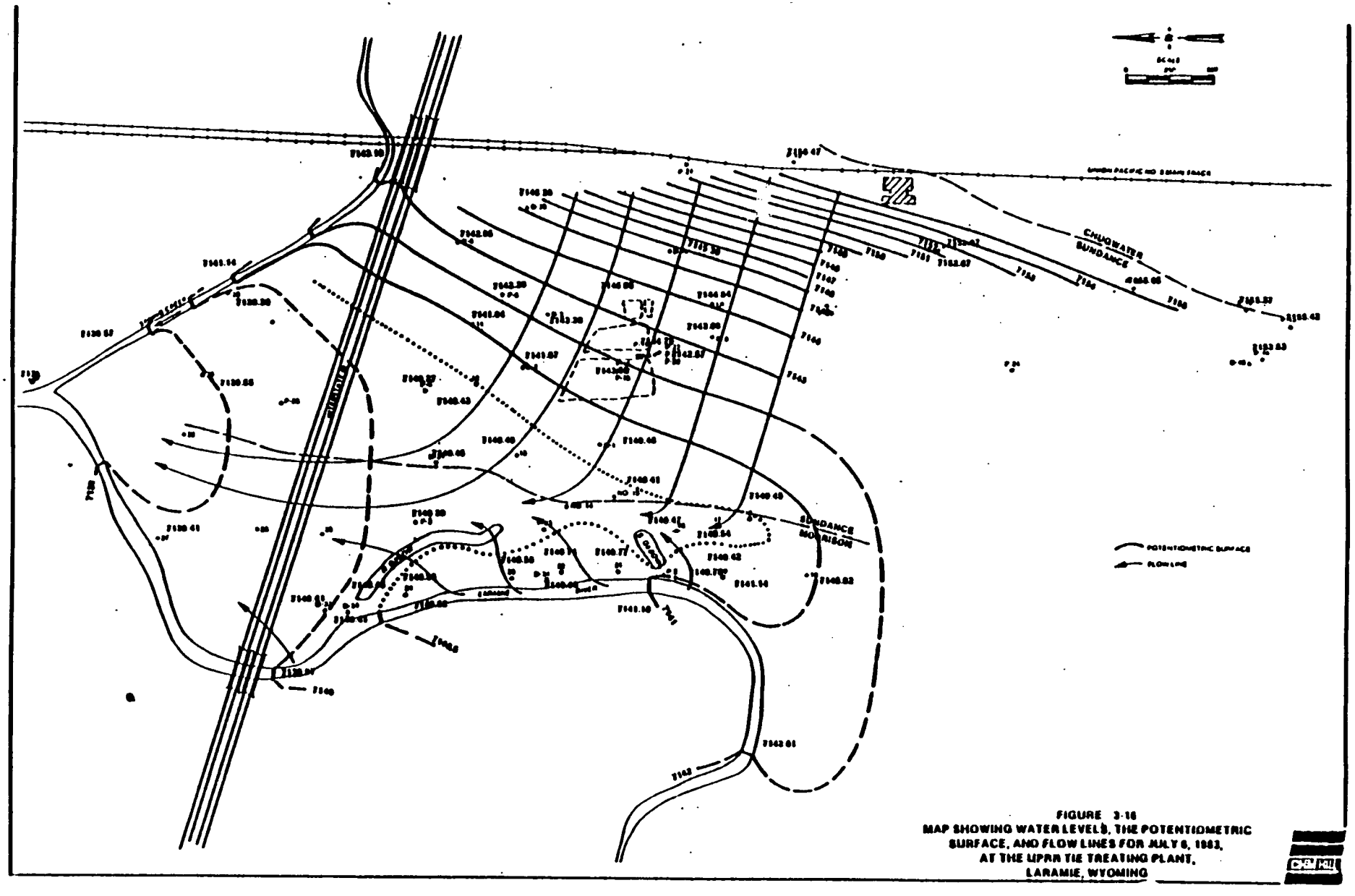

Figure A-4

Ref: CH2 Hill, 1986

B. SITE HISTORY

UPRR began operations at the Laramie site in 1886 and treated railroad ties and other wood products until 1983. Wood preserving agents used by UPRR or its contractor (the J. H. Baxter Company) in the treatment process included zinc chloride (1886-1931), a creosote oil and asphalt-based petroleum/residuum oil mixture (1928-1983), and pentachlorophenol or PCP (1956-1983). Creosote, some creosote constituents and PCP are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). UPRR closed the wood treating operation in May 1983.

During the first 70 years of operation, process wastes from the plant were disposed of in various locations on the site (Figure B-1) including low areas and sloughs immediately north and west of the plant. In 1958, UPRR constructed four unlined waste collection ponds near the center of the site, and routed liquid wastes to these impoundments until 1983. Solid wastes from cleaning the retorts were reportedly buried south of the plant (Area G).

From 1980-83, waste sludges from another UPRR tie treating plant in The Dalles, Oregon were also disposed of in the Laramie waste collection ponds. These sludges were wastes from wood treating operations that used creosote, pentachlorophenol, and ammoniacal copper arsenate.

The recent history of the site has included numerous investigations of on-site contamination in response to regulatory and legal actions by the U.S. Environmental Protection Agency (EPA) and the Wyoming Department of Environmental Quality (DEQ):

1. In August and November 1980, UPRR submitted notification and a Part A application as required under Sections 3005(e) and 3010 of the Resource Conservation and Recovery Act (RCRA), thereby qualifying for interim status for the four waste collection ponds.

2. Contamination outside of the collection ponds was initially discovered in October 1981 as a result of RCRA interim status ground water monitoring requirements (40 CFR Sections 265.90 - 265.94).

3. In October 1981, the State of Wyoming filed suit against UPRR under Wyoming Statute Sections 35-11-301(a)(i), (ii), and (iii). In October 1982, the State and UPRR reached a litigation suspension agreement and formalized a more thorough investigation through an "Investigative Research and Remedial Action Plan" that included the following four-phase program:

   - Preliminary Investigation
   - Remedial Investigation
   - Feasiblity Study
   - Implementation of Remedial Action and Monitoring

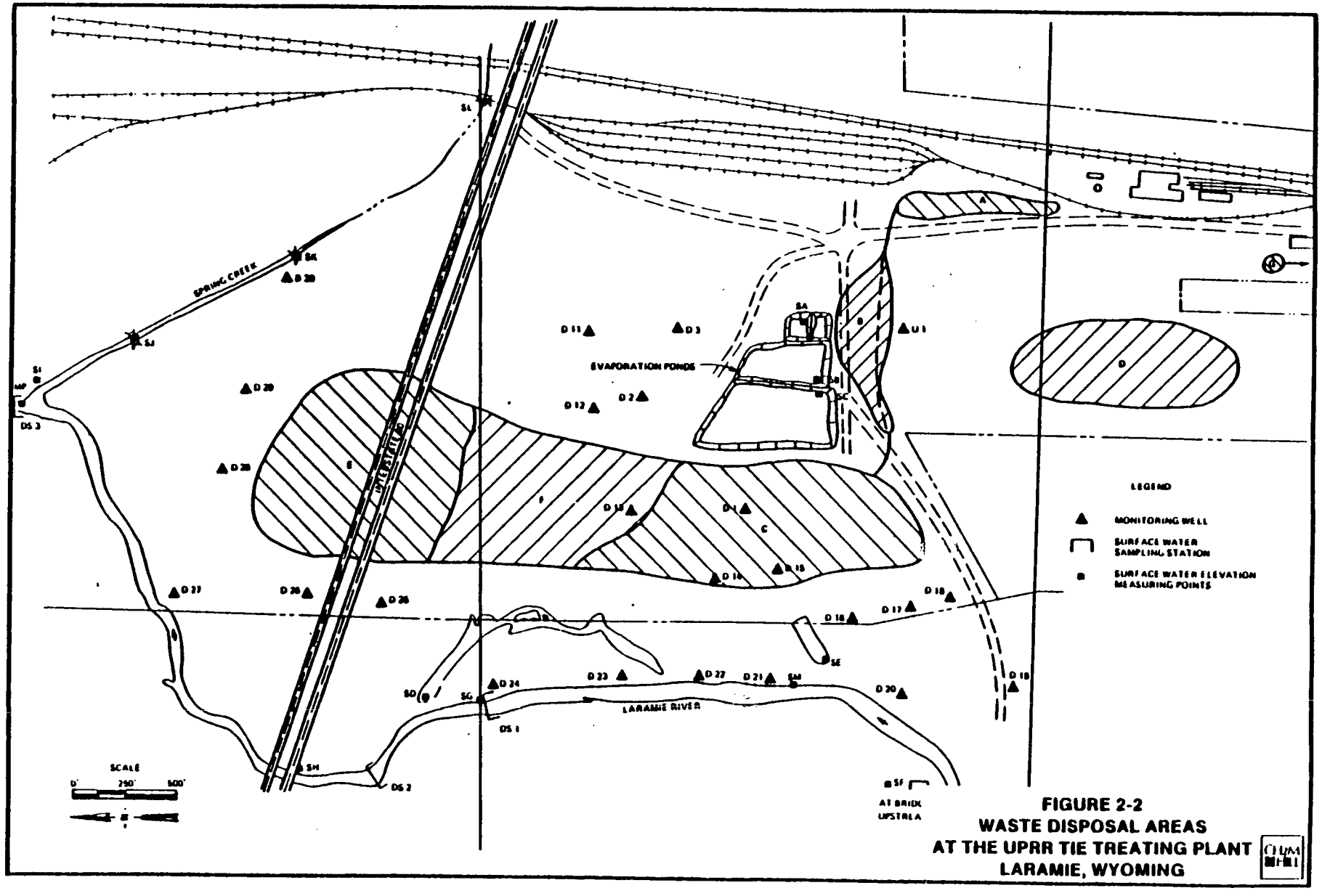

Figure B-1

Ref: CH2MHILL, 1986

B. SITE HISTORY (cont'd)

4. In September 1983, EPA listed the portions of the site not specifically regulated under RCRA at the time (those areas other than the four waste impoundments and the associated contamination) on the CERCLA National Priorities List (NPL) (48 FR 40658, September 8, 1983).

5. In November 1983, EPA entered into an Adminstrative Order on Consent with UPRR under Section 106 of CERCLA (Docket No. CERCLA VIII-83-05). The order required UPRR to perform a Remedial Investigation and Feasibility Study consistent with the four phase program required by Wyoming's litigation suspension agreement and EPA guidance.

   UPRR has submitted its final reports on the first three phases of the four-phase investigation/remedial action program.

6. Concurrently with the CERCLA AO, EPA also entered into an Adminstrative Order on Consent with UPRR under Section 3008 of RCRA (Docket No. RCRA (3008) VIII-83-25), which required closure of the waste impoundments, and, if necessary, post-closure care of the RCRA-regulated areas.

   As required by tne RCRA order (paragraph 29), UPRR partially closed the four waste ponds in the summer and fall of 1984 by removing, treating, and/or disposing of offsite the contents of the ponds. This partial closure was the subject of litigation between EPA and UPRR [Union Pacific Railroad Company v. William D. Ruckelshaus, et al. (Civil No. 84-0190, D. Wyoming, 1984)], and resolved in a Consent Decree in July 1984.

7. On October 20, 1983, the State of Wyoming issued a permit to construct a pilot industrial wastewater/oil product recovery well system (Permit No. 83-549). The system is currently in place, although its effectiveness has not met expectations.

8. UPRR is currently constructing an industrial wastewater collection and treatment system pursuant to the authority of a construction permit (Permit No. 84-77RR), issued on August 1, 1984 by the State of Wyoming.

9. In October 1985, UPRR relocated a 3000 foot reach of the Laramie River bed about 150 feet further west from the site. This action was performed under the authority of a dredge and fill permit issued to UPRR on September 13, 1985, by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act.

10. On March 20, 1986, the WY DEQ issued a National Pollutant Discharge Elimination System (NPDES) permit to UPRR, authorizing a discharge from UPRR's proposed ground water treatment plant to the Laramie River. The plant is currently under construction.

B. SITE HISTORY (cont'd)

11. As noted above or in the supporting record, UPRR has already completed some preliminary remedial actions. These actions include:

    a. relocation of the Laramie River 150 feet further west from the site (completed in the fall of 1985);
    b. construction of a flood levee four feet above the 100 year flood level for the site (first constructed in 1983, completed in 1985);
    c. construction of a temporary cutoff barrier in the fall of 1983 to mitigate oil migration to the Laramie River.

The alternative selection process presented in this document focuses on additional interim remedial actions rather than a final remedy. EPA views the combination of these new interim remedial actions as the first part of Phase 4 (Implementation) of the UPRR program under the Wyoming litigation suspension agreement. Under CERCLA and the NCP, the new interim remedies constitute a first operable unit pursuant to 40 CFR Section 300.68(c).

C. CURRENT SITE STATUS

Approximately 140 acres of the 700 acre site are contaminated. The contamination ranges from soil saturated with free oil to ground water containing parts per billion levels of dissolved contaminants.

Representative ranges of contaminant levels are presented in Table C-1. Many of the analytical data are represented as ND (not detected or below detection limit). In many cases, however, analytical results were qualified by very high detection limits. Thus, the designation of ND does not necessarily mean that the contaminants were not present for a given area.

Much of the contamination remains in the alluvium, where the heavier-than-water creosote oils lie at the bottom of the alluvium (10-15 feet deep) on top of the bedrock. However, extensive contamination of the bedrock formations has occurred in a fractured zone in the Morrison formation and in other bedrock locations as deep as 70 feet.

1. Alluvium

The bulk of the contamination at the site is made up of alluvial sands and gravels that are saturated or nearly saturated with oils containing creosote constituents and PCP. It has been estimated that over 700,000 cubic yards of alluvium are contaminated, of which more than 300,000 cubic yards are saturated or nearly saturated. It has also been estimated that the volume of oil in the alluvium is as much as nine million gallons, of which about one million gallons of "free oil" (oil that would flow freely from the soil) could be recovered.

The main body of the oily contamination in the alluvium is centered around the locations of the former retort building and the four waste impoundments, including a shallow depression in the bedrock surface west of the ponds. Figure C-1 shows the extent of measured alluvial contamination (solid line) and the extent of oily contamination greater than one foot thick (broken line). Figure C-2 is a three-dimensional depiction of the thickness of the oily and oil-saturated alluvium as viewed from north and west of the site.

Several soils samples were collected and analyzed for chlorinated dibenzo dioxins (CDDs) and chlorinated dibenzo furans (CDFs). Although some CDDs (hexa-, hepta- and octa-) were detected, none of the tetra- or penta- varieties of CDDs or CDFs were measured above detection limits.

2. Bedrock

All three bedrock formations underlying the alluvium at the site (Morrison, Sundance and Chugwater) have been contaminated by wood-preserving wastes to some extent (Table C-1). Figure C-3 depicts where the three bedrock formations subcrop and the areal extent of contamination within each formation. Figure C-4 presents a schematic of vertical contamination in the formations.

Table C-1
Representative Levels of Contaminants Found at the UPRR Laramie Tie Treating Plant Site[a]

Parameter	Formation:	Alluvium		Morrison	Sundance		Chugwater	Laramie River
	Medium:	Soil	Water	Water	Soil	Water	Water	Water
	Units:	mg/kg	ug/L	ug/L	mg/kg	ug/L	ug/L	ug/L
VOLATILES:								
Benzene		0.30-0.65			ND-0.56			
Toluene		1.9-18			0.59-18			
METALS:								
Arsenic		1.2	ND-35					
Chromium		2.1	5-39					
Copper		1.7	10-40					
Zinc		19	ND-80					
POLYNUCLEAR AROMATICS:								
Acenaphthene		ND-7200	ND-6700	ND-5700	150-1100	ND-35	ND-5	ND-37
Acenaphthylene		ND-250	ND	ND-460	37-250	ND	ND	ND-3.3
Anthracene		ND-3700	ND-5000	ND-2300	49-540	ND	ND	ND-1.8
Benzo(a)anthracene		ND-340	ND	ND-1700	23-180	ND	ND	
Benzo(a)pyrene		ND-98	ND	ND-960	15-92	ND	ND	
Benzo(b)fluoranthene		ND-99	-	-	-	-	ND	
Benzo(ghi)perlene		ND-23	ND	ND	ND-23	ND	ND	
Benzo(k)fluoranthene		ND-65	ND	ND-860	ND-67	ND	ND	
Chrysene		ND-1100	ND	ND-1200	22-160	ND	ND	
Dibenzo(a,h)anthracene		ND	ND	ND	ND	ND	ND	
Fluoranthene		ND-6700	ND-8700	ND-7300	78-530	ND	ND	ND-2.5
Fluorene		ND-6900	ND-4100	ND-4500	85-710	ND-9	ND	ND-14
Indeno(1,2,3-cd) pyrene		ND-24	ND	ND	ND-24	ND	ND	
Naphthalene		ND-22,000	ND-41,500	ND-16,000	660-6200	ND-1600	ND-21	11-150
1 Methyl Naphthalene		-	-	-	-	-	-	3.8-42
2 Methyl Naphthalene		-	-	-	-	-	-	6.1-26
Phenanthrene		ND-18,000	14,100-17,300	ND-9300	290-1900	ND	ND	1.9-16
Pyrene		ND-5300	1600-7100	ND-5300	75-460	ND	ND	ND-1.5
PHENOLS:								
Phenol		ND-52	ND-102	ND	ND	ND-2.1	ND	
Pentachlorophenol		ND-3700	ND-6500	ND	ND	ND-22	ND	
2,4-Dimethylphenol		ND-1.4	ND	ND	ND	ND-5	ND	

CHLORINATED DIBENZODIOXINS (units are ug/kg):

Tetra-	ND
Penta-	ND
Hexa-	0.15-715
Hepta-	35-14,200
Octa-	124-28,000

Key:
a - source for data is Phase II Remedial Investigation Report by CH2MHill, March 17, 1986
ND - Not Detected, value was below minimum detection limit for method

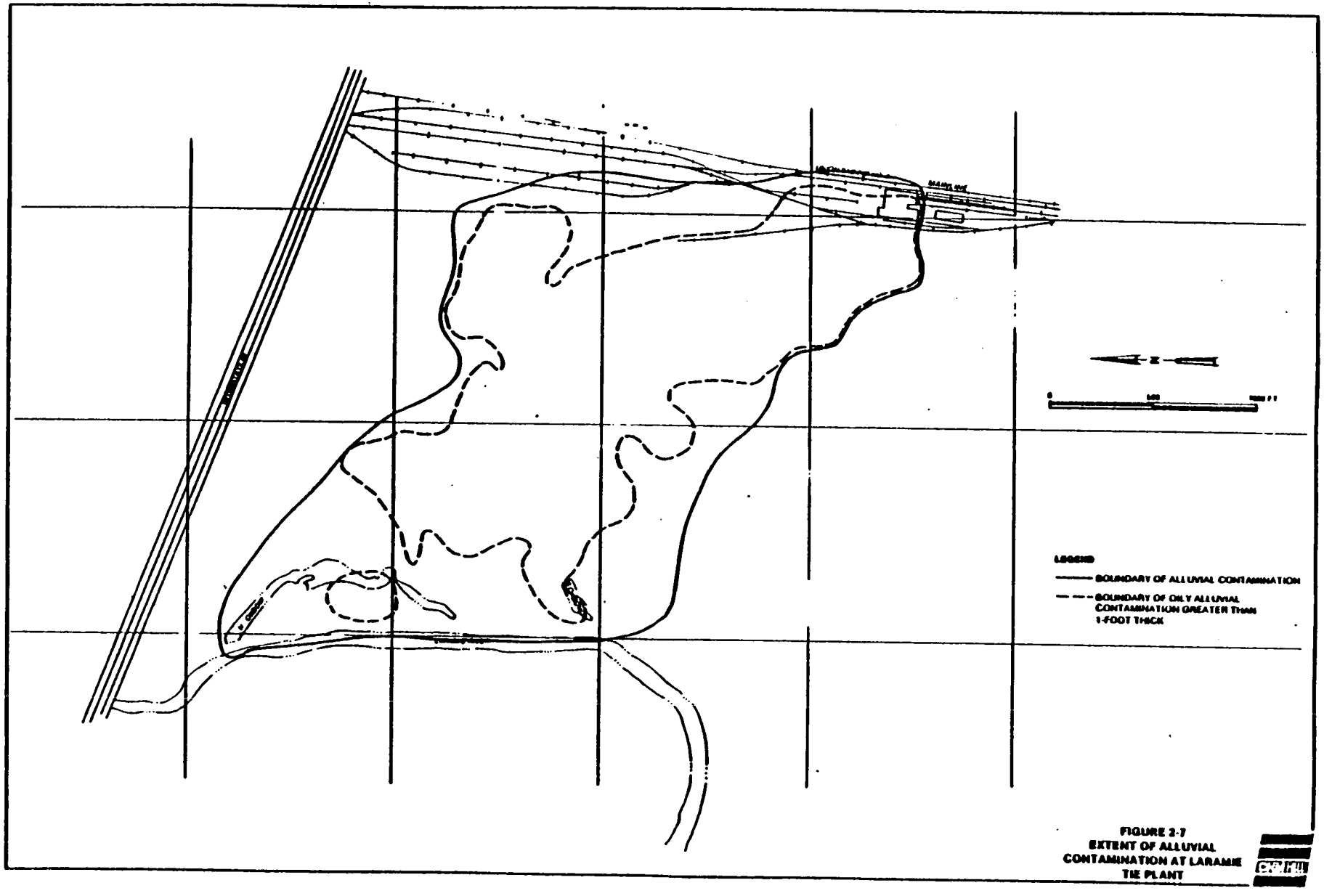

Figure C-1

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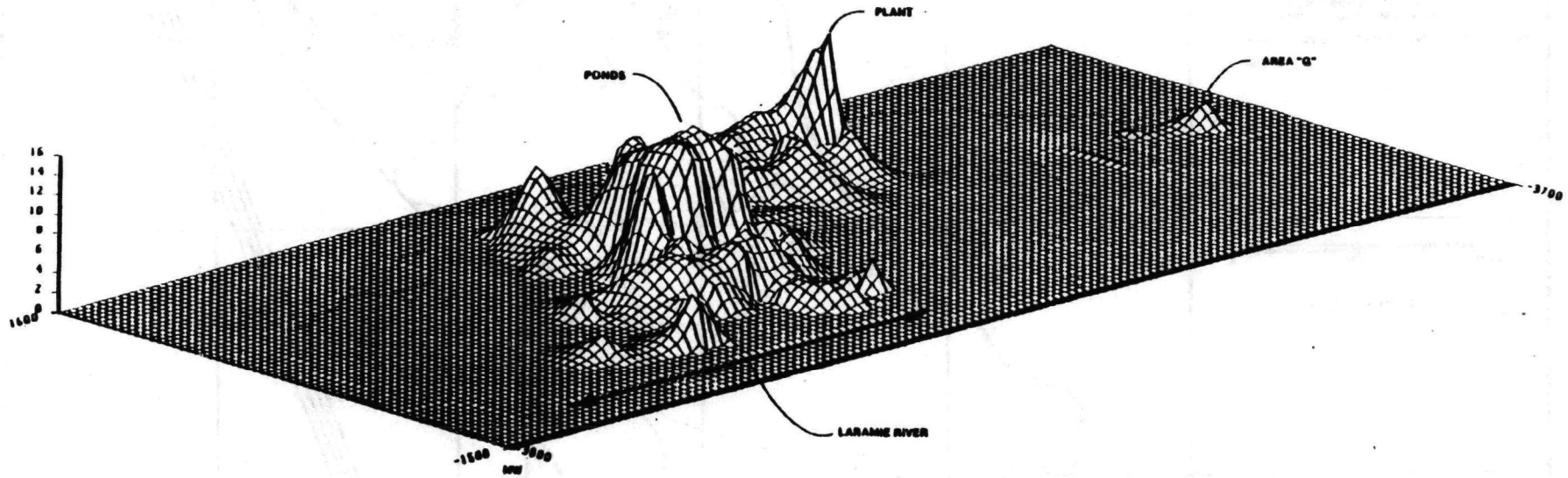

FIGURE 2-6
ISOMETRIC "3D" VIEW FROM THE NORTHWEST
SHOWING THE OILY AND OIL-SATURATED ALLUVIUM
AT THE UPRR TIE TREATING PLANT,
LARAMIE, WYOMING

Figure C-2

Ref: Cl Hill, 1986

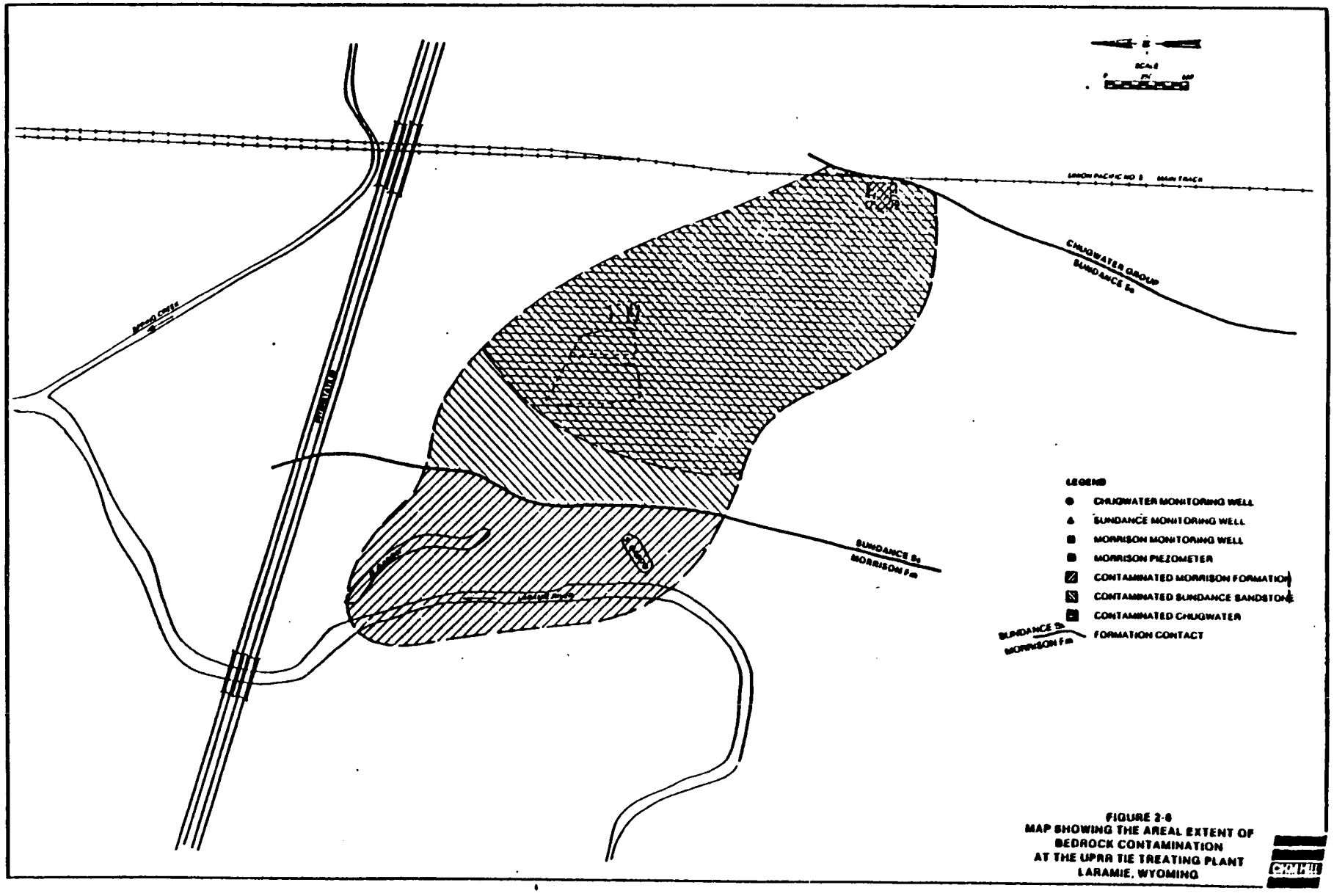

FIGURE 2-8
MAP SHOWING THE AREAL EXTENT OF
BEDROCK CONTAMINATION
AT THE UPRR TIE TREATING PLANT
LARAMIE, WYOMING

Figure C-3

Ref: CH2MHILL, 1986

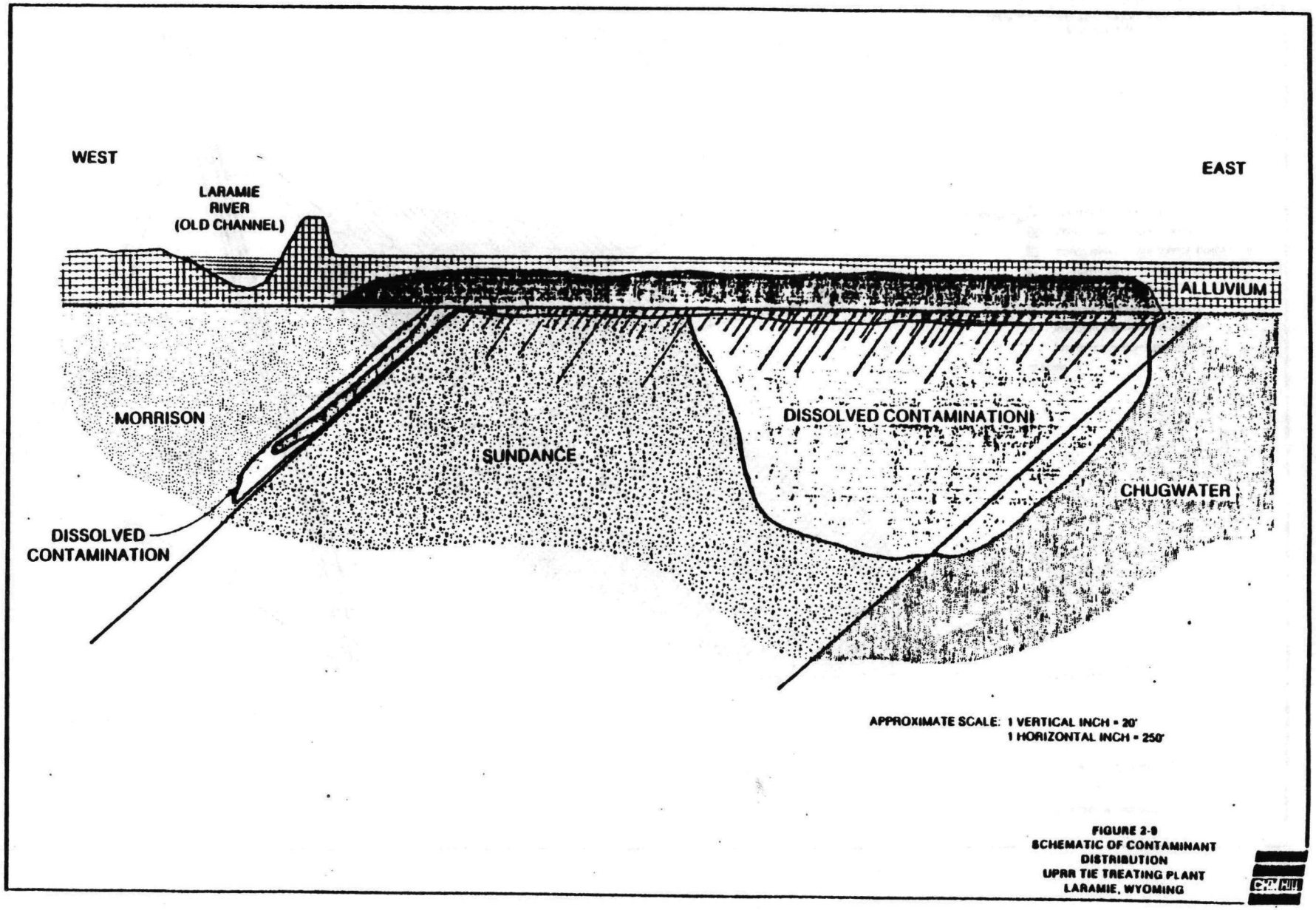

Figure C-4

Ref: CH2MHill, 1986

C. CURRENT SITE STATUS (cont'd)

3. Laramie River

Contamination of the Laramie River by the site has been indicated by visual observation and the analysis of water and sediment samples (Table C-1). Data presented by UPRR in the Remedial Investigation Report show contamination in samples collected before installation of the sheet metal barrier (fall 1983). Visible contamination ceased after the barrier was installed, and subsequent downstream water and sediment samples collected and analyzed by UPRR did not show detectable levels of site related contaminants.

EPA has, however, received results from downstream sediment samples collected in September 1985 which indicate continued presence of contaminants related to wood treating wastes in river sediments. In addition, during the July-August 1986 public comment period, EPA received reports from citizens of the continued presence of contaminants in alluvial back waters downstream from the site. At a minimum, further sampling of downstream river sediments is indicated before the matter of off-site contamination is laid to rest.

4. Potential and Actual Risks

Table C-2 presents potential and actual pathways and scenarios for contaminants to leave the site. Most of the pathways or scenarios presented involve either a high likelihood of occurrence (some have already occurred) or a release posing significant risks to public health or the environment. For the present, none of the pathways includes the combination of both high likelihood and significant impacts.

Some of the more immediate or likely pathways for the contaminants to threaten public health or the environment involve the movement of the contaminants off-site. Public health or environmental threats for which there is already documented evidence include the migration of the gross contamination through the alluvium to the Laramie River; migration of contamination through the bedrock to off-site aquifers; and deposition of contaminated surface soils further downstream by flood or wind erosion.

The most severe threats to public health or the environment are more potential than immediate, and are based on future, rather than present, scenarios. They include the potential for contamination to spread far enough in off-site bedrock aquifers to contaminate wells which might become a source for drinking water, stock water, or agricultural purposes. Other future scenarios could include either industrial use or residential use of the site. The public health risk from either of these scenarios is significantly heightened by the increased likelihood that on-site workers or residents would be exposed to airborne or surface soil contamination. A less likely pathway associated with these scenarios involves the use of the on-site alluvial or bedrock aquifers, either for industrial or residential purposes.

C. CURRENT SITE STATUS (cont'd)

Local officials have indicated the City's intention to include at least that portion of the site adjacent to the Laramie River as part of a greenbelt along the river. Users of that greenbelt could be exposed to contaminants from the site that either migrated off-site previously (flood or wind erosion) or are continuing to migrate off-site, either as contaminated soil particles or organic vapors.

Tables C-3 and C-4 present a summary of the health effects and EPA health standards for many of the contaminants found at the Laramie Tie Treating Plant site. A comparison between these data and the data presented in Table C-1 shows that several EPA Health Related Standards are exceeded for many site contaminants, including arsenic, acenapthene, benzo(a)pyrene, fluoranthene, and pentachlorophenol.

Table C-2
Summary of Scenarios and Risk Pathways
for the UPRR Laramie Tie Treating Plant Site

Source	Scenario/Pathway
A. contaminated bedrock ground water	1. installation of on-site wells into contaminated formations, use of contaminated ground water for drinking water, stock water, agricultural, industrial or commercial purposes.
	2. migration of contaminated ground water to offsite receptor wells, use of contaminated ground water for drinking water, stock water, agricultural, industrial or commercial purposes.
B. gross contamination in alluvium and underlying bedrock	1. use of contaminated alluvial ground water for drinking water, stock water, agricultural, industrial or commercial purposes.
	2. seepage of oily waste to Laramie River: - toxicity to aquatic life; - contaminant bioaccumulation in fish; - human consumption of fish; - recreational use contact, direct human exposure (swimming).
	3. contaminants spread through bedrock aquifers, migrate to receptor wells, use of contaminated bedrock ground water (A-1, A-2).
C. contaminated surface soils	1. direct contact with or ingestion of soils on-site (future use or cleanup worker scenario).
	2. migration of contaminated surface soils off-site through flood and/or wind erosion: - transport to the Laramie River, toxicity to aquatic life and human health (B-2) - deposited as surface soils off-site (green-belt or other riverside areas), direct human contact from recreational use; - air entrainment of contaminated soil particles or organic vapors; direct inhalation, absorption or ingestion by humans or animals;
	3. leaching of contaminants from surface soils to alluvium and/or bedrock, contamination of alluvial, bedrock ground water (B-3)

Table C-3
Health Effects of Contaminants Found
at the UPRR Laramie Tie Treating Plant Site

Parameter	EPA Carcinogen Category(a)	Potential Health Effects (Reference)
VOLATILES:		
Benzene	A	- headache, dizziness, nausea, convulsions, coma, death, birth defects, certain forms of leukemia, blood disorders, nervous system depression, liver and kidney damage (1)
Toluene		- nervous system depression, liver and kidney damage (2)
METALS:		
Arsenic	A	- interferes with certain metabolic processes (3)
Chromium (hexavalent)	D	
POLYNUCLEAR AROMATICS:		
Creosote	B1	
Acenaphthene		- mutagenic (4)
Anthracene		- skin carcinogen (mice) (5), mutagen (4)
Benzo(a)anthracene	B2	- animal carcinogen (5), mutagen (4)
Benzo(a)pyrene	B2	
Benzo(b)fluoranthene	B2	- co-carcinogenic data (1)
Benzo(ghi)perylene		- co-carcinogenic data (1)
Benzo(k)fluoranthene	D	
Chrysene	B2	- co-carcinogen (1)
Dibenzo(a,h)anthracene	B2	- tumorigen (5)
Fluoranthene		- co-carcinogen (with pyrene) (4)
Indeno(1,2,3-cd)pyrene	C	- co-carcinogen or initiator with negative carcinogens or in-vivo mutagen (1)
Naphthalene		- inhibitor (4)
1,2-Methyl Naphthalene		- inhibitors (4)
Phenanthrene	D	
Pyrene		- co-carcinogen (with fluoranthene) and mutagen (4), co-carcinogen or initiator with negative carcinogen or in-vivo mutagen (1)
PHENOLS:		
Pentachlorophenol		- teratogen, toxicity (4)
CHLORINATED DIBENZODIOXINS:		
Tetra- (not found)	B	
Penta- (not found)	B (b)	
Hexa-	B (b)	
Hepta-	B (b)	
Octa-	B (b)	

Table C-3 (cont'd)
Health Effects of Contaminants Found
at the UPRR Laramie Tie Treating Plant Site

Key:

a - EPA Carcinogen Category Explanations:

A Human Carcinogen - sufficient evidence from epidemiological studies to support a causal association between exposure and cancer

B1 Probable Human Carcinogen - limited evidence of carcinogenicity in humans from epidemiological studies

B2 Probable Human Carcinogen - sufficient evidence of carcinogenicity in animals, inadequate evidence of carcinogenicity in humans

C Possible Human Carcinogen - limited evidence of carcinogenicity in animals

D Not Classified - inadequate evidence of carcinogenicity in animals

E No Evidence of Carcinogenicity in Humans - no evidence for carcinogenicity in at least two adequate animal tests or in both epidemiological and animal studies

b - CDD carcinogenicities based on equivalence factors relative to 2378 TCDD

References:

(1) - An Exposure and Risk Assessment for Benzo(a)pyrene and Other Polycylic Aromatic Hydrocarbons, Volume I. Summary, EPA-440/4-85-020, July 1982.

(2) - Ambient Water Quality Criteria for Toluene, U.S. EPA, Washington, D.C., EPA-440/5-80-075, October 1980.

(3) - Health Assessment Document for Inorganic Arsenic, U.S. EPA, Washington, D.C., EPA-600/8-83-021F, March 1984.

(4) - Wood Preservative Pesticides, Creosote, Pentachlorophenol and the Inorganic Arsenicals (Wood Uses) Position Document 2/3, U.S. EPA, Washington, D.C., PB82-229956, March 1982.

(5) - Health Effects of Risk-Assessment Categories, C. F. Cramer, et al., Brookhaven National Laboratory, October 1983.

Table C-4

EPA Standards for Contaminants Found at the UPRR Laramie Tie Treating Plant Site

Parameter	EPA Ambient Water Quality Criteria: Drinking Water Only	EPA Ambient Water Quality Criteria: Drinking Water + Aquatic Organisms	10^{-6} Cancer Risk Level[a] For Drinking Water	Proposed RMCL	Levels of Contaminant at UPRR site
Units:	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES:					
Benzene	0.66	0.67	0.78	0	ND-0.65
Toluene	10,800	14,300		2000	ND-18
METALS:					
Arsenic	0.0022	0.0025	0.0028	50	0-35
Chromium (hex)	50	50		120	5-29
Copper	1000	1000		1300	10-40
POLYNUCLEAR AROMATICS:					
Acenaphthene	20	20			ND-6700
Benzo(a)pyrene	0.0029	0.0031	0.0029		ND-960
Fluoranthene	188	42			0-8700
PHENOLS:					
Phenol	3500	3500			ND-102
Pentachlorophenol	30[b]	1010		0.22	ND-6500
2,4-Dimethylphenol	400	400			ND-5

Notes:

a - 10^{-6} Risk Level assumes 70 kg adult drinking 2 liters of water per day.

b - Pentachlorophenol standard based on odor.

D. ENFORCEMENT

(The Enforcement Section is confidential and is included only in Agency copies of this report)

E. ALTERNATIVES EVALUATION

The primary objectives of remedial action at UPRR's Laramie Tie Treating Plant are to mitigate the adverse environmental impacts of the site and to protect human health, welfare, and the environment. The remedial action must also comply with CERCLA, the National Contingency Plan (40 CFR Part 300), the requirements of the EPA CERCLA Administrative Order on Consent, and the litigation suspension agreement with the State of Wyoming.

Specific objectives for remedial action(s) at the site involve mitigation of the following risks or pathways summarized from Table C-2:

- installation of on-site wells into contaminated formations, use of contaminated ground water for drinking water, stock water, agricultural, industrial or commercial purposes;
- migration of contamination to off-site wells, use of contaminated ground water;
- seepage of alluvial contamination to Laramie River, causing toxicity to aquatic life, contaminant bioaccumulation in fish, and possible human exposure through consumption of fish or recreational use contact;
- direct human contact with or ingestion of on-site surface soils (future use or cleanup worker scenario);
- off-site migration of contaminated surface soils through flood and/or wind erosion:
  - transport to Laramie River, risk to aquatic life and human health;
  - deposition of contamination as surface soils off-site (greenbelt or other riverside areas), direct human contact from recreational use;
  - air entrainment of contaminated soil particles or organic vapors; direct inhalation, absorption or ingestion by humans or animals;

The RI/FS process has identified several major remedial action measures (in addition to no further action) for consideration as solutions to the above listed risks or pathways. These measures may be divided into two categories, those that are interim or partial in nature, and those that have at least the potential to be final or permanent remedies:

I. No Further Action
II. Interim Remedies:
  A. Contaminant Isolation/Source Control
  B. Primary Oil Recovery
III. Permanent Remedies:
  A. In-situ Remedies:
    (1) Solidification
    (2) Enhanced Oil Recovery or In-situ Soil Washing
    (3) In-situ Bioreclamation
    (4) Pump and Treat Selected Bedrock Ground Water
  B. Excavation and:
    (1) Soil Washing
    (2) On-site Incineration
    (3) Off-site or On-site Land Treatment

E. ALTERNATIVES EVALUATION (cont'd)

In its FS, UPRR evaluated these remedial action alternatives based on technical feasibility, short term environmental effectiveness, and long term environmental effectiveness. UPRR's evaluation placed a heavier emphasis on long term environmental effectiveness than the other two factors.

In the preliminary screening process for these remedies, UPRR judged the no action and in-situ solidification alternatives to be inadequate to address the contamination and eliminated them from further evaluation. EPA concurs with this evaluation.

EPA has reviewed UPRR's evaluation of the remaining remedies, and has concluded that the record documents the effectiveness of only certain interim remedies thoroughly enough to support a decision on their adequacy to mitigate environmental and public health risks. Thus, the only remedy evaluations fully discussed here are those for the interim remedies.

Since UPRR's RI/FS did not evaluate all of the final remedies adequately enough to support selection of a final remedy, especially for the in-situ remedies, the final remedies identifed by UPRR are discussed here for informational purposes only. As discussed elsewhere in this document, UPRR will perform further evaluation of final remedies pursuant to RCRA authority.

1. Interim or Partial Remedies:

a. Contaminant Isolation:

A Contaminant Isolation System (CIS) was the only interim remedy documented adequately in UPRR's FS. The CIS is intended to mitigate off-site movement of contaminated ground water and surface soils. As proposed by UPRR, the major components of an isolation system for the Laramie Tie Treating Plant could include:

(1) re-alignment of the Laramie River channel 150 feet further west from the site to reduce chances of migration of contaminants to the river and provide a "clean" area for installation of a barrier wall between the site the river channel; this remedial action was accomplished in October 1985;

(2) a barrier wall constructed through the alluvium and bedrock around the contaminated areas; the wall would penetrate the full thickness of the Morrison formation on the north, west and south sides; barrier wall alternatives evaluated were:

- grout curtain
- soil-bentonite
- vibrating beam
- sheet piling
- cement-bentonite
- ground freezing

E. ALTERNATIVES EVALUATION (cont'd)

(3) a reverse-gradient ground water draining and pumping system to mitigate off-site seeping of contaminated ground water through the barrier wall;

(4) a water treatment plant to remove contaminants from the ground water withdrawn from inside the barrier wall; the treated water would be discharged to the Laramie River under the authority of an NPDES permit; water treatment options considered included:

- activated carbon
- air stripping
- biological treatment
- UV-Ozone

(5) placement of caps over areas where heavily contaminated surface soils are exposed;

(6) reliance on a slight updip hydraulic gradient in the Sundance and Chugwater formations to mitigate downward migration of contaminants into the bedrock;

(7) institutional controls (deed restrictions) on ground water use at the site; and

(8) a ground water monitoring plan to measure system integrity.

b. Evaluation of Contaminant Isolation System options:

(1) The barrier wall options were evaluated against three criteria:

- technical feasibility
- applicability to long term (5+ years) scenario
- assurance of wall continuity

The results of that evaluation were that only the soil-bentonite and cement-bentonite walls met all three criteria. Further evaluation of these two options showed soil-bentonite to be more cost-effective. Pilot tests were performed with soil-bentonite to assure its effectiveness for this type of waste.

(2) Water treatment options were evaluated against three criteria:

- demonstrated technical feasiblity
- high removal efficiency for low levels of PNAs and chlorinated phenols
- reliability and ease of operation

The results of that evaluation were that only the activated carbon option met all three criteria. The other three alternatives were eliminated from further consideration.

E. ALTERNATIVES EVALUATION (cont'd)

c. Primary Oil Recovery:

This alternative may be implemented in at least two ways:

(1) the "passive" method of installing parallel trenches through the alluvium into the first few inches of bedrock and letting the oil drain into the trenches; EPA's consultant proposed a method of digging the trenches twenty-seven feet apart and removing one million gallons of recoverable oil in one year.

(2) the "active" method of installing and operating a dual pump oil recovery network in the oil-saturated alluvium; based on this type of system, UPRR is projecting a three to five years oil recovery program;

In UPRR's FS, Primary Oil Recovery is considered a necessary preliminary action before implementation of any final remedies. The process would remove a significant portion of the free or drainable oil in the alluvium in preparation for bioreclamation, soil washing or any of the final remedies discussed below.

2. Final Remedies:

As noted above, the RI/FS performed by UPRR did not completely evaluate all of the final remedies, and further evaluation is to be accomplished through a RCRA 3008 Consent Order (see Section K). Therefore, only a cursory discussion of the final remedies is presented below.

a. In-Situ Treatment Alternatives:

(1) Enhanced Oil Recovery or In-situ Soil Washing

This alternative consists of cycling a contaminant extraction solution through the contaminated zones via an injection/withdrawal system. The withdrawn contaminated solution would be treated above ground for oil removal prior to reinjection. The process would continue until the withdrawn ground water contained acceptable concentrations of contaminants.

(2) Bioreclamation:

This method consists of enhancing conditions for microbial degradation of surface and subsurface contamination. The most important factors in implementing this type of treatment are the temperature and pH in the area of treatment and the availability of oxygen and nutrients.

E. ALTERNATIVES EVALUATION (cont'd)

The feasibility of the Bioreclamation alternative was not evaluated in detail by UPRR other than to identify some of the key factors and some pilot and field tests that would have to be completed before implementing the alternative.

(3) Pump and Treat Selected Bedrock Ground Water

This method would be designed specifically to remove the "stringers" of contaminants from the fractured zone at the Morrison-Sundance interface, or at least mitigate the movement of the contaminants further off-site. These "stringers" are located outside the proposed boundaries of the soil-bentonite barrier wall and will require special remedial action.

The goal of the method would be to provide a "boost" to the natural slight updip gradient in the Sundance formation. A line of pumping wells could be installed on the outside of the north end of the west barrier wall, creating a cone of depression in the lower Morrison formation. To assure that these wells don't generate pressure on the inside of the wall in that vicinity, corresponding wells would be installed inside the wall.

b. Excavation/Treatment/Disposal Alternatives:

(1) Excavation and Soil Washing:

This alternative would consist of the construction of a soil washing system on-site and the subsequent excavation and treatment of the contaminated alluvial and bedrock materials. After treatment, the materials would be considered for delisting as a hazardous waste and may be used to back fill the excavation.

(2) Excavation and On-site Incineration:

This alternative would consist of incineration of the excavated contaminated alluvial and bedrock materials in a rotary kiln incinerator that would be constructed on-site. Incineration would have to designed to result in 99.9999 percent destruction of the principal organic hazardous contaminants. The incinerated material would be returned to the excavated area.

(3) Excavation and Off-site Land Treatment

This alternative would consist of treating excavated contaminated alluvial and bedrock materials in a land treatment facility constructed in the Laramie area.

E. ALTERNATIVES EVALUATION (cont'd)

(4) Excavation and On-site Land Treatment

This alternative is the same as b-(3), except that land treatment would take place at the site inside the contaminant containment system. Because of the limited area, this alternative could take considerably longer than the off-site alternative.

c. Final Remedy to Meet or Exceed All Federal Requirements:

According to the record established thus far by UPRR, the alternative most likely to meet or exceed all applicable or relevant and appropriate federal requirements is #b-(2), Excavation and Incineration (99.9999% destruction) of all alluvial and bedrock contamination, followed by on-site disposal of residues that did exceed site cleanup objectives. This is a proven technology that would best be able to achieve a final remedy.

3. Results of Evaluation, Coordination of Remedies:

One of the most important conclusions to be derived from the UPRR RI/FS process was that all of the final remedies evaluated rely on contaminant isolation as a source control first operable unit. The principle is that all of the final remedies will involve some sort of disturbance of the waste mass in order to treat or destroy it. This disturbance could mobilize significant amounts of the hazardous substances, increasing risks to public health or the environment. Also, each of the final remedies is likely to take an extended period of time, i.e., more than five years. Each of these facts points to the conclusion that some partial remedy is needed to mitigate the risks of the contaminants moving off-site before or while the more permanent remedies are developed, evaluated and implemented under RCRA authority.

A contaminant isolation system (as described earlier) is fully consistent with each of the final remedies presented. The barrier wall and the rest of the contaminant isolation system were judged to be the only effective interim remedy, and the individual components of the system were selected on the basis of cost effectiveness.

Table E-1
Summary of Alternatives Evaluation

Alternative	Criteria A	B	C	D	E	F	G
No Further Action	N	N	N	N	0	0	0
Interim Remedies:							
Contaminant Isolation	1	2	2	2	2	1	1(N)
Primary Oil Recovery	2	1	1	2	2	1	1(N)
Permanent Remedies:							
In-situ Solidification	1	1	0	1	1	1	1
Enhanced Oil Recovery/In-situ Soil Washing	2	2	1	1	2	1	1
Bioreclamation	2	1	1	1	2	1	1
Pump and Treat Bedrock Ground Water	2	2	2	1	2	1	1
Excavation/Soil Washing	1	1	1	1	1	1	1
Excavation/On-site Incineration	2	2	2	1	1	2	2
Excavation/Off-site-On-site Land Treatment	2	1	1	1	1	1	1

Criteria:

A - Proven Technology with potential to treat this type of waste

B - Demonstrated Reliablity

C - Technical Feasibility at the Laramie Site

D - Cost Effective

E - Mitigates short term environmental risks at the Laramie Site

F - Mitigates long term environmental risks at the Laramie Site

G - Meets Applicable or Relevant and Appropriate Requirements

Ratings:

0 - fails to meet criterion
1 - may meet criterion partially, may have some unknowns
2 - meets criterion
N - not applicable

Table E-2
Summary of Cost Evaluations

Alternative	Costs (in millions of $) Capital	Annual O&M	Present Worth
No Further Action	0	0	0
Interim Remedies:			
Contaminant Isolation	7.5	0.57	15 a
Primary Oil Recovery	9.6	0.75	13 c
Permanent Remedies:			
In-situ Solidification	not computed		
Enhanced Oil Recovery/In-situ Soil Washing	1.5	2.1	11 a
Bioreclamation	3.8	1.2	11 b,c
Pump and Treat Bedrock Ground Water	not computed		
Excavation/Soil Washing	8.2	15	
Excavation/On-site Incineration	78	32	150
Excavation/Off-site Land Treatment	8.4	8.1	38
/On-site Land Treatment	1.1	0.46	6.7

Notes:

Costs do not include pre-1986 expenditures of $6,000,000.

Capital and O&M costs from UPRR FS (by CH2MHill); Present Worth costs from Table 6-21, adjusted to reflect only costs for each particular remedy:

a - $6,000,000 subtracted for pre-1986 costs.
b - $11,900,000 subtracted for Primary Oil Recovery.
c - $17,500,000 subtracted for pre-1986 costs and contaminant isolation.

F. COMMUNITY RELATIONS

The Laramie Tie Treating Plant site has generated a high level of community interest, with citizens and environmental groups commenting extensively on the RI and FS reports prepared by UPRR. These groups have included local, state-wide and national organizations, such as the Environmental Defense Fund, and have demonstrated an extraordinarily high level of expertise in the issues and problems at the site. The process of citizen involvement and EPA responsiveness to that public involvement is presented in greater detail in the Community Relations Responsiveness Summary Report, Appendix D.

During the remedial planning stage of the project (prior to July 1986), comments addressed the broad issues of remedial alternatives, technical and cost questions, application of other laws, and community impact issues. In general, the comments and questions from citizens and environmental groups advocated very similar positions. While the public strongly opposed UPRR's earlier proposal of the contaminant isolation system as a final remedy, they generally concurred that the system should be part of an interim solution. Commenters generally saw the slurry wall as inadequate to contain the contamination for more than 10 or 20 years, and said that the contaminants are too heavy to be affected significantly by the reverse-gradient pumping. Commenters also:

- questioned the effectiveness of UPRR's proposed oil recovery system, especially because of the general ineffectiveness of the pilot system;
- disagreed with irrigation of the land with untreated ground water as an unproven technology that may lead to air contamination;
- called for an improved ground water monitoring plan;
- criticized the scoring system used by UPRR in the alternative selection process;
- expressed concern that the contamination would adversely affect a proposed "greenbelt" recreation area in Laramie, as well as socio-economic growth of the area.

In general, EPA agreed with these comments and asked UPRR to revise its Feasibility Study to address these concerns. EPA's detailed comments and concerns were presented to UPRR in a major position letter dated April 8, 1986. EPA agreed that the contaminant containment alternative was inadequate as a final cleanup remedy and asked UPRR to revise its evaluation in order to develop more permanent remedies.

F. COMMUNITY RELATIONS (cont'd)

Comments received during the July-August 1986 public comment period on the final Phase III FS report were generally supportive of the revision that contaminant containment would an interim remedy, provided it was followed by a thorough and timely cleanup. Citizens continued to express strong concern, however, that no specific remedy and no specific timetable for establishing a remedy had been set. The community also asked for information on the schedule and protocol for the pilot and field test program.

EPA agrees with these concerns and intends to use RCRA authority to institute a specific schedule of pilot and field tests. Negotiations with UPRR on this issue are under way, and the schedule is expected to be in place by early October 1986. Although EPA will not require further revision of the Phase III FS report at this time, we will require selection of a more specific permanent and final remedy after completion of the pilot and field tests. The selection of the remedy will take place under the procedures of developing and issuing a RCRA post-closure care permit. EPA intends to coordinate the steps in this process to maximize overlapping studies and minimize the overall time required to reach a conclusion.

Some significant public concerns remain unresolved, but will be addressed under RCRA authority (see Sections D, K). These concerns pertain to two basic questions: to what level of contamination will EPA require the site to be cleaned and how quickly can the cleanup process be implemented.

EPA recognizes these concerns as the most significant for the site and has stated for the record that EPA will determine the final cleanup levels during the issuance process for the RCRA post-closure permit. In our determination, we will consider input from various sources including public comment on the draft permit. EPA's basic position is that the levels will be set such that they assure the protection of public health and the environment within a reasonable time period.

G. CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The NCP generally requires that a final remedy selected under CERCLA authority attain or exceed applicable or relevant and appropriate requirements that have been identified for the site [40 CFR 300.68(i)(1)]. However, the remedy selected in this document is an interim remedy (first operable unit), not a final remedy. Therefore, as provided for at 40 CFR 300.68(i)(5)(i), the NCP does not require that the remedy selected herein meet the requirements discussed below.

In accordance with the CERCLA Compliance Policy found in the preamble to the revised NCP (50 FR 47946, November 20, 1985), EPA has reviewed the list of potential applicable or relevant and appropriate Federal requirements for a final solution at this site, and has determined that the following would be selected:

- the requirements of the Resource Conservation and Recovery Act, as amended, especially the requirements of Sections 3008(h), 3004(u) and 3004(u); and the regulations promulgated at 40 CFR Parts 264 and 265;

- The Safe Drinking Water Act (Maximum Concentration Levels at 40 CFR Section 141.11-141.16; Recommended Concentration Levels);

- The Clean Water Act as amended, especially the requirements of Sections 301, 302, 303, 306, 307, 309, 403 and 404.

EPA would also consider the following state requirements:

- The Wyoming Environmental Quality Act - Article 3, Statute 35-11-301;

- Wyoming Water Quality Rules and Regulations, especially Chapters 3, 4, 8, 9, and 11, including Wyoming's Ground Water Protection Policy.

After consideration of these potentially applicable or relevant and appropriate requirements, EPA concludes that the selected interim remedy for the Laramie Tie Treating Plant site is fully consistent with these requirements:

1. EPA has long intended that final cleanup of the RCRA regulated unit and the associated contamination be implemented under RCRA authority. The 1984 amendments have expanded RCRA jurisdiction significantly, and EPA is moving to strict, direct application of RCRA requirements rather than the NCP. In addition, even if portions of the site were to remain under CERCLA jurisdiction for final remedy, RCRA requirements would still be the most appropriate for the site. In many instances, the older wastes have commingled with the RCRA regulated wastes, and are also amenable to treatment through similar technologies.

G. CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS (cont'd)

Based on the findings of the CERCLA RI/FS process, EPA concludes that any permanent remedy for the RCRA regulated areas (now the entire site) will rely on the Contaminant Isolation System as a means of preventing off-site migration of contaminants during implementation. Thus, the CERCLA first operable unit will be consistent both with full closure of the regulated unit and with any post-closure corrective actions.

2. In compliance with the Clean Water Act, the Wyoming Environmental Quality Act, and associated regulations, UPRR has applied for and received an NPDES permit (No. WY-0032590, signed March 20, 1986) from WY DEQ for the discharge from the Water Treating Plant that is part of the Contaminant Isolation System. The limits in the permit were developed on a flow-weighted/water quality basis to assure that the discharge would not result in any violations of water quality standards for the adjacent reach of the Laramie River.

3. On September 13, 1985, U.S. Army Corps of Engineers issued to UPRR a dredge and fill permit pursuant to Section 404 of the Clean Water Act to authorize the relocation of about 3000 feet of the Laramie River bed about 150' futher west from the site. Negotiations over the permit resulted in a condition that any wetlands that might be filled in during the rechannelling operation must be replaced. UPRR has complied with the conditions of the permit.

H. RECOMMENDED ALTERNATIVE

1. First Operable Unit

EPA is selecting a source control interim remedy (first operable unit) pursuant to 40 CFR Section 300.68(c). This remedy is a Contaminant Isolation System designed to mitigate off-site movement of contaminated ground water and surface soils during planning and implementation of more permanent remedies. The major components of the isolation system are:

- re-alignment of the Laramie River channel 150 feet further west from the site to reduce chances of migration of contaminants to the river; this activity was completed in the fall of 1985.

- a soil-bentonite slurry barrier wall constructed through the alluvium and bedrock around the contaminated areas;

- a reverse-gradient ground water draining and pumping system to mitigate off-site seeping of contaminated ground water through the barrier wall;

- an activated carbon water treatment plant to remove contaminants from the ground water that is withdrawn from inside the barrier wall; the treated water will be discharged to the Laramie River under the authority of an NPDES permit; and

- a ground water monitoring system to measure the effectiveness and integrity of the system.

EPA has determined that the Contaminant Isolation System is a cost-effective remedy in accordance with the NCP and is consistent and compatible with all the final remedies considered. The other source control systems considered in the evaluation of alternatives were not as cost-effective as the selected remedy.

EPA stresses that the contaminant isolation system selected as a first operable unit is not a final remedy in that it does not permanently address the most likely potential risks to public health, welfare, or the environment. More permanent remedial action will be required to minimize these risks.

EPA notes, however, that this Contaminant Isolation System is consistent with any permanent remedy for this site.

The estimated cost of the selected remedy is as follows:

Capital expenses:	$7,000,000
Annual O&M:	57,000
Present Worth:	15,000,000

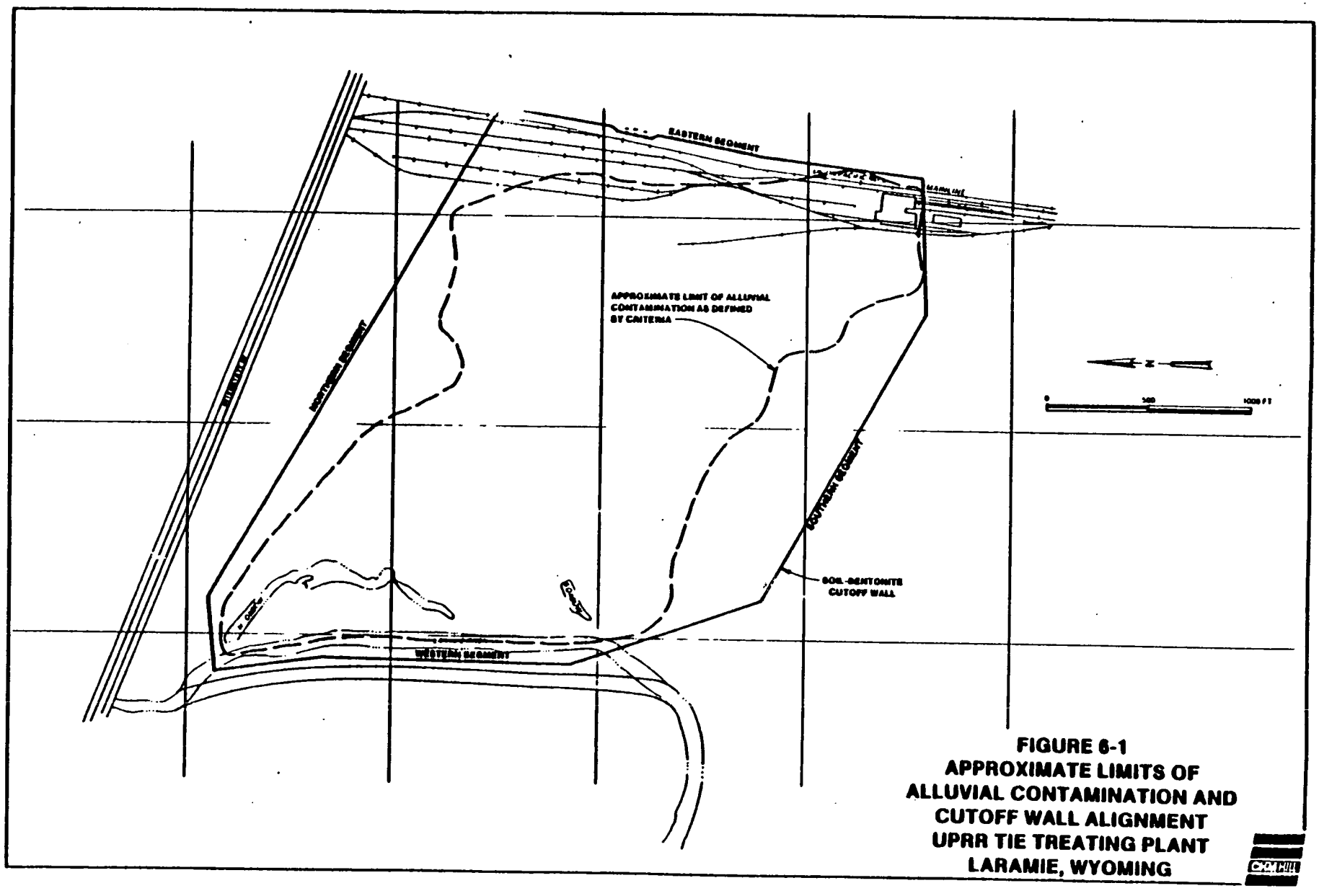

Figure H-1

Ref: CH2MHill, '986

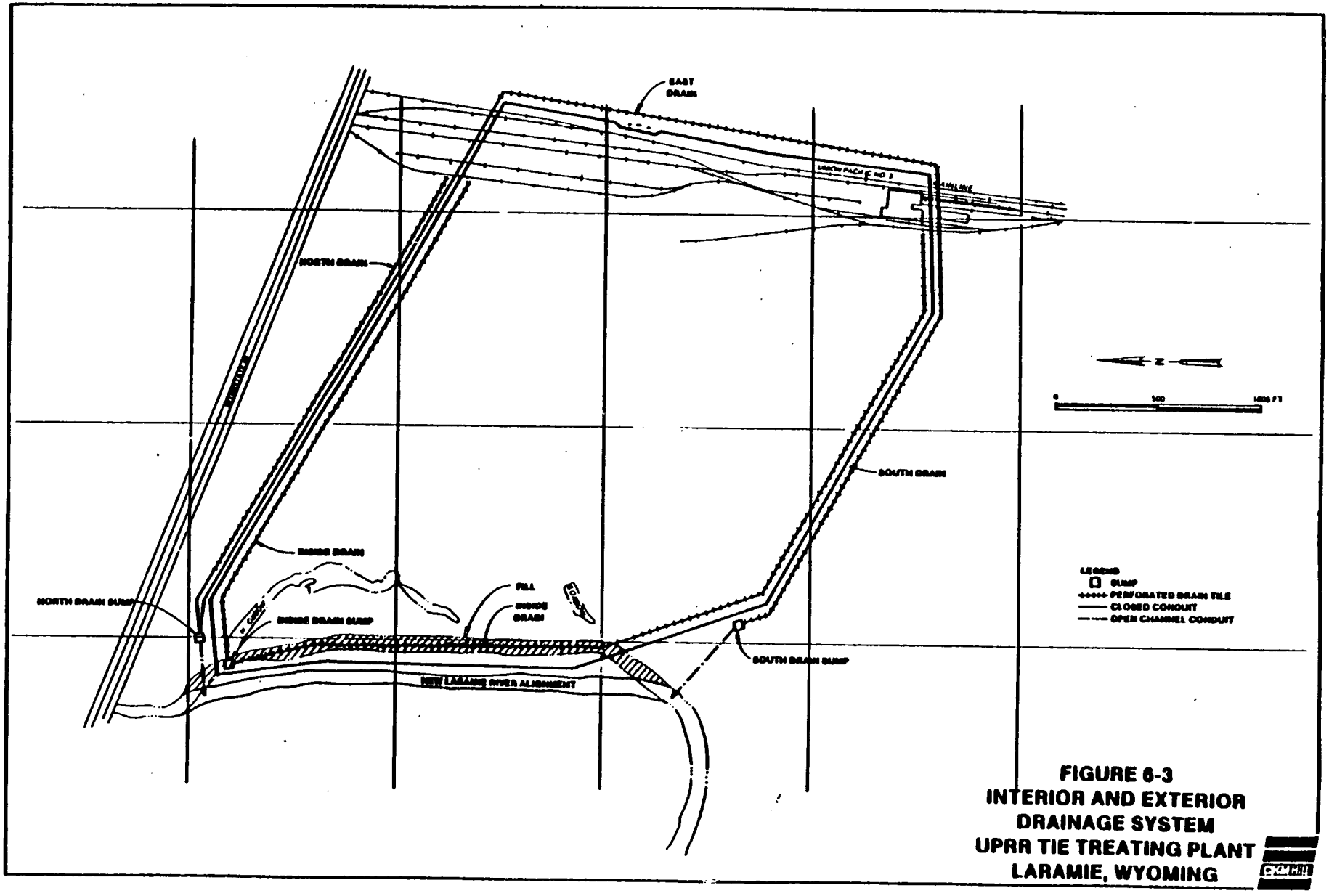

Figure H-2

Ref. 12Mill, 1986

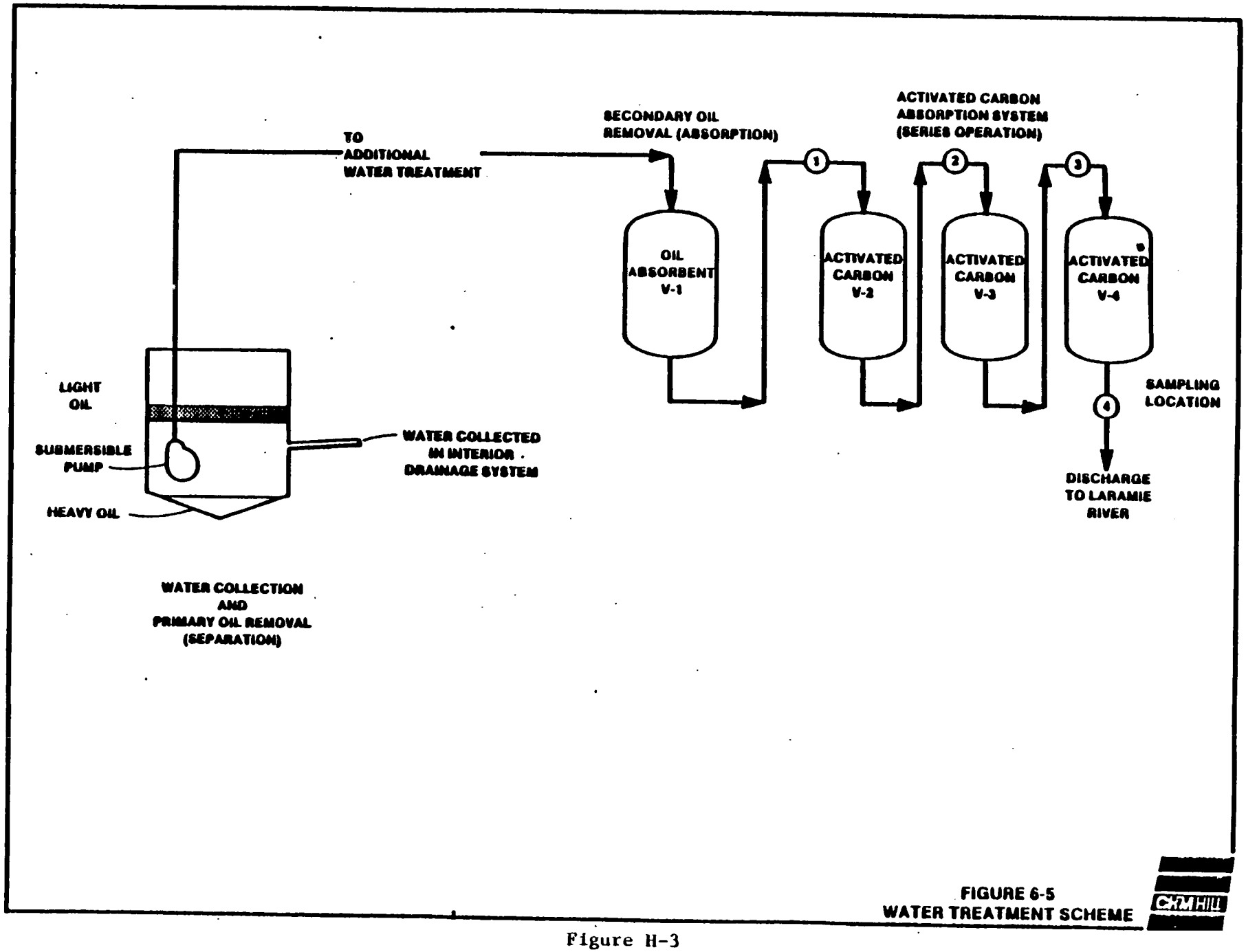

FIGURE 6-5
WATER TREATMENT SCHEME

Figure H-3

Ref: CH2MHILL, 1986

H. RECOMMENDED ALTERNATIVE (cont'd)

2. Other Interim Remedies:

a. other contaminant isolation remedies:

The FS developed by UPRR includes other interim remedies under the category of source control contaminant isolation techniques. These remedies include the following:

- capping of highly contaminated surface soils (such as in the pond bottom areas);
- institutional controls (deed restrictions) on ground water use at the site; and
- reliance on an upflow gradient in the Chugwater and Sundance formations.

EPA is not including these other interim contaminant isolation alternative remedies in its remedy selected under CERCLA for the following reasons:

- the capping of the RCRA pond areas and other highly contaminated areas is a process that clearly falls under RCRA jurisdiction at this site; UPRR has already submitted a closure plan for the ponds, and that plan is currently under review at EPA and has been circulated for public comment.
- UPRR did not adequately address EPA concerns that the effectiveness of the institutional controls identified in the FS couldn't be assured; and
- UPRR places undue confidence in the upgradient ground water flows in the Chugwater and Sundance formations; those upgradient flows are slight rather than strong, and could be influenced by off-site pumping in the Sundance formation.

b. Primary Oil Recovery:

As discussed in Section E-1-b of this document, primary oil recovery is considered a likely preliminary step before any of the final remedies that would be implemented at this site. However, as discussed elsewhere in this document (Sections D, K), all further remedies at this site beyond the source control first operable unit will be implemented under RCRA authority.

H. RECOMMENDED ALTERNATIVE (cont'd)

c. Pump and Treat Morrison Bedrock Contamination:

This method is listed as a final remedy in Section E, but could also be considered an interim remedy. Because this contamination is located outside the soil-bentonite slurry wall, it will likely require a different remedy from the bulk of the contamination that is located inside the wall.

3. Final Remedy

EPA is not, at this time, selecting a final remedy for cleanup of contamination at the UPRR Laramie Tie Treating Plant site. The record developed by UPRR in the RI/FS process was not adequate to support such a selection.

The final remedial action best documented by UPRR's studies to date is on-site incineration of the contaminated soils. This is the only remedy identified in the evaluation that has an established record as an effective final remedy.

EPA has serious concerns that the effectiveness of all the remedies evaluated in the FS was not adequately demonstrated. Even in the case of incineration, EPA is concerned with some of the possible short term risks involved in excavating and managing the on-site material.

EPA acknowledges that permanent remedy for the site will be selected under RCRA rather than CERCLA authority. The application of RCRA authority to the entire site is imminent, and that authority will be exercised in the short term through development and implementation of pilot and field scale tests to measure the effectiveness of two remedies that have significant potential as a final remedy, namely free oil recovery and in-situ bioreclamation.

I. OPERATION AND MAINTENANCE (O&M)

UPRR has developed basic operation and maintenance (O&M) procedures for the selected source control first operable unit, as follows:

1. Soil-Bentonite Slurry Cutoff Wall:

   The wall will be inspected on a weekly basis by the site operator for erosion, damage, and visible contamination. Erosion will be repaired by backfilling and rip-rap, if required, and wall damage will be repaired using soil-bentonite, cement-bentonite, or other impermeable barrier material.

2. Reverse Gradient Water Management System:

   Maintenance of the water management system will include routine equipment calibration, maintenance for the pump station components, and periodic checks of the manholes and sumps. Each manhole and sump will be checked at least semi-annually for unobstructed inlet flow and the presence of oil and or sediment. If necessary, drain lines, manholes and sumps will be cleaned.

3. Water Treatment System:

   The three carbon columns will be monitored for evidence of contaminant breakthrough biweekly. At the first sign of phenol breakthrough on the second column, the first column will be taken out of service, filled with virgin carbon, and placed back in service as the third column. The effluent of the preliminary klensorb column will also be analyzed biweekly for oil breakthrough. An on-line turbidity meter will continuously monitor the influent to the klensorb column to detect high levels of oils or suspended solids.

4. Post Containment Monitoring Plan, including monitoring of:

   a. the NPDES discharges from the north and south sumps;
   b. alluvial water levels inside and outside the slurry wall;
   c. bedrock water level and water quality (Figure I-1);
   d. Laramie River water quality.

A more detailed O&M plan will be developed by UPRR pursuant to the provisions of the CERCLA Administrative Order on Consent after approval of the first operable unit. The litigation suspension agreement with the state requires development of an O&M manual by the time construction of the system is 50% complete.

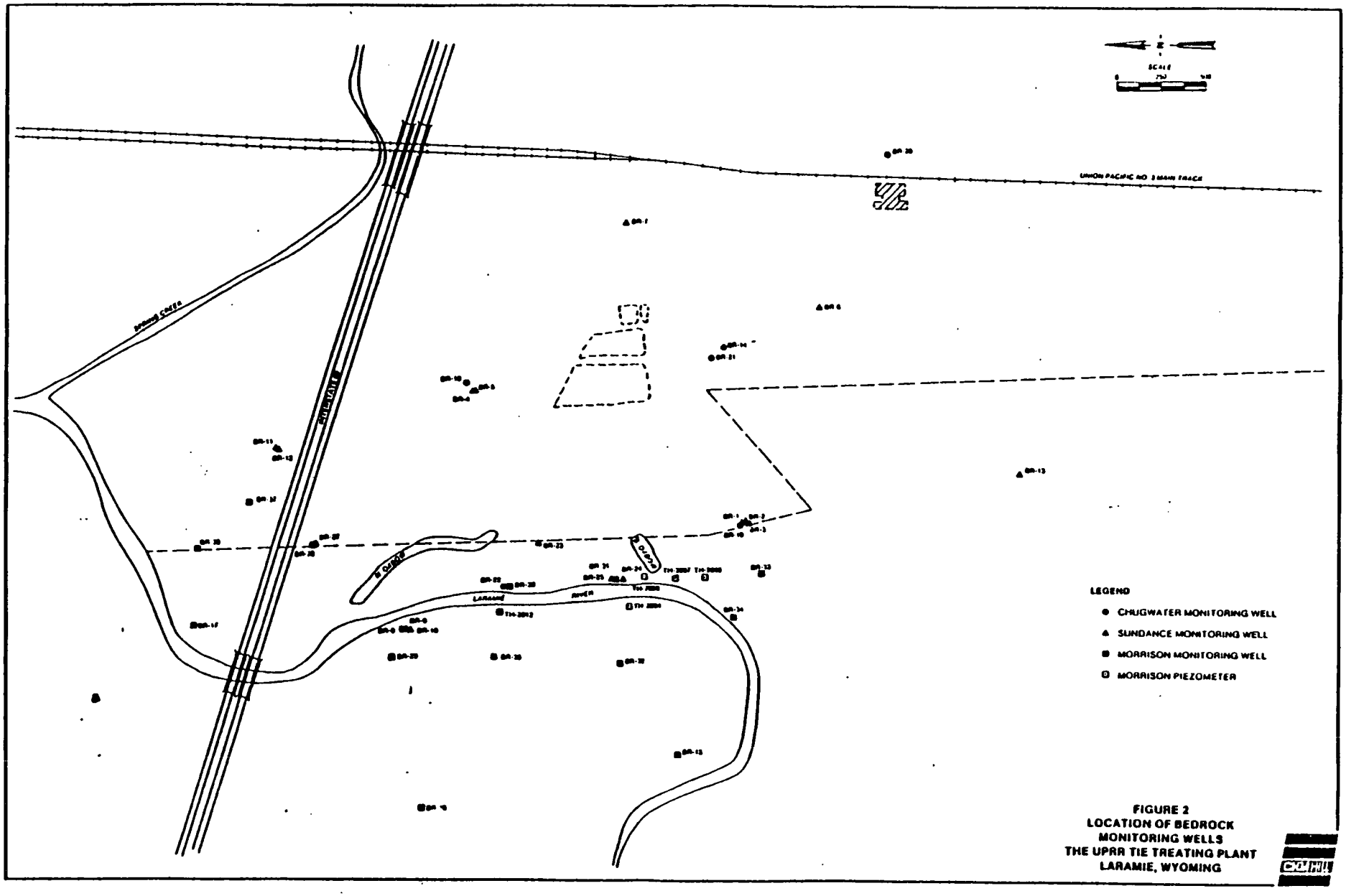

Figure I-1

Ref: CH2MHill, 1986

J. SCHEDULE

Some of the key milestones for implementing the selected remedy have already been accomplished. In the spring of 1986, UPRR initiated planning and design of the slurry wall. Construction of the wall was initiated in June 1986.

The key future milestones and dates for project implementation of the CERCLA first operable unit (Contaminant Isolation System) are as follows:

Milestone	Date
Approve Remedy (sign Record of Decision)	September, 1986
Complete Construction of Contaminant Isolation System	To be decided pursuant to paragraph 30 of the 1983 CERCLA consent order (about April 31, 1987)

K. FUTURE ACTIONS

As noted previously, this record of decision selects only a "first operable unit" or interim partial remedy for the site. EPA has determined that the contaminant isolation system alone is not adequate as a permanent cleanup remedy and would not be sufficient to comply with the NCP. EPA intends that more permanent and effective remedies be developed and implemented for this site. EPA has also determined that some of the other remedies identified in the CERCLA FS need to be evaluated further through pilot and field tests to measure their effectiveness more thoroughly.

As also noted earlier, EPA has determined to apply RCRA authorities rather than CERCLA for implementing final remedial action at this site. EPA is currently negotiating with UPRR on the details and schedule of the pilot and field test program to assure the effectiveness of the final remedies under consideration, and this program (expected to last about one year) will be included in a new RCRA Administrative Order on Consent. EPA anticipates that these negotiations will be completed by early October, 1986, and that the RCRA Consent Order will signed soon thereafter. EPA also anticipates that the new RCRA order will also cover development and implementation of further interim remedies, including primary oil recovery and/or Morrison bedrock ground water treatment in preparation for permanent remedial action. The CERCLA program will be involved in these negotiations and programs to provide comments and ensure continuity of approach.

Sometime during the pilot and field test program, EPA will be requesting UPRR to submit its post-closure care plan. Submittal is required within 180 days of the request from EPA. EPA plans to use the results of the pilot and field tests to when developing the requirements of UPRR's permit for post-closure care.

As discussed in Section C of this document, some questions remain unresolved about off-site contamination. These questions should be fully resolved before final selection of remedies by RCRA.